



Predictive maintenance. Predictable trains.

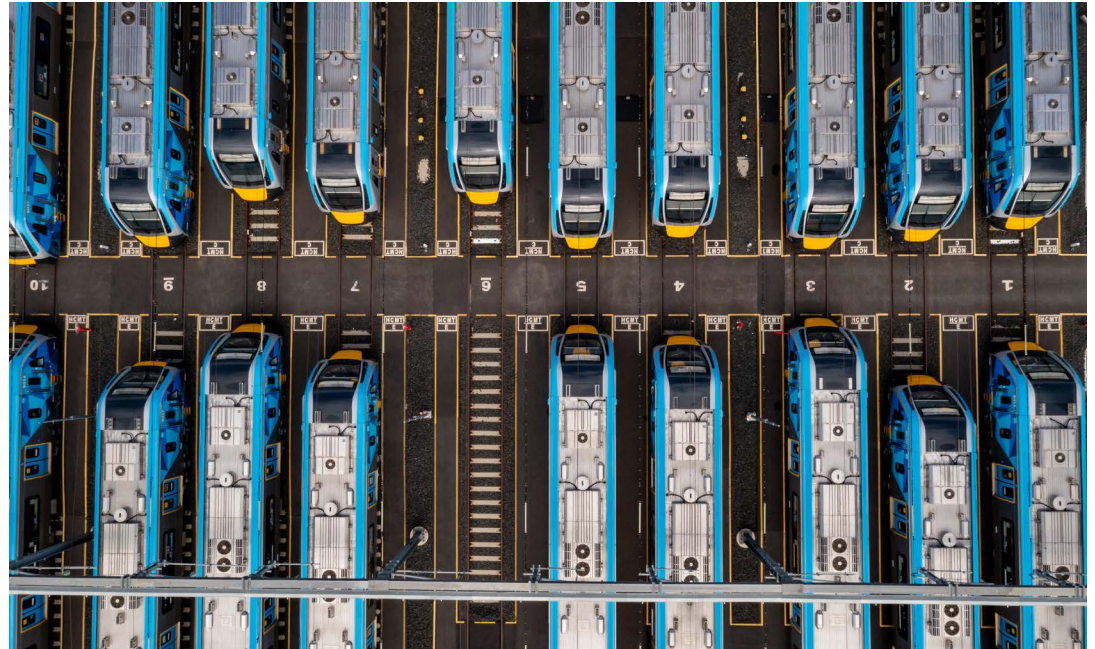
Downer and IBM keep passengers moving safely, reliably and comfortably with updated, sustainable asset management

by Josh Young

7-minute read

Net zero isn't going to be easy. Rather, it's going to take a lot of hard work and cooperation. Together, we all are going to need to make better, more sustainable choices regarding what we eat, how we live and where we go.

In fact, making smarter choices about how, when and where we travel is a critical component of achieving a better tomorrow. The transportation sector is a major contributor to global greenhouse gases. And over the past decade, governments and private businesses have been cooperating to create a more



sustainable infrastructure for moving people and materials across our planet.

For example, every day in Australia millions of travelers choose light and heavy rail systems to get them where they need to go. And for over 100 years, the Downer Group has focused on building those passenger trains and keeping them moving and in service.

“What we’ve really seen in the last 10 years is a shift in the way that governments manage their trains,” explains Adam Williams, Head of Growth for Rail and Transit Systems at Downer. “Before, they would have us build their trains initially, but they would operate and maintain them—maybe bringing us in for an overhaul or upgrade. But now, they don’t want us to just design and

build the trains, they want us to package in through-life support—effectively all of the maintenance work for the trains across a span of usually 25–30 years.”

He continues: “So now, we’re the largest provider of through-life support asset management services for passenger rollingstock in Australia. That means every day we put several hundred trains into service across every major city in Australia.”

And alongside this ongoing management is an expectation to help create a more sustainable transportation network. “At this point, almost all western jurisdictions have committed to being some form of net zero by 2050 or thereabouts,” explains Williams. “That incentivizes us to invest in technology and provision new services focused on driving efficiency and long-term value. It’s not just something we want to focus on. It’s critical to our success.”

Reduces
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51%

increase in train reliability

Processes
asset data
contained in
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A step beyond just management

To accommodate these trends, Downer used IBM technology to create its TrainDNA rollingstock asset management platform. But as time passed, the business realized that it needed more than just software. As Williams explains: “We were looking to the future—to beyond what we were already delivering. We wanted to improve the service to our passengers, and we wanted to turn our attention overseas. But that kind of scale meant we needed to rethink some things—so we looked for some external help.”

Downer now coordinates with [IBM Consulting™](#) for the ongoing development and enhancement of TrainDNA. And this platform, currently powered by the [IBM® Maximo® Application Suite](#), harnesses complex



analytics and near real-time data to support predictive maintenance efforts for more than 200 trains across Australia.

“IBM clearly has the experience and capability around physical asset management,” notes Williams. “But they also bring the ability to work with the data that we’re getting—transforming that data into something that’s valuable to us, our customers and their passengers.”

“With TrainDNA,” he explains, “we’re able to observe all of our trains—their locations, where they are on their timetables, their statuses. We can dial in on every single asset in every carriage in real time. We can see the screens the drivers see and more.”

The digital platform has boosted performance within Downer, empowering it to deliver higher quality

service to passengers. In the Auburn maintenance center alone, Downer effectively doubled the number of trains that it could maintain from this facility—all while netting a 20% improvement in efficiency. And with more trains in operation, Downer can promote more timely service to passengers, getting them where they need to go, when they need to get there.

“Working with IBM, we’ve also developed a number of administrative applications within TrainDNA,” adds Williams. “For example, we now have one that lets us manage the identification and movement of the hundreds of carriages our staff interact with every day around the train maintenance facilities and stabling yards. It also helps with overseeing train isolation—where we disconnect a carriage from the electrical grid to make it safe for our maintenance teams to work on it.”

“Everything is done through Maximo,” continues Williams. “We mostly use it for the nuts-and-bolts management for our day-to-day maintenance activities, but it also handles all of our workforce planning and scheduling. It manages the configuration and health of all of our assets. It’s sort of the Bible—the one source of truth—for all the data from the 1,500+ carriages in our system.”

And the information collected for this data pool is gathered using [IBM MQ](#). As Williams notes: “We’ve got MQ for all of the integration. We’re pulling in something like 30,000 messages every 10 minutes from each train. So that’s over 30 million total messages each hour.”

Moving forward, Downer and IBM will be adding [IBM Cloud Pak® for Integration](#) to streamline the flow of data across the TrainDNA platform,

while [IBM Cloud Pak for Data](#) will help consolidate, rationalize and analyze these collected bits of data. And the joint IBM and Downer team will also enhance the solution with [IBM Cloud Pak for Watson AIOps](#), which will define the rules surrounding any alarms triggered by the gathered information as well as any corresponding workflow adjustments.

Further, the client's staff intend to use tools available within [IBM WebSphere® Hybrid Edition](#) to modernize the company's existing applications for a cloud-native architecture. And [IBM Instana® Observability](#) provides application performance monitoring, empowering system operators with a real-time understanding that lets them remove bottlenecks and resolve issues faster.

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Adam Williams, Head of Growth, Rail and Transit Systems, Downer Group

Next stop: a better tomorrow

In June 2022, Downer signed a new agreement with IBM Consulting, focused on enhancing the abilities of TrainDNA through more integrated and collaborative development processes. Not only will these changes better support the company's international growth plans, but they will also empower Downer to offer new features and capabilities within TrainDNA.

Under this new agreement, Downer and IBM assembled a joint sustainability team focused on reducing energy consumption. "The challenges that Downer faces as a business are really the challenges that society faces in general," notes Williams. "There's an obvious challenge around decarbonization, and we think this creates both a huge challenge and a huge opportunity."



Together with IBM, Downer is searching for opportunities to cut the energy use of its fleet. “If you think about a train operator like Sydney Trains or Metro Trains in Melbourne, that network is one of the biggest users of electricity in the entire state. And if we can better understand which rail systems are using the most energy—how they need to respond throughout the day as the weather and passenger demands change—we can really optimize use and get a better outcome for everyone overall.”

He continues: “So we’re currently figuring out how to even monitor and control this stuff. Should we adjust the air conditioning? Can we balance the energy load or the traction controls—which is one of the major power draws—in real time based on the number of passengers? If we can save only a few percent, it will have a huge impact

on the carbon footprint for the whole network—and for the whole country.”

With an eye towards enabling these performance improvements, Downer now coordinates with the [IBM Garage™](#) team to co-create design efforts to be more agile and better accelerate the pathway to innovation. “We’re moving away from a waterfall approach,” adds Williams, “to something with quicker cycles to release—that encourages more experimentation.”

He continues, explaining: “So one of the areas we’re working with IBM is to use the collected asset data to be more predictive in our maintenance. For example, within the air conditioning system we noticed that altered airflow through a certain point was a precursor to a failure. So now, when we see that air pattern, we can dispatch repair teams to intervene before we ever hit an issue.”

“And we’ve started to do some trials with drones and other robotic inspection equipment to improve employee safety and the repeatability of the measurements that we take,” notes Williams. “There are a lot of really awkward and potentially hazardous spaces that maintenance teams need to get into for an inspection. We’re constantly seeing trip and slip-type injuries—not to mention fall-from-height risk—but a drone could just fly in and take the measurements.”

“Once we teach the drone what the train should look like,” he continues, “it can then inspect and come back to tell our technicians about any exceptions it found. So instead of walking—or crawling—around potentially dangerous environments, staff can use the drone data to make better, more targeted maintenance decisions.”

Healthy trains. Happy commuters.

“We’ve seen a 51% increase in the reliability of the fleet,” adds Williams, “which we measure in what’s called the ‘mean distance between failure’—essentially how far each train can travel before a failure impacts service. Right now, our long-term average is over 75,000 km, meaning our performance is up there with some of the best in the world.”

Passengers, in turn, can be confident that they’ll get where they need to go more consistently and on time. And the comprehensive, controllable safety policies offered by TrainDNA protect employees while encouraging increased productivity. In fact, Downer has



grown its fleet by 21% with negligible increases in its workforce.

Overall, Downer is pleased with its choice of IBM. “With all of the data being captured by Maximo, we’re really beginning to understand what’s going on within the train,” adds Williams. “Back when we started in 2010, we had a regime of maintenance that used 30-, 60- and 90-day checks along with bigger, phased overhauls. And that made balancing workloads very

difficult, particularly if multiple trains were scheduled for major repairs at the same time.”

He continues: “What we’ve done now is better optimize the periodicity of maintenance. We’re more confident that we can predict when something will fail, which lengthens the period that we have to intervene. So far, we’ve enabled a doubling in the length of time for our routine maintenance intervals.”

Finally, teaming with IBM Consulting continues to drive innovation across the business. “With IBM, we’ve gone from what was a straight, transactional relationship to one of collaboration and co-creation,” concludes Williams. “We’re jointly talking about the best way to approach development for our products and services. And I think we’ve figured out how to best make use of our complementary capabilities to do more—a mindset where $1 + 1 = 3$.”

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Adam Williams, Head of Growth, Rail and Transit Systems, Downer Group



About Downer Group

Founded over 150 years ago, [Downer](#) (link resides outside of ibm.com) employs over 44,000 global staff and is a leading provider of integrated urban services. The group's Rail and Transit Systems delivers rollingstock asset management services in Australia and New Zealand, with expertise in delivering whole-of-life support to customers.

Solution components

- IBM Cloud Pak® for Data
- IBM Cloud Pak for Integration
- IBM Cloud Pak for Watson AIOps
- IBM Consulting™
- IBM® Instana® Observability
- IBM Maximo® Application Suite
- IBM MQ
- IBM WebSphere® Hybrid Edition

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Produced in United States, October 2022.

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