McConnell Dowell Outlines Its IoT Strategy for Competing in the Australian Construction Industry

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ADVISORY REPORT

REPORT SUMMARY

Construction company McConnell Dowell wanted to implement IoT on its worksites for efficiency and safety and chose Orange Business Services as a partner based on its willingness to create an open platform with repeatable use cases.

SUMMARY

Issue

Despite all the technology advances in enabling organizations to transform digitally, the construction sector, in comparison to virtually all other sectors, is lagging behind in this journey. Across the value chain from design and engineering, procurement, and building to operations and maintenance, technology adoption in construction is low. The industry often prefers the traditional way of doing things: manual processes for managing partners and suppliers. There tends to be heavy preference on traditional physical on-site inspections. This happens at a time when there is an abundance of technology alternatives to support business objectives such as workplace safety or environmental and regulatory compliance. Unsurprisingly, the sector tends to underperform. Cost overruns are common and overall performance could always be better. But, this is starting to change.

GlobalData research shows a wealth of technology from blockchain to autonomous vehicles that can help this industry. Building information modeling (BIM), which aims to improve the speed, efficiency, and management of projects through collaboration, is just one example. Some 64% of construction companies used BIM in 2019, compared to only 29% in 2016. Moreover, there are even bigger opportunities. Recent innovations have shown that 3D printing, for example, may be scaled up to produce housing and commercial buildings in days rather than months. Major contractors are investing in AR/VR for safety training and in wearable tech to try to improve workplace safety. The construction industry remains a dangerous profession. For example, more than one-fifth of all fatal accidents at work in the EU-28 took place within the sector. Emerging markets continue to outspend developed countries. China alone represents 30% of the global market. Many emerging markets are often further ahead in technology adoption than the developed countries. GlobalData's 50 'Construction Mega Cities' have construction project pipelines valued at a combined USD 4.2 trillion.

This report considers how McConnell Dowell, a major infrastructure construction company founded in 1961, developed a strategy and open architecture for using IoT to deliver outcomes, scale, and repeatability. The information was based on a discussion between the company and GlobalData technology analysts.

KEY TAKEAWAYS

- Spend on digital transformation is growing in the construction sector to address issues such as productivity loss, skill shortages, and health and safety challenges.
- McConnell Dowell turned to IoT to help address its challenges around productivity and cost, identifying early use cases such as asset tracking and environmental monitoring.
- A key challenge in IoT partner selection was the fragmented nature of construction. McConnell Dowell searched for partners that offered open platforms rather than one-off point solutions.
- McConnell Dowell eventually chose Orange Business Services based on its advisory, security, and integration capacities as well as its willingness to create an open platform and manage a range of vendors.
- The platform that was built includes a framework for data collection from disparate sources, connectivity across multiple standards, cloud-based storage, and analytics for easy sharing among stakeholders.
- McConnell Dowell has used the platform to build out repeatable and scalable use cases like asset tracking, environmental monitoring, and materials tracking, and it now aims to expand the platform internationally.

PERSPECTIVE

Current Perspective

Construction Beginning the Digital Journey

Globally, the construction industry has faced challenges in driving strong value growth. A recent McKinsey study, for example, found the leading 1,000 construction companies have underperformed compared to the S&P 500 between 2007 and 2018 in key metrics such as EBITDA margin and return on invested capital (ROIC). While the construction sector remains vital to economies around the word, major benefactors to the development of smart cities worldwide, technology adoption is relatively poor.

However, this is changing, with construction companies worldwide increasing their ICT spend on digital transformation initiatives. According to GlobalData's "Enterprise ICT Investment Trends 2020: Construction Sector" report (July 20, 2020), on average, construction companies worldwide plan to allocate 39% of their total ICT budge towards digital transformation initiatives; this is up from 35% in 2019. The data also shows that IoT will account for 23% of this digital transformation budget, while related solutions like artificial intelligence and automation will account for 27% and 23%, respectively. The major focus of these technology-driven use cases will be in addressing productivity losses; skills shortages; asset tracking; cost control; and workplace health, safety, and environmental compliance.

McConnell Dowell

As a major infrastructure construction company, McConnell Dowell had its fair share of industry challenges. Like others within the construction sector, the company is facing pressure to drive delivery of projects with fewer resources, identify ways to improve the overall utilization of laborers, and improve the on-time delivery of materials from factory to warehouse. There is also a need to better coordinate on-site assets such as cranes and conveyors with workers. Like its industry peers, there were many examples of engineers and project managers spending excessive time on administrative tasks rather than on the field, operations, or frontline work where they are needed most. If the balance is not struck, there can be an adverse impact on employee experience, customer service, and- ultimately- the ability to deliver on time and budget.

Early IoT Opportunities Encounter Problems

Early on, the company identified ways in which IoT can drive new efficiencies. This could include, for example, reducing the number of physical on-site visits with video technology, location-based services, or the use of drones. Monitoring for noise and dust could improve environmental compliance. In doing so, the cost of acoustic specialists could be saved. Asset management, tracking, and geo-fencing could not only provide end-to-end visibility and prevent potential theft, but also help to better coordinate employees with physical assets to improve uptime and operational efficiency. This could include avoiding the unnecessary assembly and disassembly of scaffolding and cranes. Technology, if coordinated correctly, can also increase the monitoring of progress. With greater visibility and predictability through daily tracking, there could be less focus on contingency planning and more bottom-line savings.

Perhaps the most challenging piece for the company was selecting the primary partner to implement the IoT platform. The construction industry is by nature varied in its projects. Each construction site and every build has its own requirements in terms of planning, labor, materials, and compliance. Many service providers can offer a turnkey solution to one area, with hardware, software, and services that meet one set of immediate requirements. But, the solution does not work for another set of similar requirements or other locations. While best intentioned, the point solutions do not scale vertically or horizontally. They are also limited in their repeatability. Despite the cost savings and operational efficiencies, the silo approach can often create a technology ecosystem as fragmented as the construction industry it is trying to help transform. Every new construction project is different. The equipment use for the trade in six months will often have different requirements. Many incumbent manufacturers to this sector can also take a ‘walled garden’ approach to the overall connectedness of their equipment. Therefore, a one-size-fits-all approach was a non-starter.

Vendor Selection Focused on IoT Platforms That Solve for Tomorrow, Not Point Products Today

An out-of-the-box solution can be a quick fix for a problem today, but can quickly become out of date. One of the most crucial aspects for partner selection was being able to deliver an open platform that is able to support both in-house and third-party suppliers on an ad-hoc basis. The ideal for McConnell Dowell was to construct a modular set of use cases that could be repeatable across different projects when applicable. McConnell Dowell therefore narrowed its search for an IoT partner that would also help co-create and co-develop solutions rather than re-sell a prepackaged connected widget. Some degree of professional services and system integration was also essential in the setup, design, and transferability in moving from one use case today to the next one in six months’ time.

McConnell Dowell has domain knowledge within its industry, but it did not necessarily have the skillsets internally to manage all aspects of end-to-end IoT deployment including data warehouse, device sourcing, security, integration, and development of analytic models. It needed a partner that could provide this hands-on support. Given recent history of an overpromise and an under-delivery, it cast the net far and wide to find a partner to help transform its construction operations, starting in Melbourne, Australia.

Orange Business Delivered These Platforms with Professional Services, Co-Creation, and Security

After a lengthy tender process that saw several high-profile bids, McConnell Dowell awarded the business to Orange Business Services. Orange was willing to take a piecemeal approach to building a wider IoT solution, looking initially at smaller use cases based on specific worksite problems. Rather than limiting itself to its own products, the company played more of an advisor and integrator role, helping its client select from 'best-of-breed' products and integrate them within an open framework. Through trial and error, partners were moved in and out of the project until the solution, customer support, workflow integration, and response times were at the right levels and consistent. As an integrator, Orange was also to focus on issues such as platform interoperability and usability. Ultimately, this approach created a wider IoT platform that allows both parties to build use cases to solve new on-site problems with repeatable solutions.

Orange then helped develop a custom IoT platform based on its 'Connected Sites' approach. This involved creating an in-house framework around the collection of data from multiple sources such as location, machine telemetry, environmental sensors (e.g., wind, noise, temperature, vibration, etc.), equipment utilization, and video analytics. The transport of data used a range of connectivity solutions such as LoRaWAN, NB-IoT, 4G, and WIFI broadband; a platform for the storage and processing of data; plug-ins to support data visualization; and dashboards for real-time monitoring. This platform is running on the cloud to access and cross-correlate data from across different categories such as employee reporting, inventory tracking, environmental monitoring, and asset management into granular modules. This approach is important for many stakeholders from IT and the business lines such as plant, operations, facility, and supply chain managers. The parties are also looking at better ways to share data, such as notifications integrated into a command center, mobile apps, and open APIs. The latter is essential for driving an open, multi-vendor environment and reducing development times.

This platform-centric approach is what ultimately helped to create new uses cases, insights, the ability to identify hidden relationships between separate data sets, and a growing reference library of repeatable use cases. While Orange offers a range of pre-integrated devices and a partner ecosystem, it's the platform approach to bringing on new vendors and ideas which prevailed. This was important for scale.

Security, Privacy, and Data Governance

With so much data being shared, a major reported differentiator for Orange was its ability to provide additional security frameworks, including data governance. It is one of leaders in managed security and has an exceptionally sound vision for securing operational technology (OT), an area of importance for sectors like construction as these environments interconnect with traditional ICT stacks. IoT drives a lot of this convergence of IT and OT. Service providers that have a strong cyber approach for both are best positioned to deliver value in IoT in the long term.

Business Outcome: Cost-Savings, Yes; but McConnell Dowell Has Repeatable Solutions

With cost and time the biggest variables to construction, the company wanted to focus on improving specific KPIs around testable cost savings in categories like project overrun and equipment costs as well as time savings around completion targets, downtime, and administration. Based on the platform and business objectives, the company compiled a library of repeatable use cases. Some of these included:

- **Digitization of manual tasks** - Created several modules that helped employees to automate manual tasks through the use of mobile devices and applications. This freed up time for higher-value tasks for engineers and project managers.
- **Environmental monitoring** - Deployed environmental sensors for indicators such as wind speed, noise, heat, and dust that can be collected and correlated across sites to monitor for things such as compliance. Correlating some wind events to noise events has prevented false positives. In legacy environments, the company could have been in breach of compliance.

- **Asset tracking platforms** - Extended the use of machine and fleet telemetry data to collect across more sites and locations; correlated this with other project and employee data to ensure more efficient overall asset utilization through the use of analytics. McConnell Dowell can have several projects on in greater Melbourne at one time. Using real-time data can reduce downtime of expensive equipment, like cranes, if their arrival coincides with the arrival of critical and correct inventory and availability of licensed crane operators.
- **End-to-end material tracking** - Built a solution that provides better end-to-end visibility to better track important materials for projects direct from manufacturers through to specific locations on a worksite. The first use was tracking large concrete panels from manufacture through to installation on-site. This transparency reduces downtime and costs from incorrect arrivals or installations.

Roadmap and Contactless Processes

With the wider availability of technology that can drive transformation to the sector, McConnell Dowell is currently exploring the use of drone technology to automate site-surveying, particularly for more remote sites. There are many other potential use cases in photogrammetry. Furthermore, the success of the project is inherent in the company's expansion and re-use of these use cases. Initially, each use cases was developed for specific problems at specific sites across Melbourne, Victoria. The company signed a global agreement with Orange, and there are many opportunities to replicate and export capabilities to other markets for business outcomes felt outside the shores of Australia. Earlier in the quarter, an inventory tracking solution was brought to worksites in New Zealand. Other APAC opportunities are under consideration in Singapore.

A platform-led approach to IoT, such as Orange's 'Connected Sites,' can also provide additional solutions required for the construction sector as it moves into a post-COVID world. With new regulations around social distancing, as well as perennial concerns over lockdowns and the health and safety of workers, there will be a continued drive to search for more use cases for contactless processes. This will likely encompass areas such as automated site access and visitor management systems, including the use of AI-enabled temperature monitoring systems or infrared imaging to improve employee safety. There will be more investments into remote asset management as well as drone surveying and real-time video surveillance, phasing out on-site inspections. COVID-19 has changed thinking around business continuity planning (BCP) in construction as part of the recovery. As the industry looks to mitigate risk, such as impacts from any future pandemics, the investments in new technologies will look to drive new efficiencies, improve the health and safety of workers, enforce compliance, and reduce the costs of unplanned downtime. While the construction industry has been a late mover in digital transformation, 2021 could be the turning point where IT investments accelerate as a means of making a bigger difference to the bottom line.

RECOMMENDED ACTIONS

Vendor Actions

- The construction industry is incredibly fragmented across its value chain, from design and planning to materials suppliers to equipment vendors, project management, and delivery. In order to deliver an IoT implementation that will bring value beyond a single project, the lead IoT partner needs to be able to work with an ever-changing list of vendor partners. Building a wider ecosystem of sensor, software, and equipment partners that can be plugged in modularly to various projects should be a priority for those looking to win IoT deals in the construction sector.
- Security is also paramount to any IoT implementation; however, within the construction sector, the importance is even greater. The connection of operational technology like cranes, excavators, conveyors, and other heavy machinery into IT systems carries greater fiscal and physical risk if the system becomes compromised. A strong understanding of operational technology from machinery and equipment to platforms like SCADA systems is key when trying to win IoT deals within the construction industry.

- While the construction industry is beginning to become more digitally enabled, oftentimes companies in the sector will have less experience or less manpower dedicated to working with digital technologies and IT systems. Successful IoT vendors will be able to deliver strong advisory and integration services. Being able to provide fully managed services around areas like applications, cloud, network, and security will be necessary to win some deals in the sector.
- The construction industry is still in the early days of implementing IoT solutions, and many IT buyers in the industry are still wary of jumping head-first into buying an end-to-end solution. One of the reasons McConnell Dowell selected Orange as its IoT partner was its willingness to design and test proof-of-concept solutions before moving onto wider implementations. The industry as a whole is under pressure to deliver projects more quickly and at lower cost. Offering trials and proof-of-concept services is an important tool to help win wider business.
- While McConnell Dowell's initial deployment of data warehousing and analytics software was on AWS, Orange and the company are working on building an on-site solution as well to support better performance and higher security. IoT vendors should be exploring different options for edge compute and storage. Potential use cases for construction like real-time video analysis or autonomous vehicle control can benefit from the lower latency of an edge deployment, while also improving security by not having certain data leave the site.

User Actions

- While some providers promote NB-IoT as the network of choice for IoT due to global standards and the development of 5G, LoRAWAN is widely available and NB-IoT is not. LP-WAN can also work better in some environments than others. There are considerations like cost and coverage and pricing models. IT buyers should take a connectivity-agnostic approach. While NB-IoT can claim GSMA backing, the solution is not always available and/or is not the best networking solution for all use cases.
- The best partners will be open to expanding their approved vendor lists and listening to concerns from the client. Orange was willing to work with vendors sourced by stakeholders at McConnell Dowell, as well as using its own existing list of partners. Furthermore, Orange was willing to trial different partners in order to ensure McConnell Dowell's solution worked within the proper SLA parameters. Openness is critical, particularly in any industry with a lot of moving parts like construction, and should be a consideration when choosing an IoT partner.