Digital Twins Driving Operational Excellence and Improving Throughput

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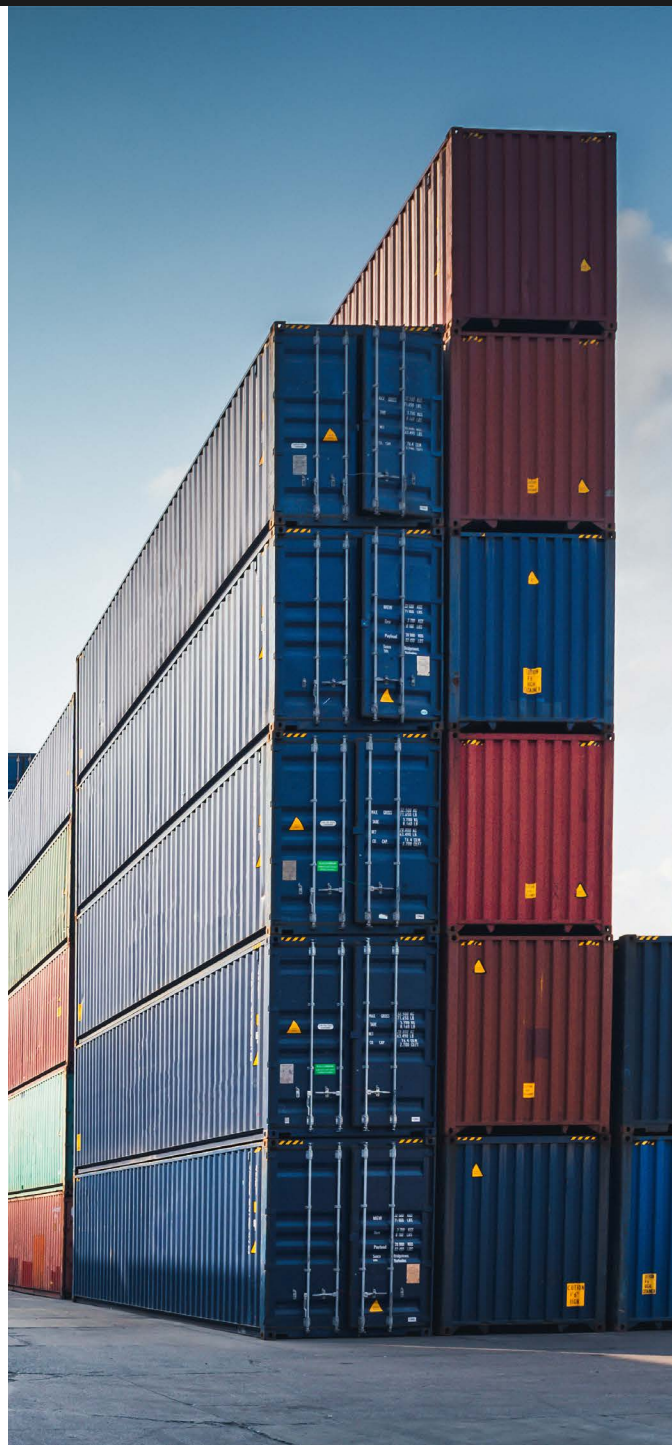


The status quo for port operations

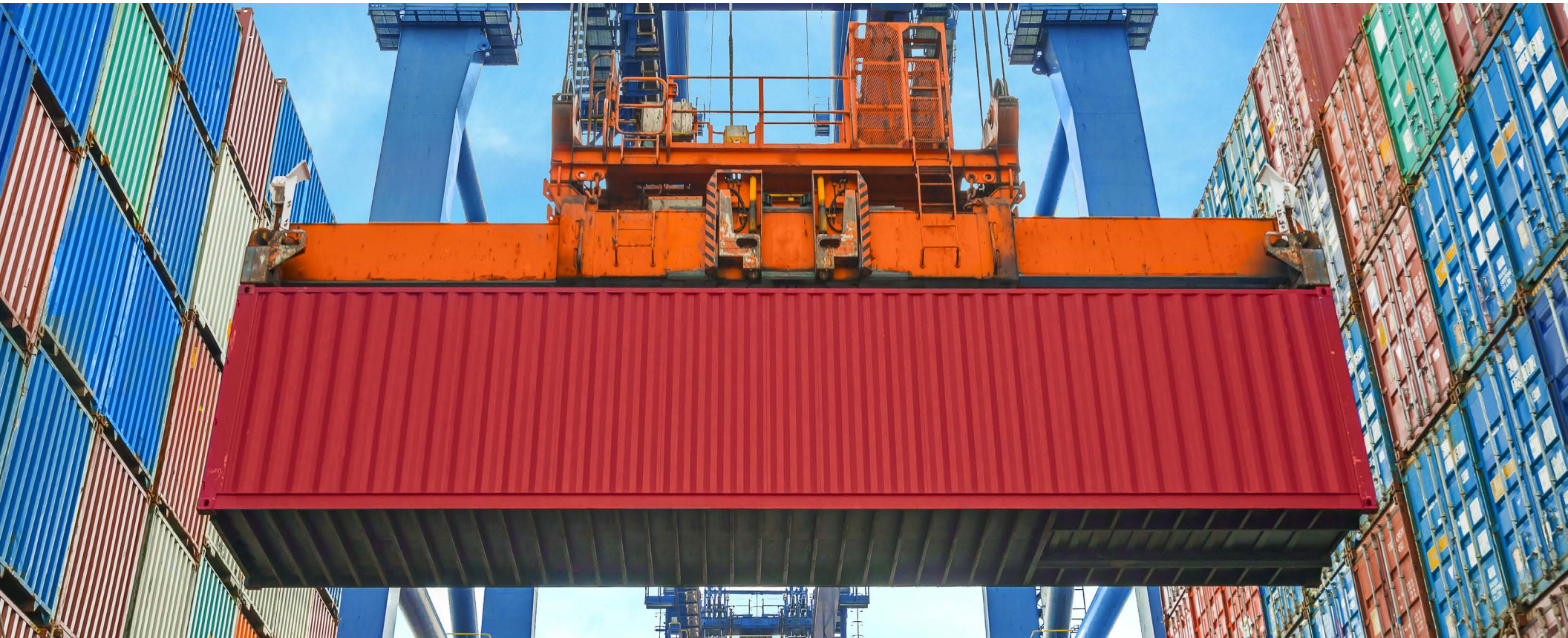
Ports are keystones to international commerce, powered by a global maritime sector that is growing rapidly. But for something so vital to global economies, they are often overlooked for their role in the global supply chain. The engineering behind ports, like other kinds of infrastructure, is often plagued by long-standing inefficiencies that impede collaboration—and the ability to deliver the innovation needed to keep up with increased demand.

Oftentimes, the infrastructure design, construction, operation, and maintenance functions are siloed, leading to a lack of collaboration between stakeholders and inefficient or even costly delays and issues. When ports have siloed teams and data, it creates inefficiencies, wasted resources, and manual workarounds, resulting in essential processes and workflows undertaken with inaccurate or outdated data. With increasing demands for cargo and turnaround, ports must find ways to enhance their efficiency to remain competitive in the global market while battling aging infrastructure and outdated solutions, creating a need for new technology that empowers both growth and modernization.

Not only are ports globally challenged with collaboration, transparency, and efficiency hurdles, but with a global call for more sustainable practices, ports need a way to track and manage their sustainability initiatives. Whether these new practices include electrification of assets and infrastructure, carbon neutrality efforts, or adapting to new environmentally friendly processes, ports and port authorities are tasked with implementing them without sacrificing efficiency and cargo handling capacity.

Throughout all these challenges, ports and port authorities must remain focused on how to increase their throughput, optimize their utilization of the space that they have, and gain resiliency against the increasing occurrences and strength of extreme weather events. By being at the forefront of the coastlines around the world, ports are perhaps the most exposed to inclement weather and increasingly extreme climate conditions.

So, the question becomes: how can ports and port authorities take steps to address these challenges while also increasing their efficiency and effectiveness in operations?



Simplifying tenant management

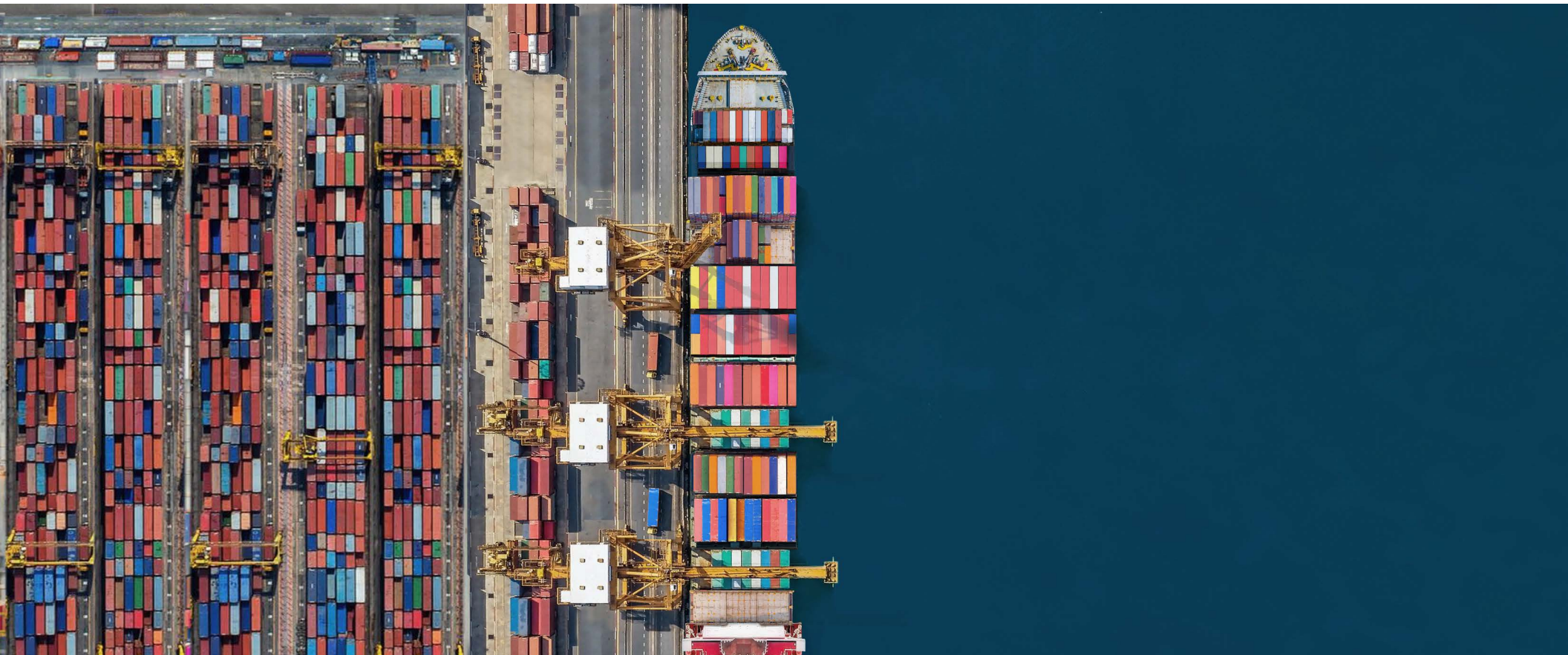
Among the duties of operating a major port is the managing the various tenants, whether they are terminal operators, cargo handlers, marine agencies, or some other business unit. Having easy access to contract and leasing details, ongoing projects in various areas, cargo and manifest information, and monitoring activities across the port is a daunting task that typically involves significant human resources, time, and various systems to juggle. Simply accessing this information can be a struggle, and the accuracy of the data is another question altogether, which can delay decision-making and eventually impact the efficiency of port operations. Port operators need a consistent, reliable, and accessible way of monitoring their various tenants, buildings, warehouses, and cargo if they are going to ensure that the port is running smoothly.

How Bentley helps

Bentley provides operational digital twins that can simplify tenant management by connecting to the systems that provide the necessary information and then surfacing it in-context for a visually immersive user experience. Locating accurate information is easy and accessible, enabling port operators to make data-driven decisions faster and more effectively. By creating a digital model of the port and integrating directly with the systems that house the data, port operators can access updated tenant information, check in on projects happening across the port, see cargo details, or monitor operational activities all from a single portal.

Maximizing utilization of capacity

With the cargo shipping sector rapidly growing, ports all over the world are in a race to increase their throughput, often with limited opportunity for expanding port infrastructure. This situation means that ports and port authorities must find a way to become faster and more efficient without compromising the safety of their personnel. Ships are becoming larger to accommodate more cargo, and ports need to adapt to manage them. This challenge goes deeper than simply loading and unloading ships faster; ship traffic needs to be managed more effectively, rail and truck operations should run more efficiently, and warehouse management needs to be tightly monitored to ensure that everything is where it is supposed to be. On top of these challenges, with an increase in throughput comes an increased strain on assets including cranes—which can not only endanger personnel, but can also bring operations to a standstill if the assets are not maintained and managed properly.



How Bentley helps

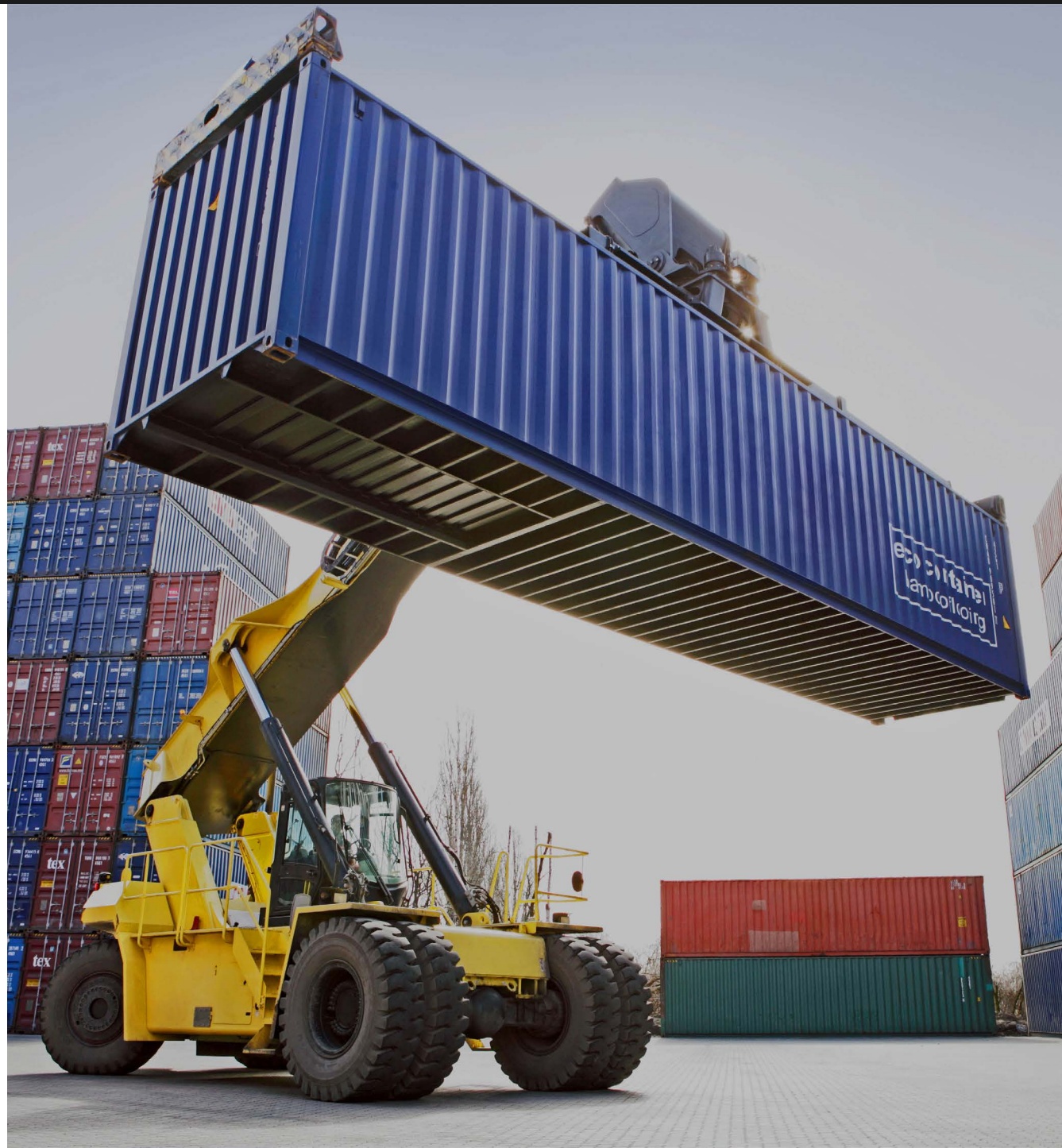
With Bentley's Port Operations Solution, digital twins can be used to meet the challenges that come with a growing industry. By connecting ship traffic data to a 3D model of the port, port operators can monitor, schedule, and berth ships quickly and safely. The solution helps ensure that berths are the right size for the right ships and are available for docking. Similarly, updated and accurate asset information can be surfaced directly into the digital twin, ensuring that operators know exactly where all their assets are and the condition that they are in. Maintenance can now be predictive and preventative rather than reactive, enabling your operations to continue running smoothly and your personnel can be confident in the safety of operations.

Improving safety, sustainability, and resiliency

With extreme weather events increasing globally, the ports sector is critically exposed to hurricanes, typhoons, tsunamis, and other ocean-related disasters. On top of these issues, the industry is facing a call to action worldwide to implement more sustainable and safer practices. At the center of all these challenges lies the health of a port's infrastructure and assets.

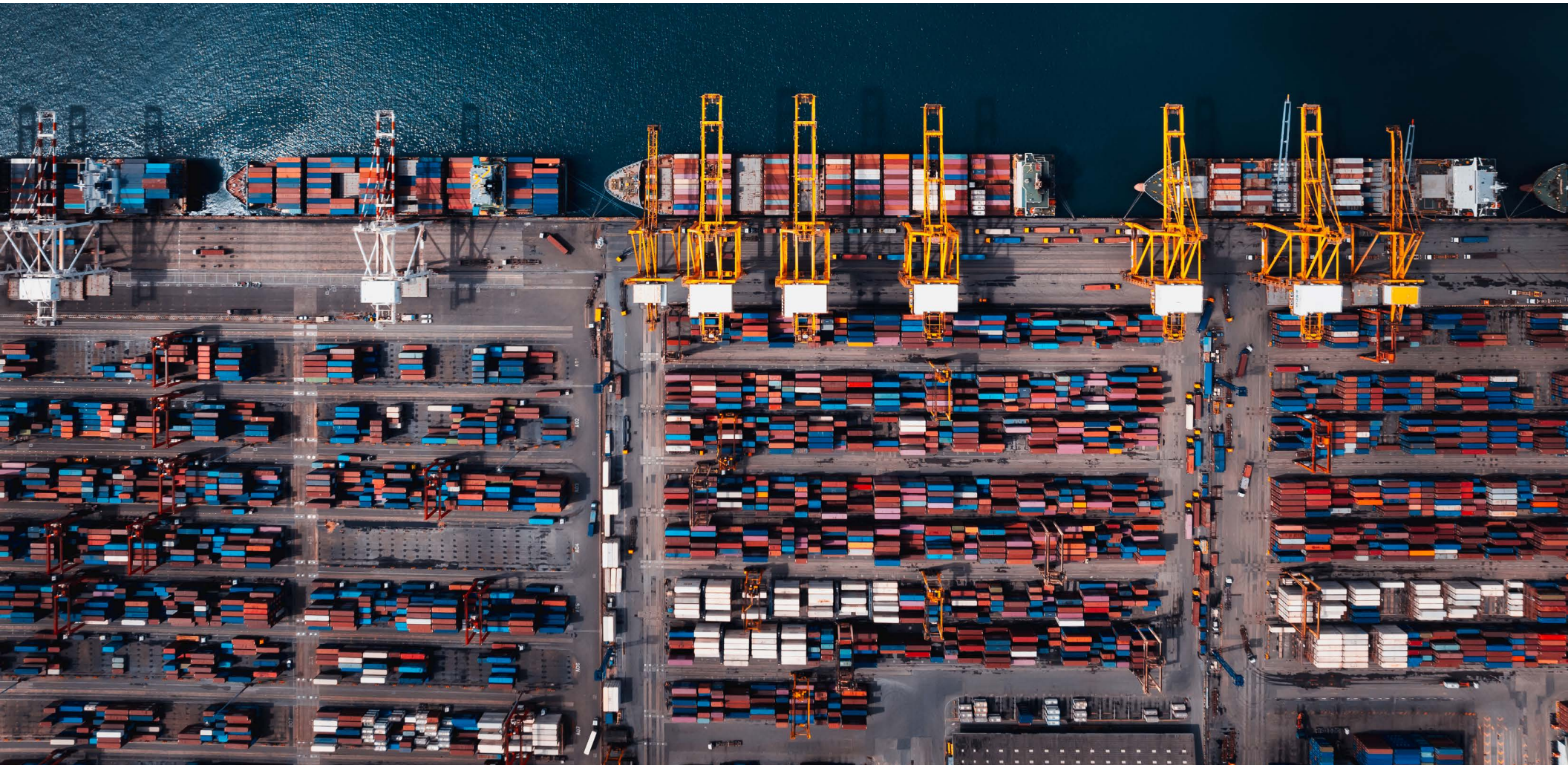
How Bentley helps

Using Bentley's digital twin solutions, complete asset visibility is possible in a visually immersive environment. Whether it is cranes, vehicles, warehouses, bridges, tunnels, or some other asset or infrastructure, having accurate and accessible information on the condition, location, and utilization is vital to having what you need, when you need it, with the confidence that it will perform as required. With digital twins, port operators can identify individual assets by their physical location and have access to updated information on the assets' use, condition, and performance. It empowers proactive, rather than reactive, maintenance, which enables ports and port authorities to extend the lifespan of assets and keep operations running smoothly, preventing costly delays and workarounds while making the port more resilient to extreme weather.



Prioritizing openness

A persistent challenge for ports and port authorities around the world is the often-siloed nature of having multiple systems, solutions, tenants, and teams managing or working on various areas or aspects of port operations. These disparate systems and teams lead to stakeholders working with a variety of data types, all from different sources and with varying levels of accuracy, leading to wasted time, manual workarounds, or costly miscommunication.



How Bentley helps

Bentley's digital twin solutions solve these challenges by prioritizing openness. By integrating your various data sources into the digital twin, you create a layered, accurate data environment that is presented in a visually immersive and easily accessible portal. It provides the accessibility and ease-of-use that teams and stakeholders need while surfacing critical data without the need for digging through multiple different systems. The transparency and common access point that Bentley provides empowers collaboration between teams, breaking down those silos and ensuring that everyone is working from the same, updated information. It drives more efficient operations, eliminating the need for manual workarounds and saving time and resources for teams across the board.

Leveraging digital twins at the port authority of New South Wales

The Port Authority of New South Wales handles operations for six seaports along the eastern coast of Australia, managing cargo shipping and cruise terminals. Alongside the shipping operations, the Port Authority manages the emergency response for the ports, the movement of dangerous materials, safety initiatives, and green and sustainability initiatives related to the coastal environment. With all of these responsibilities comes massive amounts of assets, data, and challenges related to collaborating with different organizations.

By leveraging Bentley's digital twin solutions, the Port Authority of New South Wales was able to take fresh images of the ports and create 3D reality models through which they could layer their asset information to make the system intuitive and accessible for all stakeholders. With this enhanced knowledge of assets, the Port Authority can save time and promote transparency and collaboration to share data and identify locations for living seawalls that promote marine ecosystems.

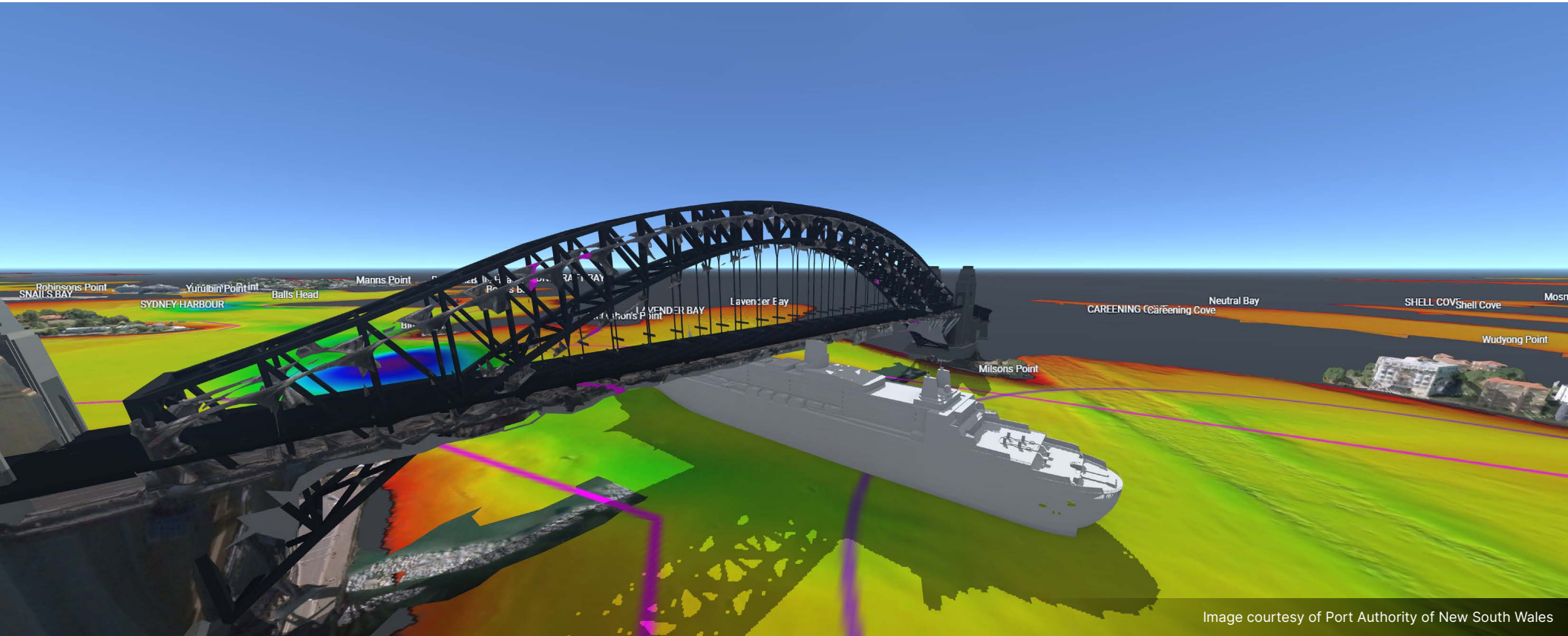


Image courtesy of Port Authority of New South Wales

Questions?

If you would like to discover more about Bentley's engineering solutions for digital twin solutions

Learn more

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