

USING INNOVATION TO NARROW THE INFRASTRUCTURE GAP

Crucial repair and rebuilding efforts have fallen dangerously behind. Technology offers a solution.

THE AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) GAVE THE U.S. a D-plus on its 2017 Infrastructure Report Card—the same dismal grade it received four years earlier.

The ASCE has estimated that by 2025, \$4.5 trillion in additional spending will be required to repair or replace the country's crumbling or outdated infrastructure. Without those fixes, the nation is more vulnerable to grave threats, including natural disasters, cyberattacks, unsafe roads, unclean drinking water, increased income inequality, and depressed economic growth.

The issue is critical—and global—but there are bright spots. Facing the monumental task of recovery after incurring hurricane damage of \$90 billion in 2017, Puerto Rico partnered with the Smart Cities Council to rebuild with smart technologies that offer greater resilience and economic opportunity. The approach “will create an innovative pathway for a better Puerto Rico,” said Governor Ricardo Rosselló, when the partnership was announced.

As Infrastructure Week devotes May 13–20 this year to promoting awareness of infrastructure challenges, it's clear that addressing them requires action on multiple fronts, from policy leadership to new models of financing—and cutting-edge tech. “The technology exists today for the

industry to help government turn the corner and close the infrastructure gap,” says Theo Agelopoulos, senior director of infrastructure business strategy and marketing at software company Autodesk.

Drones, 3D printing, augmented reality, and other technologies are poised to transform infrastructure, along with software solutions like building information modeling (BIM), an optimized process that leverages an intelligent 3D digital model to streamline all phases of construction projects, including planning, design, and build-through operations, which will increase productivity and support collaboration. The benefits can be substantial. Nearly two-thirds of architectural, engineering, and other firms using BIM have seen a positive return on investment (ROI), with about half of those reporting an ROI of 25% or more, according to a 2017 Dodge Data & Analytics report.

BIM is among the solutions that Silicon Valley-based Autodesk offers its customers worldwide. “We are all about using technology to drive automation to support companies doing

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more, and doing better, with less impact on the environment,” says Agelopoulos. “The U.K. has taken the lead on BIM by mandating its use on government-funded projects,” he adds, “with European countries following.”

Advances in artificial intelligence and machine learning will drive the growth of BIM and other tech in infrastructure, but Agelopoulos believes that government and private industry must join forces to exploit their full potential.

Convincing owners to invest more up front to reap efficiencies in the long term is challenging, he says, even though they're promised higher quality, more sustainable assets, and significant savings in operating costs. “It's a culture change that owners have to overcome,” Agelopoulos says, “but doing so will help to ensure our country is built for the future.” ■

DRIVING VALUE, INNOVATION, AND GROWTH WITH BIM FOR INFRASTRUCTURE

INFRASTRUCTURE WEEK IS not only an opportunity to shine a light on the country's pressing infrastructure needs but also a chance to take stock of the momentum in the industry to seek solutions. It's important to remember that an innovative, resilient, and competitive infrastructure industry is a key driver of U.S. economic growth. Yet government funds for repair and rebuilding have been shrinking. One emerging trend with the cost-saving potential to offset that decline is the industry's move to digitalization.

Digital technology in construction is nothing new—surveyors, mappers, and engineers have been using it for decades to design infrastructure. What is new is the larger-scale utilization of building information modeling (BIM) in infrastructure projects. BIM is an optimized process of project delivery that enables a more seamless transfer of information through planning, design, construction, and operations phases. BIM has already resulted in cost savings, productivity gains, and operational efficiencies across the building sector, and now governments and engineering companies

across the globe are establishing it as a valuable tool for infrastructure projects too.

At the core of BIM is 3D digital modeling that provides the rich information needed to allow stakeholders across all functions to more efficiently complete each phase of creating and operating a physical asset, regardless of whether it is a building, highway, bridge, or any other type of infrastructure. The latest technology can even provide a connected BIM experience that lets surveyors, drafters, designers, and construction professionals work on the same model in real time via the cloud. Connected BIM communication can also improve risk mitigation.

In 2011, the U.K. issued a Government Construction Strategy that included a mandate to phase in BIM usage on all government-funded projects; it also created a task group to determine the best ways to propel its adoption. (The European Union formed a BIM Task Group in 2016 to develop a common approach for the introduction of BIM into European public infrastructure projects.) In the U.K., BIM contributed to billions of pounds of savings



between 2011 and 2015. And the U.K.'s Construction 2025 Strategy sets out an even more ambitious vision, with efficiency targets of up to 33% lower costs and 50% faster delivery. Savings of this magnitude could go a long way toward bridging the infrastructure gap we face in America.

Now is the time to launch our own version of the BIM Task Group here in the U.S. to accelerate the adoption of BIM in infrastructure projects at all levels of government. By bringing together key federal agencies, state and

local leaders, and private-industry experts, we could fuel innovation and take advantage of homegrown technologies to shore up infrastructure across the nation. It would be one of the best ways to build better, more sustainable, and more resilient infrastructure—and reduce the costs of doing so. ●

—**Nicolas Mangon**
is vice president of business strategy and marketing for architecture, engineering, and construction at Autodesk, a global 3D design, engineering, and construction technology leader.