



Image courtesy of CDBB

# Establishing the National Digital Twin: A Q&A with CDBB's Mark Enzer

An ecosystem of connected digital twins is the start of a new approach to planning and managing assets.



**Mark Enzer**

Digital Director  
Centre for Digital Built Britain, CTO of Mott MacDonald  
and Chairman of the Digital Framework Task Group

**Today, in most of the world,** information from across the built environment remains largely siloed and inaccessible. The United Kingdom's National Digital Twin Programme aims to change that. Infrastructure leaders will be able to conduct improved analysis of more comprehensive data—which leads to better decisions, interventions, and outcomes.

In this interview, Mark Enzer—digital director at the Centre for Digital Built Britain, CTO of Mott MacDonald, and chairman of the Digital Framework Task Group—describes the potential impact that connected digital twins could have on the country's infrastructure operations—as well as on its data-sharing practices.

**McKinsey:** What's your vision for how the National Digital Twin (NDT) will change construction and operations within infrastructure?

**Mark Enzer:** The National Digital Twin is envisaged to be an ecosystem of connected digital twins, enabled by secure and resilient data sharing across organizational boundaries. We at the Centre for Digital Built Britain (CDBB) expect the NDT to unleash value principally by facilitating better decisions—in use, operations, maintenance, resilience, planning, investment and more—across economic and social infrastructure. Quite simply, well-informed decisions based on better analysis of better data lead to better outcomes for people. This is the essential promise of the Information Age, and one we think is more important than ever after the challenges of this past year.

**McKinsey:** Where do you see construction and infrastructure heading in the United Kingdom?

**Mark Enzer:** For me, the really exciting thing is seeing Industry 4.0 applied to infrastructure for the benefit of the people it serves. Our Victorian forebears served us well by developing infrastructure that was fit for the First Industrial Revolution, and now we have the opportunity to bring the Fourth Industrial Revolution to our infrastructure systems. This means recognizing

the genuine value of digital assets and melding them with more familiar physical assets to create cyber-physical systems. Such a development could potentially be as epoch-making as that first golden age of infrastructure.

**McKinsey:** Why is now the time we're really getting going with the NDT?

**Mark Enzer:** General technical advances in the industry are allowing us to imagine something that seemed like science fiction even ten years ago, and the unit cost of everything to do with data—collecting, processing, and transmitting it—has plummeted, creating the economic engine that drives digital transformation. In addition, the infrastructure industry has grown in digital maturity (though there is still a long way to go) and employed sufficient collaboration across the industry to make the NDT achievable. For example, the Infrastructure Client Group has established a Digital Transformation Task Group to accelerate digital transformation across the infrastructure industry.

In thinking about why now is the time to drive secure and resilient data sharing, and not in five years' time, we must also understand the cost of moving too slowly. If we don't come up with some common rules quickly, everybody will create their own siloed, incompatible rules—bespoke data models and inconsistent reference data libraries—that will make data sharing more difficult. They will build friction into the system.

**McKinsey:** Why are common data standards important, and how will they be used?

**Mark Enzer:** Common data standards are essential to enable the consistency and quality of data that is required for secure, resilient data sharing across organizational boundaries. It's all about interoperability and integration. Without such standards, it would always be possible to write bespoke application programming interfaces (APIs) to enable specific point-to-point data sharing, but that would create significant unnecessary additional cost if bespoke APIs had to be used for data sharing across the entire network

of potentially valuable connections. In effect, common standards would reduce the friction in data sharing. As an example, we currently find that data scientists working in artificial intelligence spend 80 to 90 percent of their time just making the data fit for use. We would change that. Interoperability will release the pent-up value of our infrastructure data.

To unlock this level of interoperability, we are developing the “Commons,” a suite of national open-source information management standards to be shared across the entire built environment.

**McKinsey:** There are a lot of stakeholders involved. Who will own the NDT?

**Mark Enzer:** The question of ownership is quite tricky, so we will have to discover some of the answers as we go. At a basic level, it makes sense for owner-operators to own their assets' digital twins, processes, and systems as well as to curate the related data. However, the picture becomes more complicated when we start aggregating data across organizational and sector boundaries. Bringing such data together creates more value, and potentially more risk, so we'll need to be careful as we work through the questions of obligations and liability, risk and reward. No matter the ownership, we believe that data related to public assets must be used for the public good.

This key principle must underpin and inform all efforts and is enshrined in the *Gemini Principles*, which are effectively the conscience of the National Digital Twin.<sup>1</sup>

**McKinsey:** How do you drive consensus and standardization between those different stakeholders?

**Mark Enzer:** The infrastructure industry is really only the sum of many individual organizations and their assets, so the required change comes down to what incentives will convince them to get on board.

We can imagine a whole spectrum of incentives. In the early days, some organizations will be motivated to be seen as leaders. And a little further down the spectrum would be enlightened self-interest: if it makes their life easier, or if it's cheaper for them to follow the standards, then organizations will do so. We're already starting to see genuine value being associated with the data sets themselves. Board rooms that see that value (whether on their balance sheets or not) will pay a lot more attention to properly structuring their data in a way that will benefit their organization. So, we anticipate that the most effective incentivization will be the carrot of market forces rather than the stick of regulation or legislation.

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<sup>1</sup>Alexandra Bolton et al., *The Gemini Principles: Guiding values for the national digital twin and information management framework*, Centre for Digital Built Britain, 2018, [cdbb.cam.ac.uk](http://cdbb.cam.ac.uk).