



# Accelerate resilient and sustainable infrastructure through data-driven decision-making

How connected, centralized data can help drive positive outcomes for government infrastructure owners.





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# Introduction

Infrastructure plays a critical role in driving economic growth and ensuring a better quality of life for society and citizens. Developing Asia will require approximately **US\$1.7 trillion<sup>1</sup>** of annual investment in infrastructure through 2030 to maintain economic growth, tackle poverty, and mitigate climate risk, according to the Asian Development Bank.

Australia's Victoria Government Department of Transport and Planning, for example, is investing in major transport projects under the Big Build initiative,<sup>2</sup> while Phase IV of the Delhi Metro Rail involves six different regions<sup>3</sup> and is slated to open priority corridors by 2026.<sup>4</sup>

State investment in civil infrastructure is growing elsewhere in the Asia-Pacific region as well,<sup>5</sup> even though large-scale state infrastructure projects have never been more challenging to manage and maintain due to the increased complexity. As governments in the region continue to tackle the challenges brought by rapid urbanization, the aging population and climate change, rethinking the approach to infrastructure development becomes even more important to address different priorities.

This e-book will look at how government infrastructure owners can fulfill three imperatives below to build resilient and sustainable infrastructure through data-driven decision-making.

- Improve operational efficiency to deliver project on time and on budget
- Reduce waste and increase resilience to enhance sustainability
- Mitigate risks to improve profit margins and the quality of work

# The right data at the right time, in the right place

As digital transformation continues apace, there is a need for governments across the region to consider how they can optimize their processes and maximize their investment, especially when large-scale infrastructure projects are at stake.

Governments working on civil infrastructure are already investing in digital technologies to succeed at adaptability, profitability, and sustainability. Digital twins, artificial intelligence (AI), building information modeling (BIM), the Internet of Things (IoT), and advanced analytics are often part of the infrastructure development today. All these solutions create a significant amount of data that can be used.

But if the data generated by your technology stack isn't managed effectively, it can lead to project errors, rework, delays, cost overruns, reputational damage or even contractual penalties.<sup>10</sup> Ensuring the data is connected is key to continued satisfaction.

Connected data enabled by a Common Data Environment (CDE) helps mitigate these challenges. A cloud-based CDE is used to connect teams, and collect, manage, and securely share data. It creates a single source of information for teams, internal and external stakeholders, and project owners, and sets your projects up for success by allowing all stakeholders to optimize and utilize information when it matters most.

In a typical project, data is shared manually between and within groups using different systems and software solutions. These solutions may not be compatible so stakeholders might receive inaccurate, outdated information, which can lead to costly project delays. In a CDE, information is centralized so it can be updated more easily and securely. This means there is just one version of approved data available to all stakeholders.

This single source of high-quality data can empower government infrastructure owners to minimize wasteful project activities and predict costs and time more accurately. Risks that can be mitigated include duplication of data and references, and incorrect or outdated data. Less time is spent searching for data, and sharing it, so more time can be spent on strategizing and decision-making.

Digital Project Delivery<sup>11</sup> is a cloud-based collaboration process for infrastructure projects that connects people, data, and workflows in a CDE across the project lifecycle. This process makes automation and cross-discipline workflows easier. Live data from multiple sources such as BIM models and geographical information systems (GIS) can further enrich the assets as-built model for maintenance and operations thus extending its longevity.

## Common data-related challenges over a project lifecycle can include:



Up to 30% of all data created in design and construction phases is lost at project closeout<sup>6</sup>



26% of all construction professionals report that none of their software solutions integrate<sup>7</sup>



Construction professionals report spending over 5 hours per 40-hour workweek searching for data and information<sup>8</sup>



52% of all rework globally is caused by poor project data and miscommunication<sup>9</sup>

# Build today's infrastructure for tomorrow

With connected data digitally stored in the CDE, governments that plan and manage infrastructure projects can improve processes and outcomes across the entire project lifecycle through data-informed decision-making, from design to procurement, production, maintenance, and outsourcing.

Here is how governments can build today's infrastructure for tomorrow by fulfilling the three imperatives:

## IMPERATIVE 1

### Improve operational efficiency to deliver projects on time and on budget

According to research on mega-projects, as many as 91.5% go over budget, over schedule, or both.<sup>12</sup> This can be caused by high construction costs, process silos, inflation, etc. However, connecting data through the CDE enables you to make informed decisions, streamline workflows and enhance collaboration, significantly improving your efficiency.

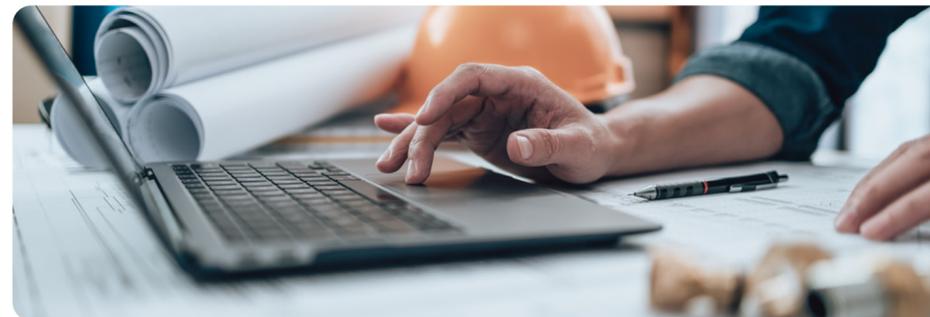
Through the convergence of GIS and BIM data, you can also eliminate data redundancy by moving information seamlessly between them, which means adding better geospatial context to the BIM process allows the project owner to have more accurate designs and saves money on requests for information (RFIs) and rework. Southern Power Engineering Consulting Company relied on BIM, which works with a CDE, to save 30% to 40% the time required for designs.<sup>13</sup>

With all GIS and BIM information stored in the cloud, stakeholders across the projects will be able to access and manage data from anywhere anytime, as well as reuse and repurpose that information in future projects without having to continuously convert data.

## IMPERATIVE 2

### Mitigate risk to improve the quality of work

The biggest delays in large infrastructure projects usually happen during the planning and permitting phases due to the complex assessments of social, economic, and environmental impacts. Optimizing dynamic data interchange between BIM, computer-aided design (CAD), and GIS allows teams to use connected data simultaneously and eliminate much of the front-end risk of designing and building.



Connected data also enables greater automation to streamline processes, reduce errors and rework, and eliminate redundancies, in order to improve your overall productivity.



## IMPERATIVE 3

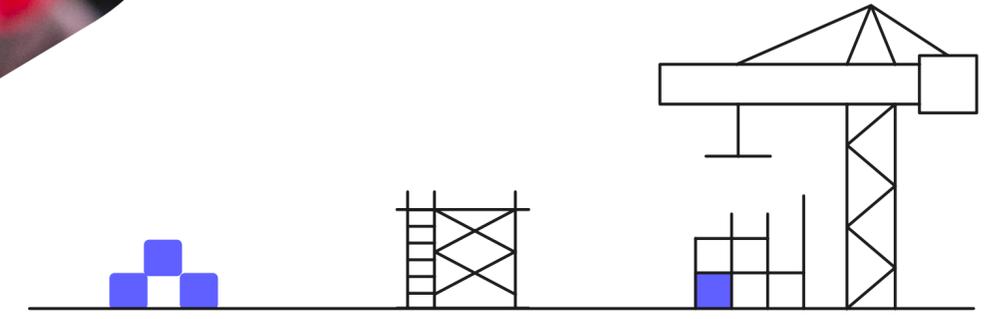
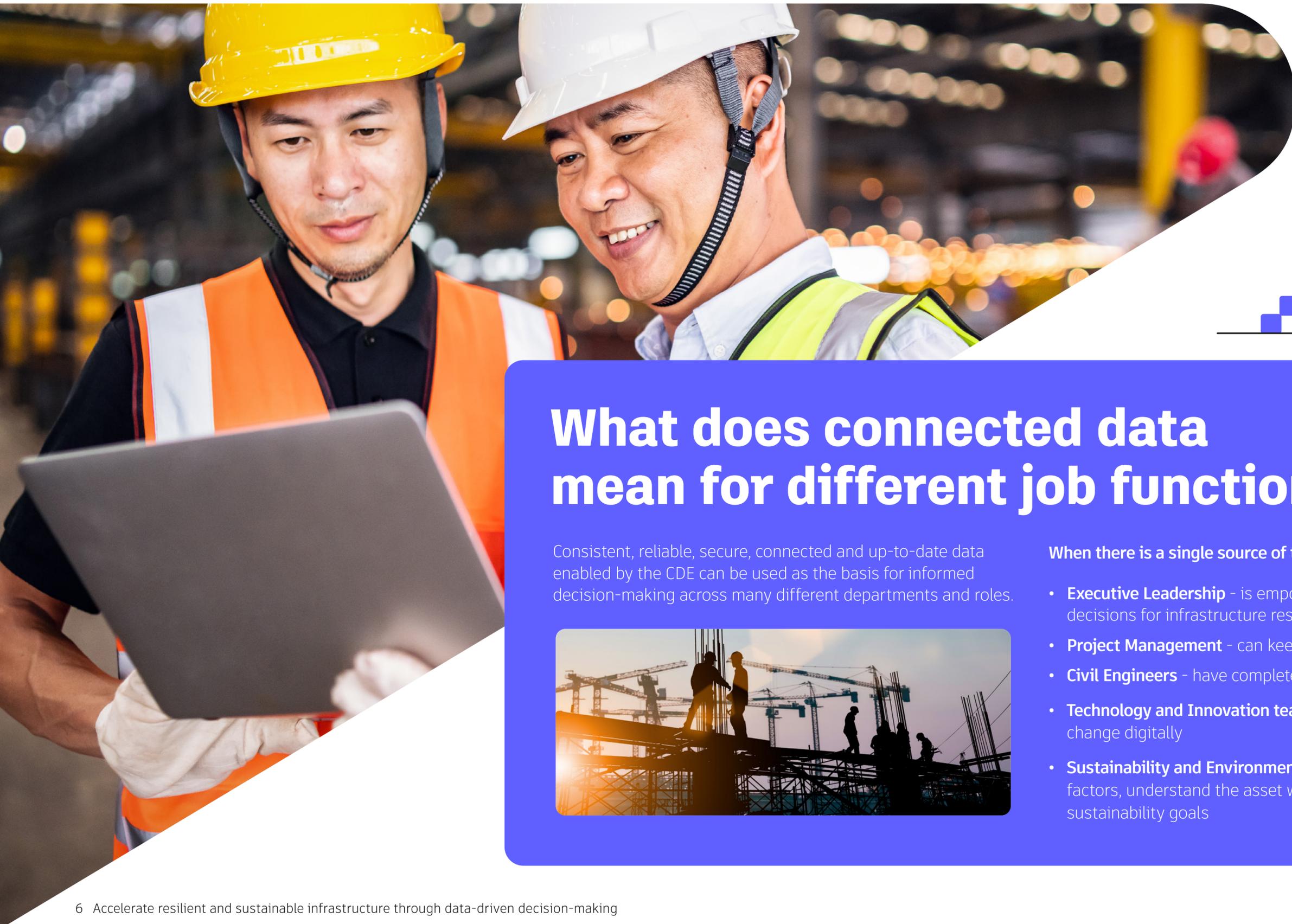
### Reduce waste and increase resilience to enhance sustainability

To meet the challenges of climate change and increasingly extreme weather events, the need to invest in resilient, sustainable infrastructure is more urgent than ever. Sixty-three percent of civil infrastructure owners surveyed in Autodesk's 2024 State of Design and Make report say sustainability goals are required for modern business.<sup>14</sup>

Data interoperability enabled by the CDE allows you to associate the accurate data with any given project, and enables people to leverage that data across all workflows for more sustainable design and minimized material wastage.

As an infrastructure owner you can further use the centralized data to reliably assess risks and optimize asset life expectancy and resiliency, increasing flexibility to reuse and repurpose existing infrastructure and improving the future infrastructure designs.

When you have connected data, you will also gain the ability to leverage AI tools to solve some of the data challenges around the carbon coefficient of a specific material in a product, or the energy efficiency of an asset.



# What does connected data mean for different job functions?

Consistent, reliable, secure, connected and up-to-date data enabled by the CDE can be used as the basis for informed decision-making across many different departments and roles.



## When there is a single source of truth:

- **Executive Leadership** - is empowered to make transformative and informed decisions for infrastructure resilience
- **Project Management** - can keep budgets and timelines on-track more easily
- **Civil Engineers** - have complete visibility of on-going projects via digital models
- **Technology and Innovation teams** - can keep operations running and adapt to change digitally
- **Sustainability and Environment teams** - will improve assessment of environmental factors, understand the asset within geospatial context, and compliance with sustainability goals

# Delhi Metro Rail Corporation

## Challenge:

The Delhi Metro Rail Corporation (DMRC) is a mass, rapid-transit system serving millions of riders in Delhi and the surrounding region. In line with its expansion plans, it needed an information-rich virtual asset for better decision-making and engineering visualization due to adopting traditional work process (2D workflow). The DMRC also faced the challenge of predicting the clashes prior to construction.

## Approach:

The DMRC partnered with Autodesk to develop a CDE with BIM at its heart, enabling its project stakeholders to communicate and collaborate seamlessly. It also used a visualization tool to create better presentation of the project and optimize the design.

By adopting the Digital Project Delivery process, it allowed the DMRC to identify and resolve clash and interference problems before construction begins, saving time onsite and reducing rework.

## Result:

The DMRC now has a single source of truth among stakeholders, which helps with better communication, project monitoring, and controlling. In addition, BIM provides better clarity of the project along with an agile decision making process. Using BIM will also help with the eventual operations of the DMRC's new metro line.



“If we’re revamping down the line in maybe 30, 40, 50 or 100 years, we know what exactly we built and what we have to build on. Preparation of a BIM model or a digital twin now is very essential for any of the projects.”

Samim Sekh, Deputy Chief Architect, Delhi Metro Rail Corporation Limited<sup>15</sup>





# Conclusion: to envision the future, don't overlook your data

Data-informed decision-making can be the key to more successful, sustainable, and resilient large-scale infrastructure projects. But to take them from the design stage to the built environment, state governments must first take control of their systems and data to:



### Deliver infrastructure projects on time and on-budget

Take control of data to manage projects and assets more efficiently. A CDE is only the start to enable data interoperability and streamline operations through enhanced collaboration.



### Build up sustainability credentials and increase resilience

Reduce environmental impact by minimizing material waste and promote a more sustainable way to improve urban areas. Build more resilient structures fit for future use.



### Take control of projects from planning to ribbon cutting

See designs, schematics and 3D renders as soon as they are available, following progress from planning to construction delivery and beyond.

Ensure data connectivity helps to drive positive outcomes for government infrastructure owners. With the right technology, you can operate more efficiently, keep projects on track, and mitigate risks more effectively. Start on your journey to surpassing expectations today.

# About Autodesk

Autodesk is a strategic partner to governments which oversee large-scale civil infrastructure. We help governments deliver faster, better, smarter, and more sustainable projects—enabling connected teams, workflows and data across every stage of the asset lifecycle.

Learn more or schedule a customized consultation with one of our experts.

Get in touch

## References:

<sup>1</sup><https://www.adb.org/publications/asia-infrastructure-needs>

<sup>2</sup>Victoria government. Super Spring Build to Transform Victoria's Transport Network. Aug 2023. <https://www.premier.vic.gov.au/super-spring-build-transform-victorias-transport-network>

<sup>3</sup><https://www.delhimetrorail.com/pages/en/phase-iv>

<sup>4</sup>The Economic Times. Delhi metro to open its phase 4 priority corridors by 2026, over 50 pc work already done. Jun 2024. <https://economictimes.indiatimes.com/industry/transportation/railways/delhi-metro-to-open-its-phase-4-priority-corridors-by-2026-over-50-pc-work-already-done/articleshow/111378635.cms>

<sup>5</sup>Deloitte. Global Powers of Construction 2023. Pg 16.

<https://www2.deloitte.com/content/dam/Deloitte/at/Documents/presse/at-deloitte-global-powers-of-construction-2024-studie.pdf>

<sup>6</sup><https://damassets.autodesk.net/content/dam/autodesk/www/pdfs/common-data-environment-iso-19650-ebook-en.pdf>

<sup>7</sup><https://damassets.autodesk.net/content/dam/autodesk/www/pdfs/common-data-environment-iso-19650-ebook-en.pdf>

<sup>8</sup><https://damassets.autodesk.net/content/dam/autodesk/www/pdfs/common-data-environment-iso-19650-ebook-en.pdf>

<sup>9</sup><https://damassets.autodesk.net/content/dam/autodesk/www/pdfs/common-data-environment-iso-19650-ebook-en.pdf>

<sup>10</sup><https://www.autodesk.com/blogs/construction/construction-common-data-environment/>

<sup>11</sup><https://www.autodesk.com/solutions/digital-project-delivery>

<sup>12</sup><https://www.strategy-business.com/article/Why-do-large-projects-go-over-budget>

<sup>13</sup><https://www.autodesk.com/asean/customer-stories/evn-spc>

<sup>14</sup>Autodesk. State of Design & Make 2024 report

<sup>15</sup><https://www.autodesk.com/support/partners/success-stories/virtual-asset-for-the-delhi-metro-phase-4-project/9183>





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