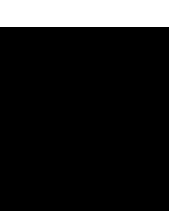


Digital Twins

As Enablers of Service Delivery Modernizations

CDAO Canada Public Sector 2025

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01

The Dilemma

02

The Opportunity

03

Barriers & Breaking Through

04

So What?

01 Challenges within Construction

<1%

Productivity Growth¹

58%

Budget Overruns²

55%

Schedule Delays³

Inefficiencies during how we build public assets, will cascade into how the assets are eventually experienced.

1. [RICS](#), [National Bank of Canada](#)

2. [Ernst & Young](#)

3. [Ernst & Young](#)

01 The Economic Burden

\$3.5_B

Lost Wages &
Productivity Cost¹

\$2.3_M

Per Hour in Lost
Productivity²

\$50_B

Healthcare Access Gaps³

The persistence of these challenges carries a significant economic toll, impacting all facets of life and industry.

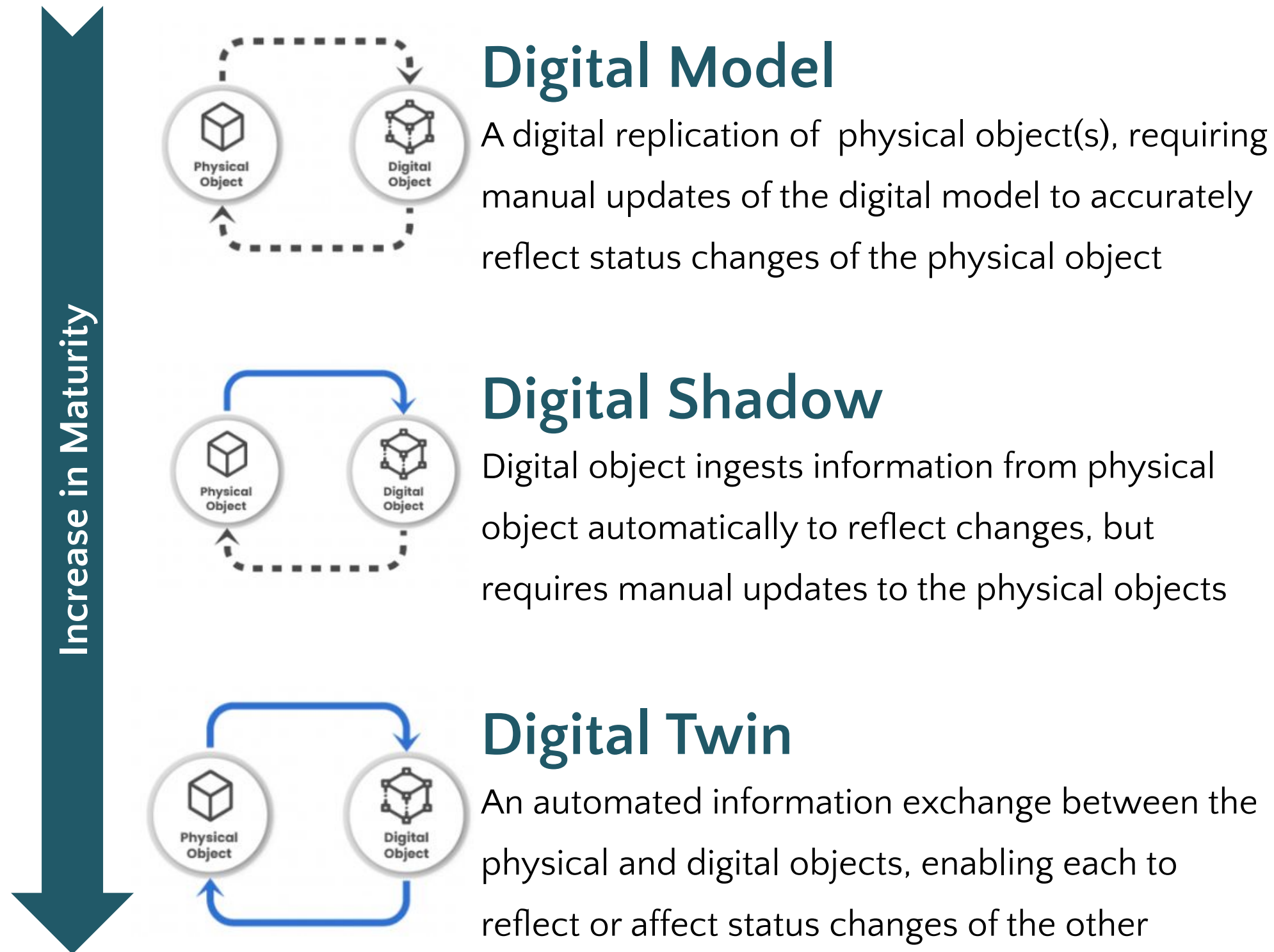
1. [Fraser Institute](#)

2. [MacMillan Supply Chain Group](#)

3. [Fraser Institute](#)

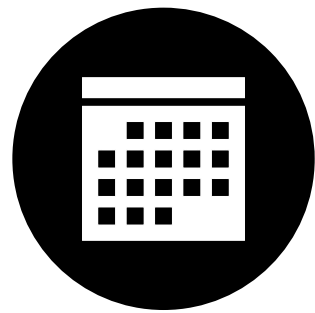
What If we could see,
simulate, and solve
problems **before** they
happen?

02 What are Digital Twins?



When we see our systems differently, we can design them differently.

02 Value Levers of Digital Twins



Schedule Efficiencies

Predictive planning and real-time monitoring can reduce delays by identifying issues early and optimizing workflows. Projects move from reactive firefighting to proactive delivery.



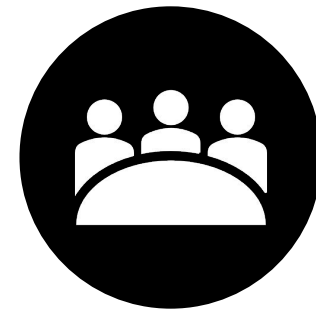
Cost Efficiencies

Simulating scenarios before committing resources, Digital Twins can help minimize waste, avoid rework, and ensure investments are directed to where they create the most value.



Improved Risk Mgmt.

Virtual testing environments allow leaders to stress-test decisions before they impact the real world. This reduces exposure to operational risks, strengthens safety outcomes, and improves resilience against disruptions.



Increased Collaboration

A common environment supported by standardized information exchange frameworks enables a single source of truth, eliminating information silos, enabling a proactive decisions through real-time collaboration.

02 Real-World Examples of Digital Twins

Virtual Singapore

Singapore

A city-wide 3D digital twin of Singapore for urban planning and resource management.

Application of Digital Twins: Modeled population growth, traffic, and environmental impacts to optimize land and infrastructure use.

- ✓ Reduced infrastructure costs and enabling more efficient changes to future planning and development within the country.



02 Real-World Examples of Digital Twins

TH 169 Freeway

Minnesota, USA

Conversion of 2.8 miles of Trunk Highway 169 into a freeway in Minnesota to improve traffic flow.

Application of Digital Twins: Simulated traffic patterns, interchange designs, and construction impacts to optimize planning.

- ✓ Saved **\$15M** by optimizing designs, and reduced disruptions.



02 Real-World Examples of Digital Twins

Rail Track Corporation

Australia

Management of a 9,000 KM rail network across Australia.

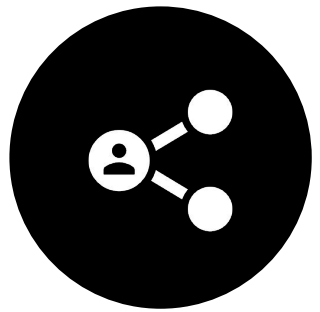
Application of Digital Twins: Predicted maintenance needs and optimized routing to enhance planning efficiency.

- ✓ Resulted in **20%** increase in efficiency, **51%** increase in train reliability.



This isn't just about a tech transformation, but a deliberate focus towards an experienced-based service modernization

03 Ceilings Impeding Complete Value Realization



Change Management

This isn't just a technology shift, but a cultural one. Without strong change management, adoption stalls, silos persist, and the benefits remain unrealized.



Readiness Gap

Both internal and external (market) readiness is required to drive adoption and evolve from pilots to larger twins that can deliver on the potential.



Public Space Innovation

Outdated or conflicting practices, policies, or regulations can block innovation, even when the technology is ready. Aligning incentives, funding models, and governance frameworks is critical to unlock innovations, scale, & drive long-term value.

Value optimization is dependent on scale achieved through broader buy-in.

Scale is dependent on crafting the right narratives that frame the value potential and costs of inaction.

Innovation without scale will reduce realized value.

Virtual Singapore

Singapore

A city-wide 3D digital twin of Singapore for urban planning and resource management.

Barriers:

- ✓ Data availability (collecting real-time urban data)
- ✓ Interoperability (integrating diverse systems)
- ✓ Public-Private Coordination (aligning stakeholders)

Breakthrough Approaches:

- ✓ Improved data availability through mandating data sharing
- ✓ Used open standards to enable interoperability
- ✓ Focused on improving public-private coordination by leveraging government authority and embedding incentives



TH 169 Freeway

Minnesota

Conversion of 2.8 miles of Trunk Highway 169 into a freeway in Minnesota to improve traffic flow.

Barriers:

- ✓ Data Silos (disparate traffic and geotechnical data)
- ✓ Cost Justification (high upfront costs)
- ✓ Technical Skills (limited in-house skills)

Breakthrough Approaches:

- ✓ Mitigated data silos by adopting federated data management approaches
- ✓ Developed a strong business case demonstrating healthy ROI
- ✓ Using strategic sourcing approaches to compensate for technical skill gaps

1. [Bentley](#)

2. [WSB](#)



Rail Track Corporation

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Management of a 9,000 KM rail network across Australia.

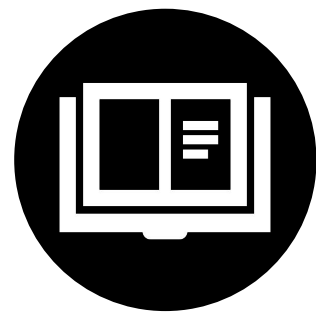
Barriers:

- ✓ Legacy systems (older rail data incompatibility)
- ✓ Geographic Scale (managing a vast network)
- ✓ Funding (securing investments)

Breakthrough Approaches:

- ✓ Used middleware to bridge data between the legacy and more modern systems
- ✓ Leveraged cloud platforms to unlock greater elasticity and enable remote management
- ✓ Identified a fixed funding model that leveraged both federal grants and other mechanisms





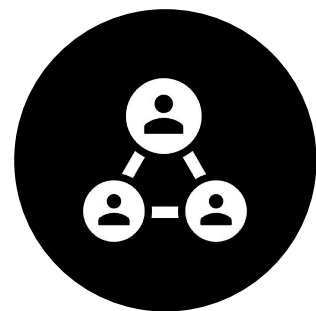
Standards as Foundations

Establishing common data standards and engagement frameworks ensures every twin can scale seamlessly across projects, services, and jurisdictions reducing duplication and accelerating adoption.



Embedded Partnerships

Collaboration must be engineered into the design and enforced through commercial requirements to break down information silos and ensure twins can deliver the most value.



Human at the Core

The twins reflect and influence based on how users experience the assets. Experiential design, focused on users ensures solutions are intuitive, accessible, and trusted.



A 'Horizons' Approach

Taking a multi horizon view establishes foundational capabilities and then shifts to maturing those over time allowing continuous improvement and better risk management.

Change, Readiness, and
Regulatory Innovations will
be the levers that will
determine **how much**
value can be realized

So What?

- ✓ Digital twins aren't only about improving the efficiency of how we build, but offer a methodology to embed the '**experience**' at the heart of how we design and build assets
- ✓ Abstracted, Digital Twins represents a capability focused on improving how decisions are made by ensuring focus on '*known* unknowns' and '*unknown* unknowns'
- ✓ Digital Twins aren't a silver bullet. However maximal value can only be unlocked by shifting the focus away from digital twin enabled *projects*, but towards digital twin enabled *systems* which adopt collaboration and governance models across wider set of stakeholders