BUILDING INNOVATION
Conference

BIM and Digital Twins

A formal position on successful integration for the AECO industry

THE FOLLOWING **PREVIEW** HAS BEEN APPROVED FOR

ALL AUDIENCES

BY THE NATIONAL INSTITUTE OF BUILDING SCIENCES™

www.nibs.org

National Institute of
BUILDING SCIENCES™

It is not so far away from...

Where the concepts of

Digital Twins and BIM

are conflated, connected,

combined and creating

confusion

NIBS COUNCILS

It's through the work of our councils and committees that we're able to **IDENTIFY AND RESOLVE PROBLEMS** that stand in the way of safe, affordable, and sustainable structures for the built environment.

Building Enclosure Technology and Environment Council

Consultative Council

Off-Site Construction Council

Building Information Management Council

Building Seismic Safety Council

Whole Building Design Guide Workgroup

Building Research Information Knowledgebase

Multi-Hazard Mitigation Council

Facility Management and Operations Council

Building Information Management Council

Building Enclosure Technology and Environment Council

Consultative Council

Off-Site Construction Council

Building Information Management Council

Building Seismic Safety Council

Whole Building Design Guide Workgroup

Building Research Information Knowledgebase

Multi-Hazard Mitigation Council

Facility Management and Operations Council

Building Information Management Council

Digital Twin Integration Subcommittee

Define the role of and develop the relationship between Digital Twins and the NIBS National BIM Program and National BIM Standard

Coordinate with authoritative organizations and consortia in BIM and Digital Twin integration efforts.

WHO IS WORKING ON THE DTI-S EFFORT

COMMITTEE MEMBER'S JOB TITLES

AECO Technologist
Applied Technology Office Director
B.S. Civil Engineering
BIM Area Manager
BIM Program Director
BIM Program Manager
Chief Executive Officer
Chief Strategy Officer
Chief Technology Office
Comprehensive Asset Manager
Customer Adoption Specialist
Customer Success Manager
Design Director
Digital Practice Lead - BIM Council Chair
Digital Twin Ecosystem development
Director of Business Development
Director Computer Scientist
Director of Digital Practice
Director of Engineering
Director of Integrated Construction
Director, Digital Transformation

Director, Industry Solutions
Director, Public Sector
Division Lead, Building Intelligence
Engineering Standards Specialist
Executive Director
Executive Director
GeoBase Integration Manager
PHD Candidate
President
Principal
Professor and Consultant
Project Manager
Science and Technology Advisor
Senior Vice President
Sr. Director, Program Controls, Analytics and IT
Systems Integration
Technology Innovation Lead
VDC Manager
VP / Head of Technology Strategy

DTIS Committee

Chairs

Scott McClure

Image Matters

Zahra Ghorbani

Penn State

Ches Meier

Fair Cape Consulting

Marc Goldman

Esri

DTIS Committee

Workgroup Leads

Scott McClure

Image Matters

Zahra Ghorbani

Penn State

Kimon Onuma

Onuma, Inc.

Ali Borhani

MacDonald-Miller

DTIS Committee

Today's Panel

Scott McClure

Image Matters

Zahra Ghorbani

Penn State

Kimon Onuma

Onuma, Inc.

Marc Goldman

Esri

DTIS Committee

Today's Panel

Preview of the position of successful integration of BIM and Digital Twins

Building Information Management Council

Digital Twin Integration Subcommittee

Build on momentum

BIM has become the best practice in built and natural world projects

Address expectations

Owners are increasingly requiring digital project delivery for their built world projects

Remove confusion

There is a lack of clarity on the differences and dependencies on BIM and Digital Twins

Accelerate delivery

Clarity and consistency will accelerate delivering on the promise of Digital Twins

Why is there confusion & lack of clarity?

Extending the Value of BIM to Owners with a Digital Twin

Digital Twins vs. Building Information Modeling (BIM)

ThoughtWire - February 1, 2023

Are BIM and Digital Twin the same..??

Confused between BIM and Digital Twin..? Do these terms seem alike to you..?

Don't worry! This article intends to address such questions and help you understand BIM and Digital Twin Technology in a better way.

BIM before you digital twin

Digital Twin in AEC Industry and Its Integration with BIM

POSTED ON APRIL 17, 2023 IN BIM

Digital Twins in construction: the biggest revolution since BIM?

Carlos Terol - June 24, 2020 - AEC Trending

What is the difference between BIM and Digital Twins?

Feature

BIM vs. Digital Twin Technology

May 8, 2019 | Sandy Mangat, Director Product Marketing, ThoughtWire

4 min read

Home > Blog > BIM and Digital Twins

BIM and Digital Twins - Cx Threat or Strategic Opportunity?

Published: April 01, 2022

Find Out How BIM and Digital Twins Can Work Together (and How They Can't)

Written by Spatial Team

Fri Jul 01, 2022

BIM is hierarchical

… and with 3 formal acronyms…

- Building Information Management
- Building Information Modeling
- Building Information Model

Building Systems

Communication Systems

Building Envelope

Conveying Systems

HVAC Systems

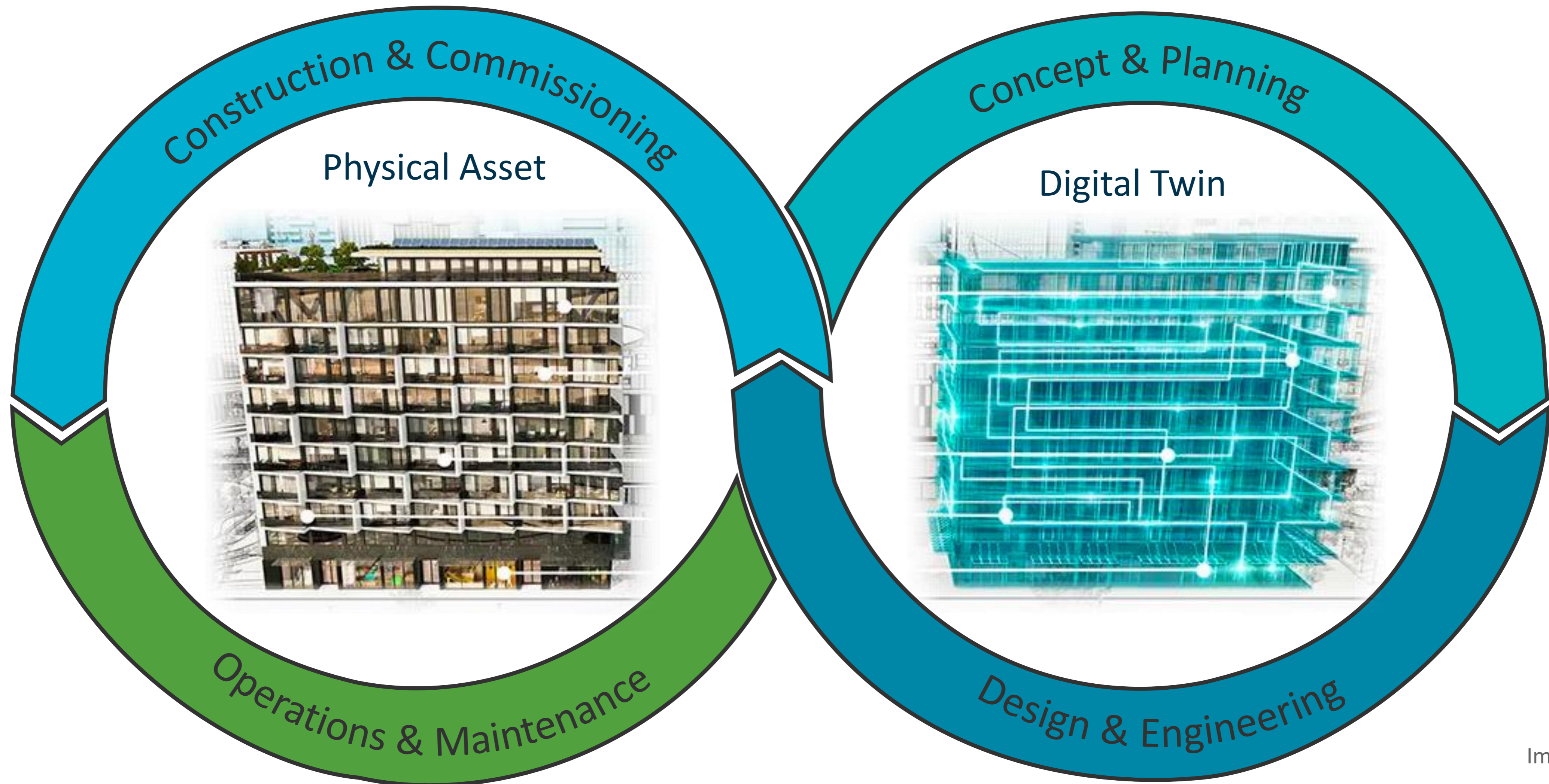Power Supply

Plans & Protocols

Controls & Monitoring
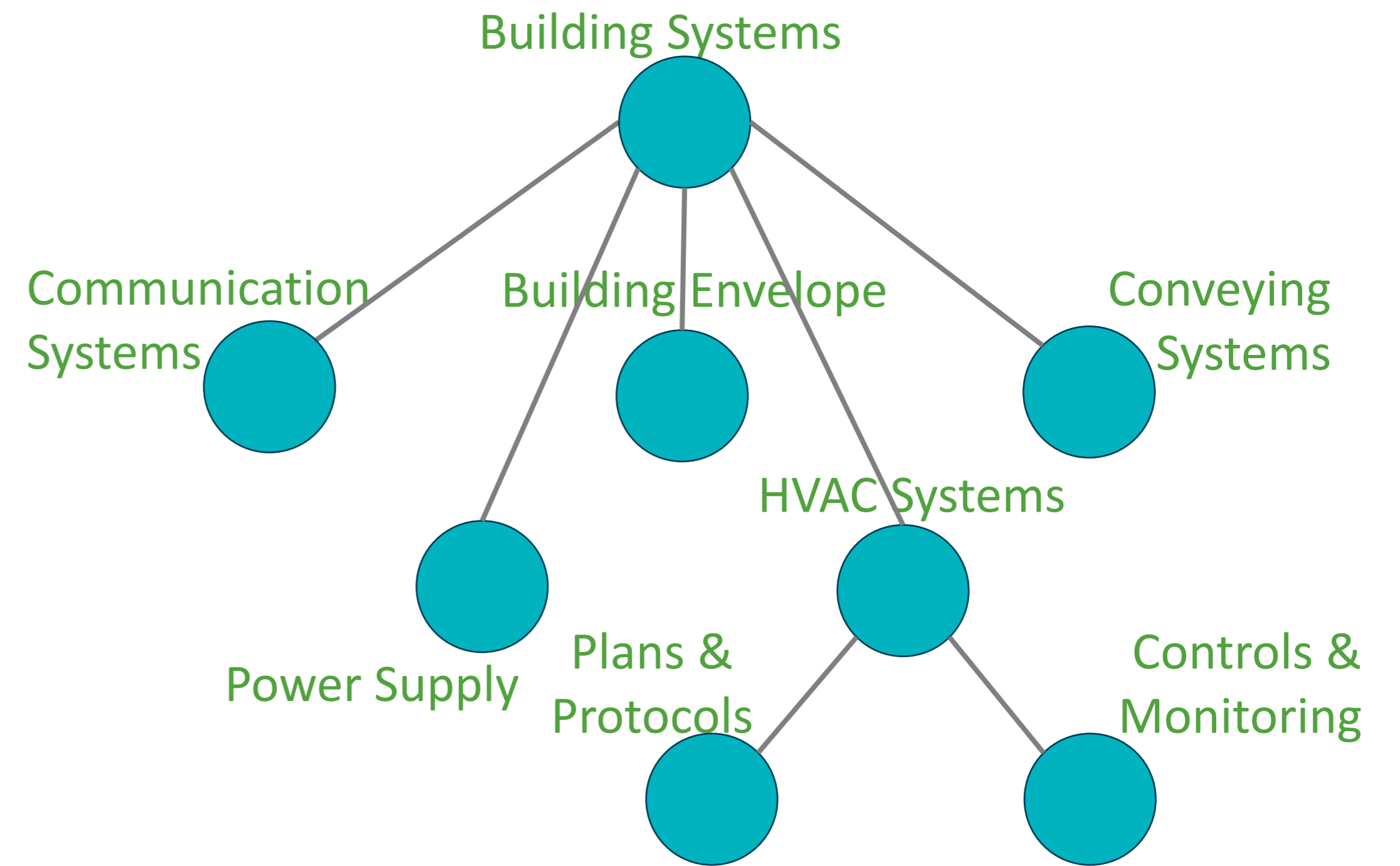
Digital Twins are node-based

A digital twin is a virtual representation of real-world entities and processes, synchronized at a specified frequency and fidelity

- Digital Twin Consortium -

Image: Escuela Técnica Superior de Ingenieros
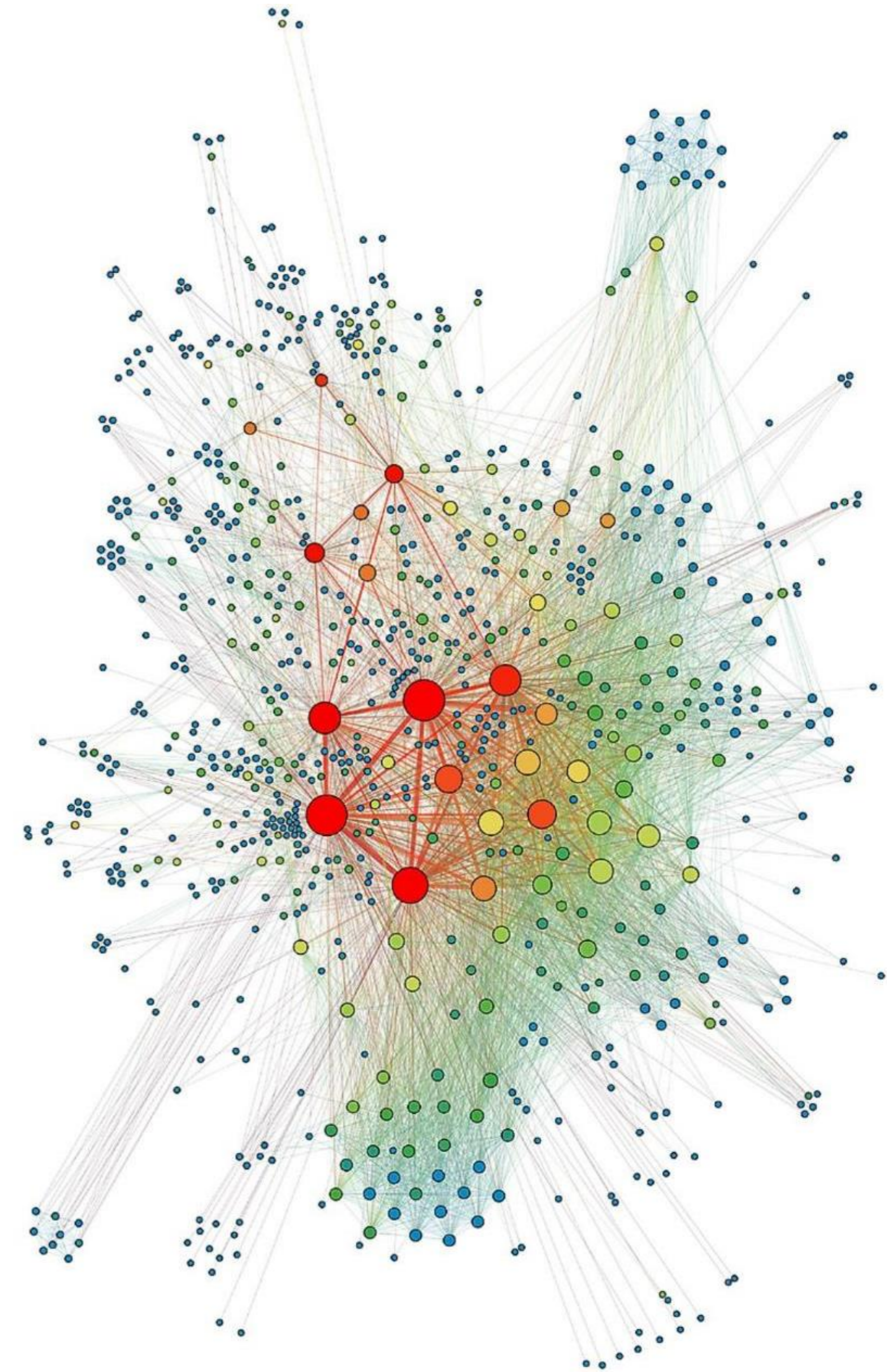
We exist amongst digital twins, impacted by BIM

Construction & Commissioning

Concept & Planning

Physical Asset

Digital Twin

Operations & Maintenance

Design & Engineering

Many standards impacting BIM & Digital Twins

SITUATION:
THERE ARE 14
COMPETING STANDARDS

Many standards impacting BIM & Digital Twins
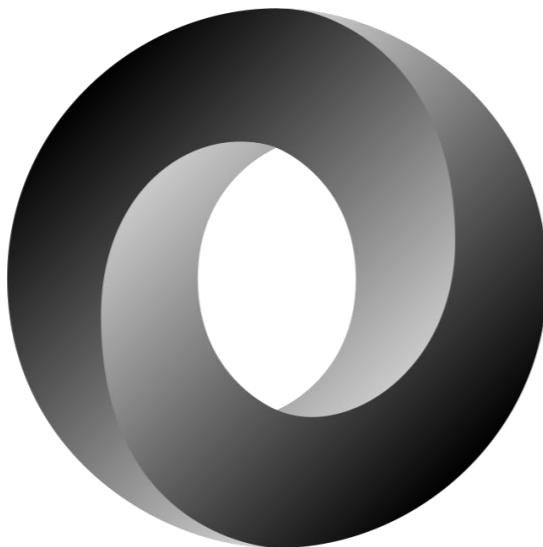
BIM and Digital Twins

A formal position on successful integration for the AECO industry

Overview

Share the progress & process of our work

Sneak peak into the position

Engage with you

Public Perception

Public Perception

In each organization and AECO segment,

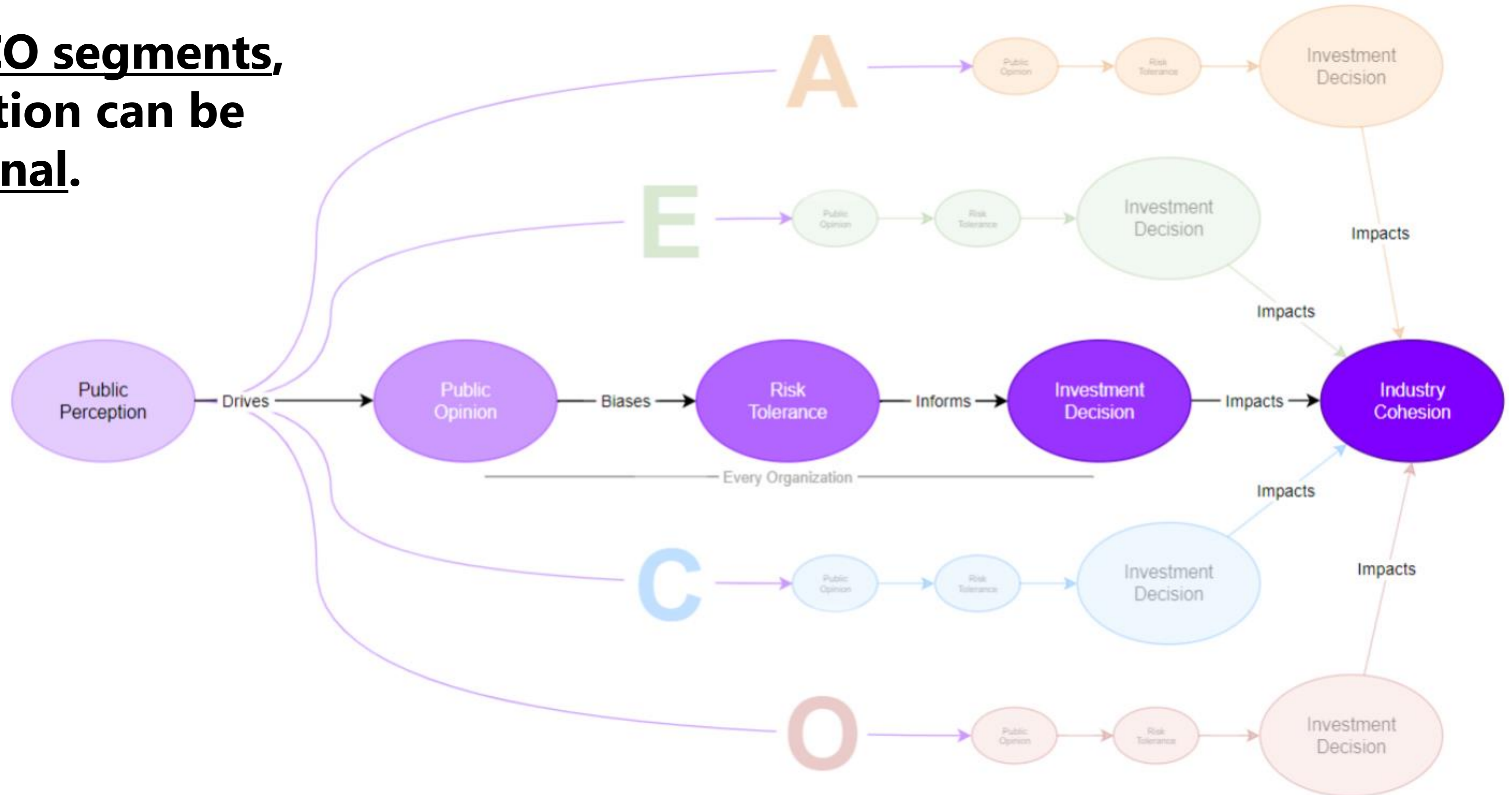**Public Perception impacts industry cohesion**

Public Perception

Public Perception impacts industry cohesion...

... in each organization and AECO segment

Public Perception

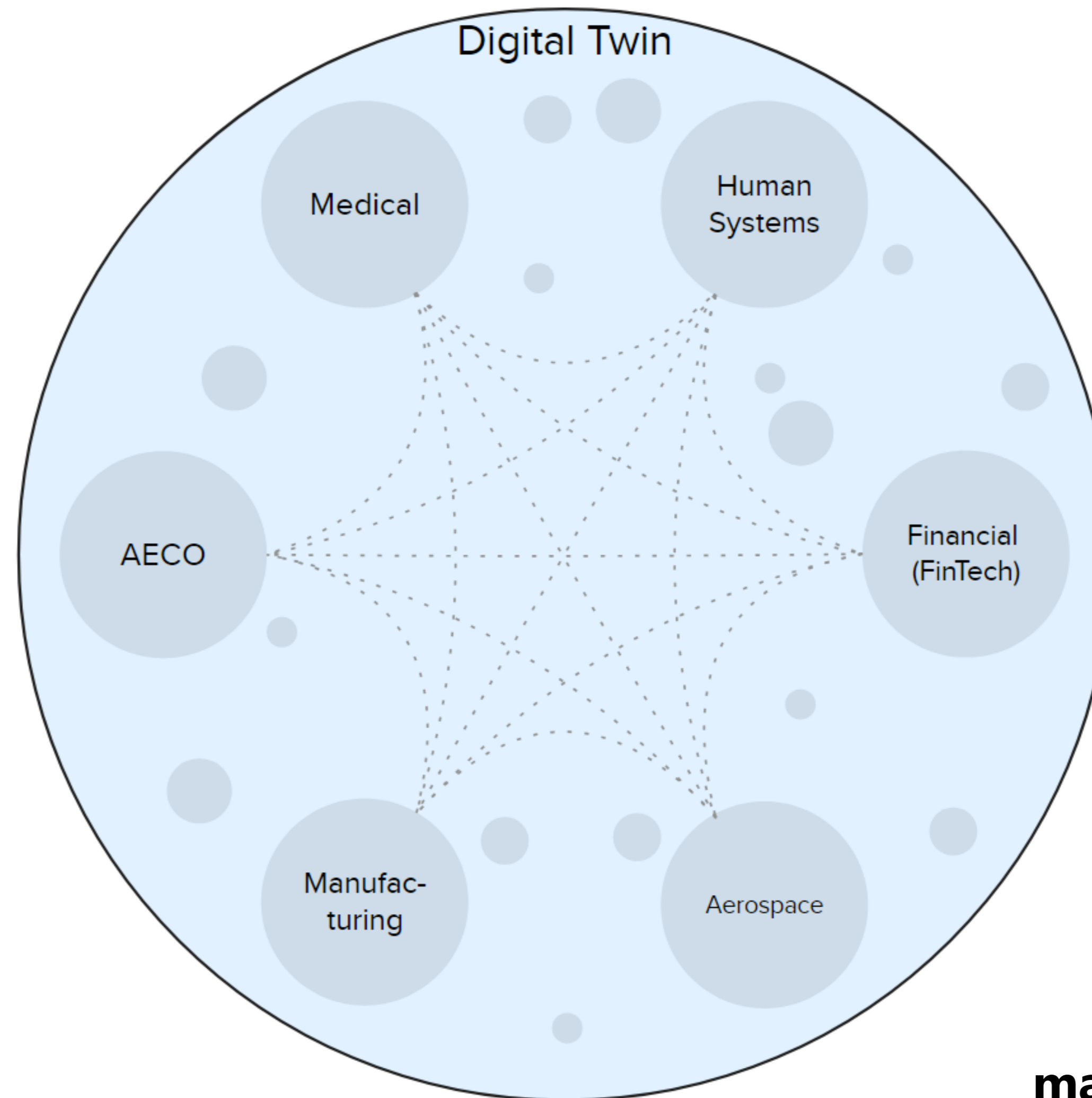**Across all AECO segments, Public Perception can be transformational.**

Public Perception

**How are Digital Twin and
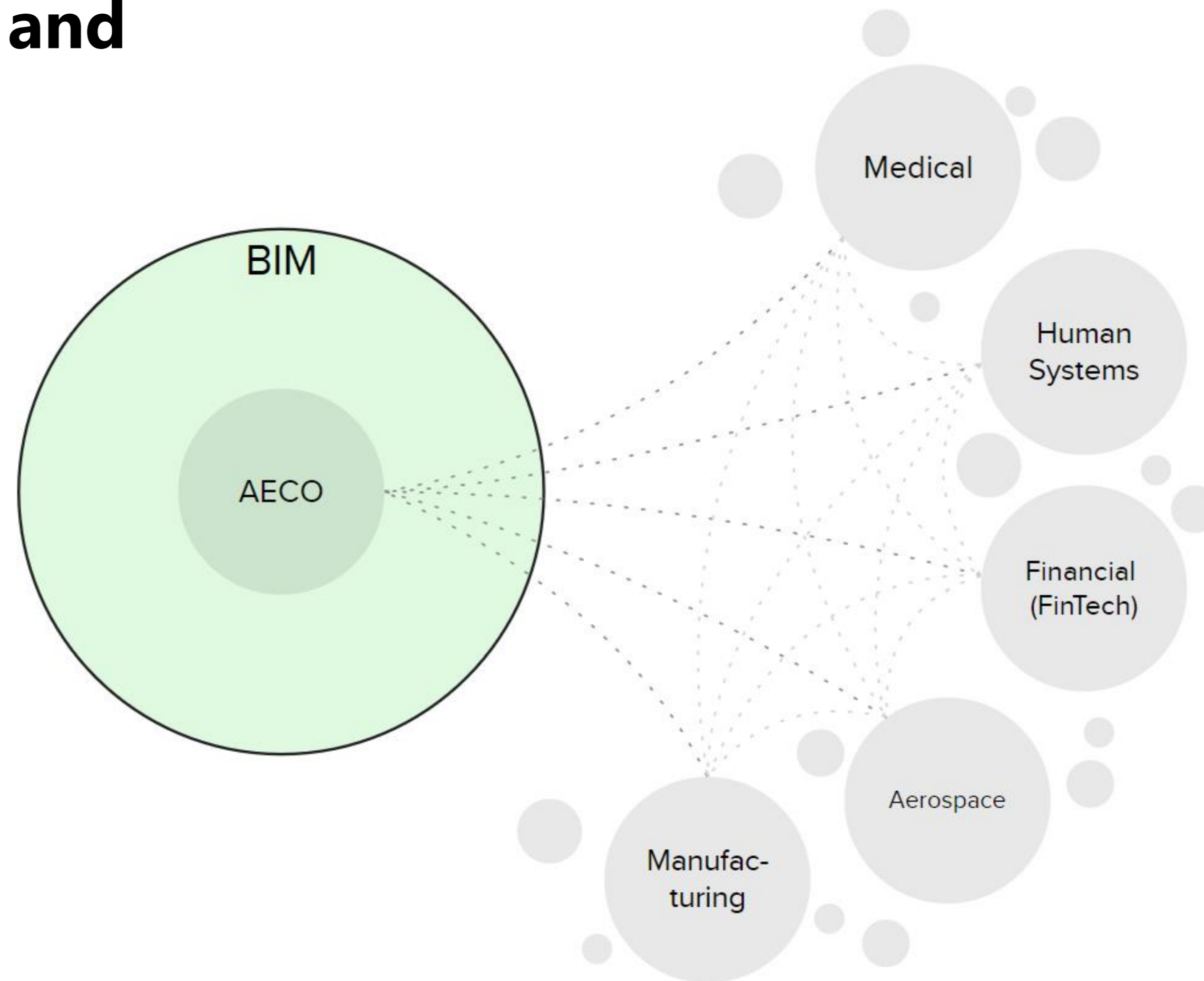BIM related to each other?**

Public Perception

How are Digital Twin and BIM related?

**Digital Twin relates
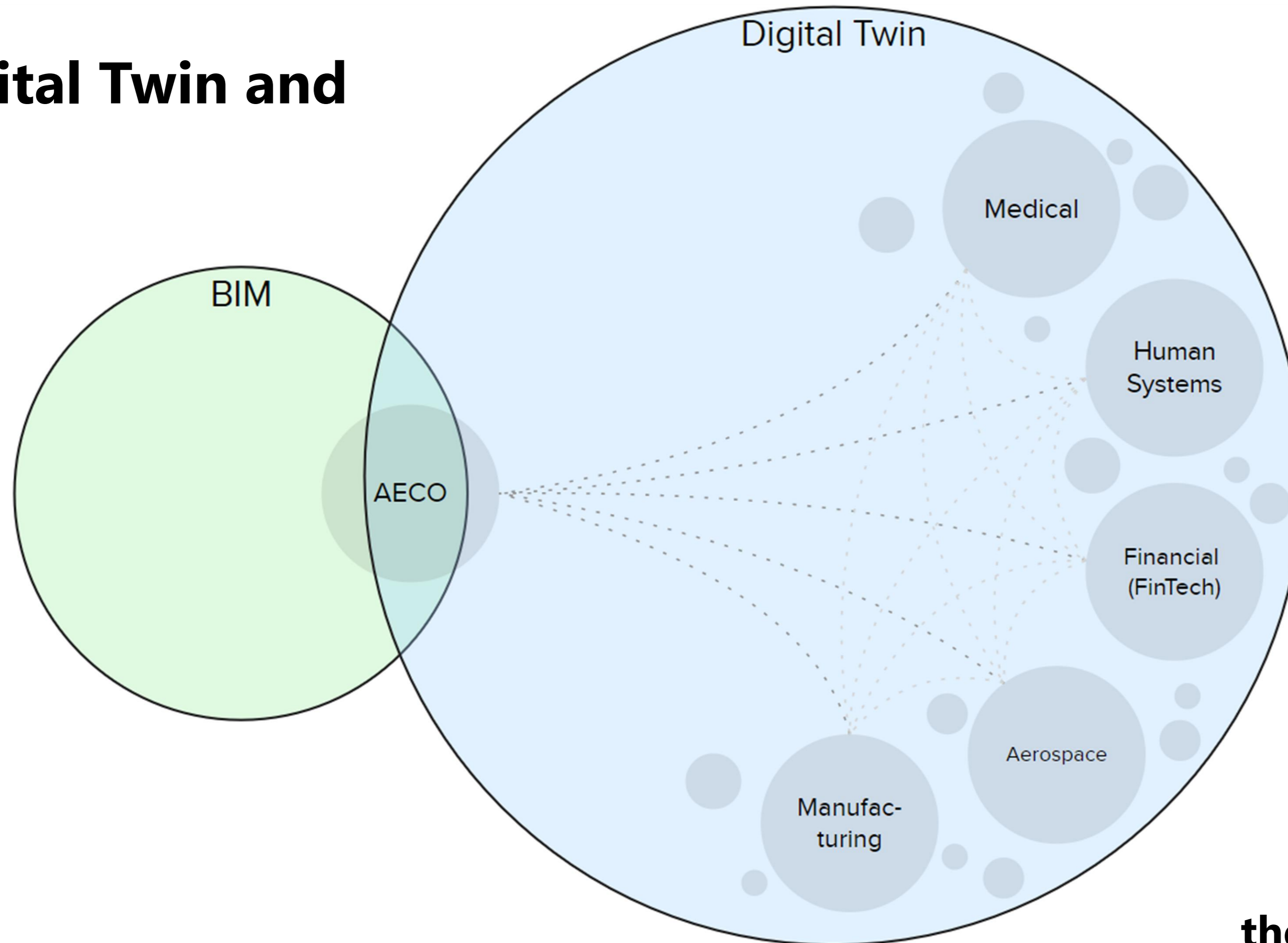<u>many things across industries</u>**

Public Perception

How are Digital Twin and BIM related?

**BIM relates
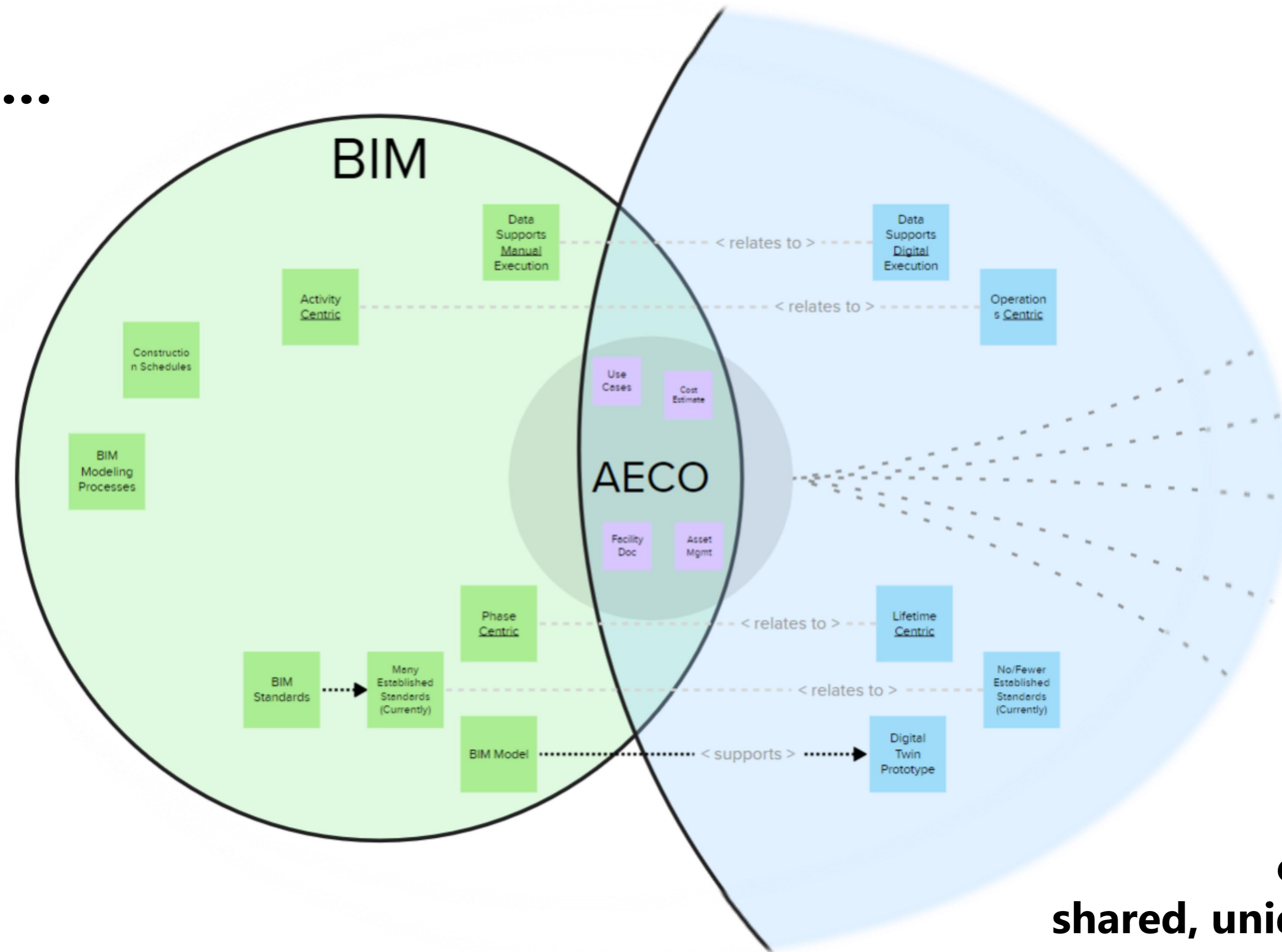AECO to industries**

Public Perception

How are Digital Twin and BIM related?

Together, they strengthen the AECO industry across ALL

Public Perception

There is more…
For later.

They are distinct
capabilities with a mix of
shared, unique, and related features

Public Perception

BIM and Digital Twin are distinct capabilities with <u>a compatible mix</u> of shared, unique, and related features
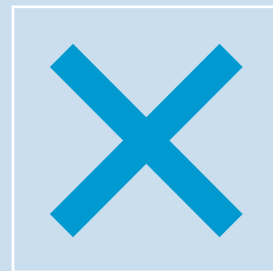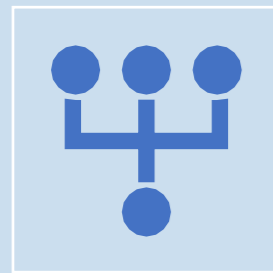
Foundations

Foundations

We already exist amongst digital twins

But interop between the frameworks are troublesome

Some systems work together, but when they don't significant issues arise

Why?

Extending the Value of BIM to Owners with a Digital Twin

🗂 Add to playlist ⓘ   ⮜ Share   💬 Comment

Digital Twins vs. Building Information Modeling (BIM)

ThoughtWire   ThoughtWire - February 1, 2023

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Fri Jul 01, 2022

Bridging the Gap

https://www.analyticsvidhya.com/blog/2023/06/srgans-bridging-the-gap-between-low-res-and-high-res-images/

What is a Digital Twin?

Copyright 2023: Zahra Ghorbani & John Messner, draft work in progress.

Uses & Execution and Data Framework

We Already Live in a Digital Twin Framework

BIM and DT Data Framework to Support Use Cases

Themes

Create a common understanding through a Data Framework that is agile, simple, open, modular and scalable

Adopt industry standards to enable a data framework for BIM and DT use cases

Unifying assets in a digital framework, ensures agility, scalability, and real-time insights throughout the lifecycle

BIM and DT Data Framework to Support Use Cases

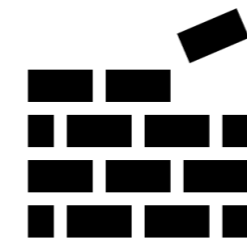*To build the future that is unified, agile, adaptable and data-driven*

DT Use Cases

Monitor MEP Asset	Optimize Energy Use
Manage Portfolio	Coordinate Design
Track Site Productivity	etc.

Application Layer

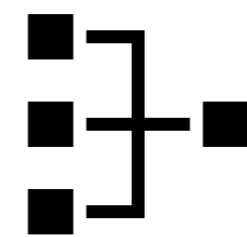|		
BMS/BAS	EDMS	AI/ML
FDD	EMS	AMS
CMMS	IWMS	etc.

Data Layer

Asset Information
Project Information
Organizational Information

Information and Communication Technology (ICT) Layer

IT Infrastructure
IoT Infrastructure
Communication Network

Create a common understanding through a data framework that is agile, simple, open, modular and scalable

Use Existing Industry Standards driven by Use Cases

To generate value and benefit from the differences between BIM and DT

One Asset → **Many Levels**

One Level → **Many Spaces**

One Space → **Many Components**

One Component → **Many Attributes**

Specific Use Case: I need to maintain facility assets
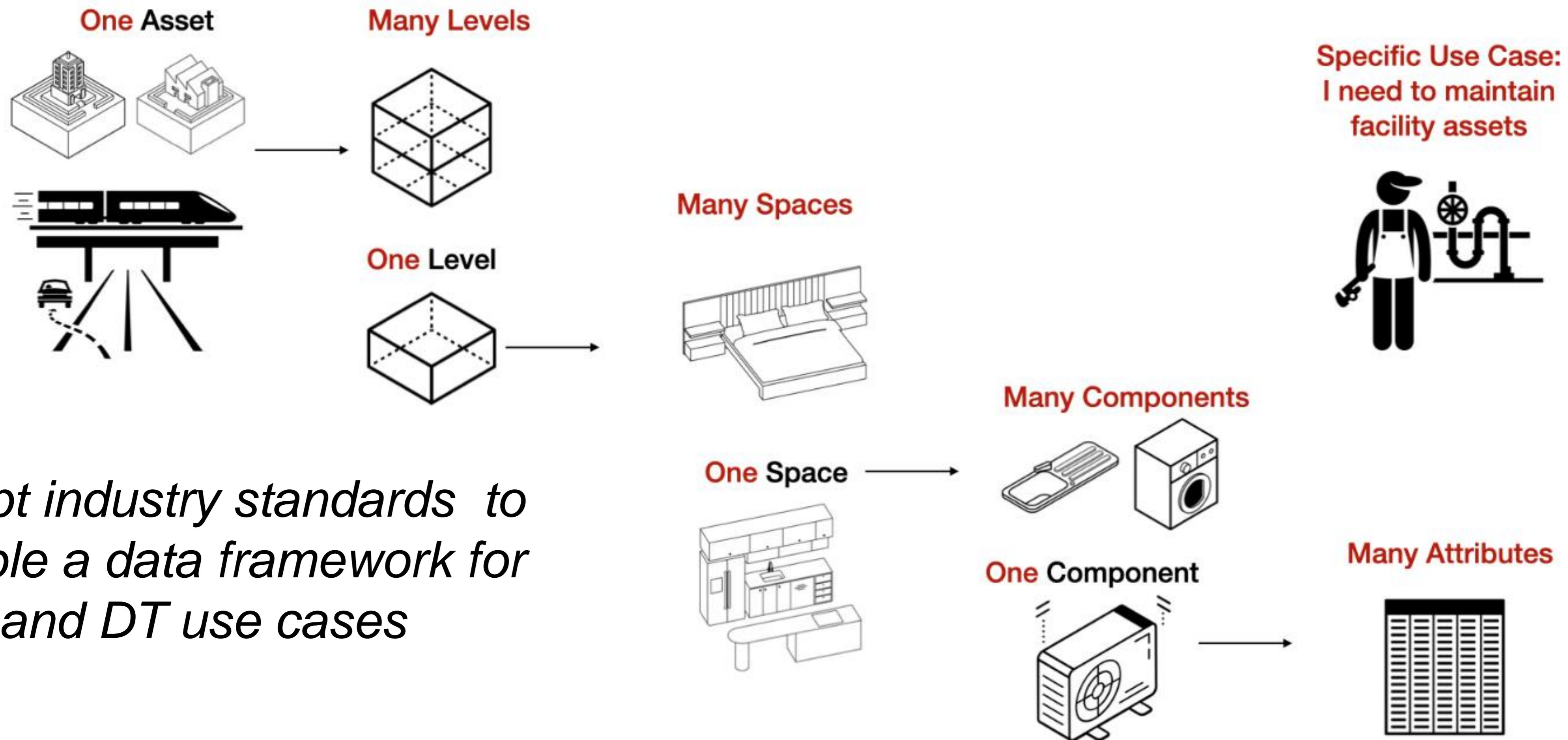
Adopt industry standards to enable a data framework for BIM and DT use cases

Expand beyond the single asset into the lifecycle

To connect the physical to the digital and maximize value of BIM and DT

Many Locations

Many Natural Systems

Many Spaces

Many Supply Chains

Many Datasets

Many Verticals

Many Horizontals

Many Assets

Many Artificial Dynamic Systems

That can be accessed on Many Platforms

Many Stakeholders

Unifying assets in a digital framework, ensuring agility, scalability, and real-time insights throughout the lifecycle.
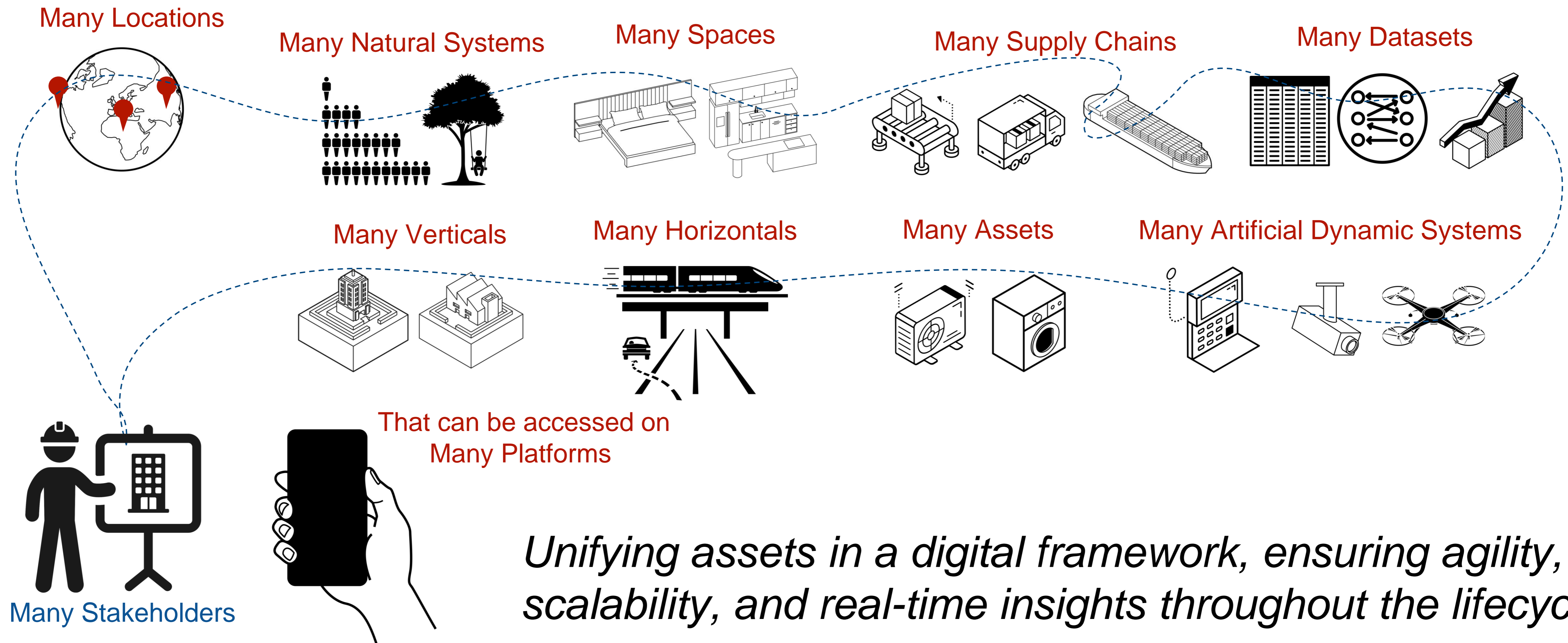
Position

Uses & Execution
and
Data Framework

1. Use **existing** Industry Standards

2. Tailor BIM & DT **data framework to specific use cases**

3. Champion Interoperability through **agility and simplicity**

4. **Ensure scalability** & adaptability beyond current use cases

5. Expand BIM **beyond individual assets** to processes & portfolios

6. **Benefit from the differences** between BIM and DT

7. Employ DT for **data-driven decision-making for the lifecycle**

8. **Connect physical to virtual** at a specified frequency & fidelity

9. **Leverage BIM** as a component for **delivering DT uses**

10. **Foster collaboration** in the BIM and DT ecosystem

Wrap-up & Follow-up

GET IN TOUCH WITH US

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Washington, DC 20005
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nibs@nibs.org

Thank you

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(202) 289-7800
nibs@nibs.org

Digital Twin Integration Subcommittee

THE DTI-S - A SUBCOMMITTEE ESTABLISHED BY THE NIBS BIM COUNCIL

BIM Council

PURPOSE OF THE DTI-S

To respond to industry needs and in support of continued innovation throughout the industry, the mission of the NIBS BIM Council Digital Twin Integration Subcommittee is to:

- Define the role of and develop the relationship between Digital Twins and the NIBS National BIM Program and National BIM Standard – United States® (NBIMS-US™)

- Coordinate with authoritative organizations and consortia in BIM and Digital Twin integration efforts.

WHY IS A DTI-S NEEDED?

CLARITY, CONSISTENCY AND A CATALYST FOR PROGRESS

Build on momentum

BIM and has become the best practice in built and natural world projects

Growing expectations

Owners are increasingly requiring digital project delivery for their built world projects

Remove confusion

There is a lack of clarity on the differences and dependencies on BIM and Digital Twins

Accelerate delivery of the promise

Clarity and consistency will accelerate the delivering on the promise of Digital Twins

WHAT IS THE DTI-S?

Define the role of, and develop the relationship between, **Digital Twins** and the NIBS **National BIM Program**

- Develop a white paper and position statement which clearly describes the relationship between **BIM** and **Digital Twins**

EXISTING DEFINITIONS

BIM

A digital representation of physical and functional characteristics...about a facility forming a reliable basis for decisions during its lifecycle
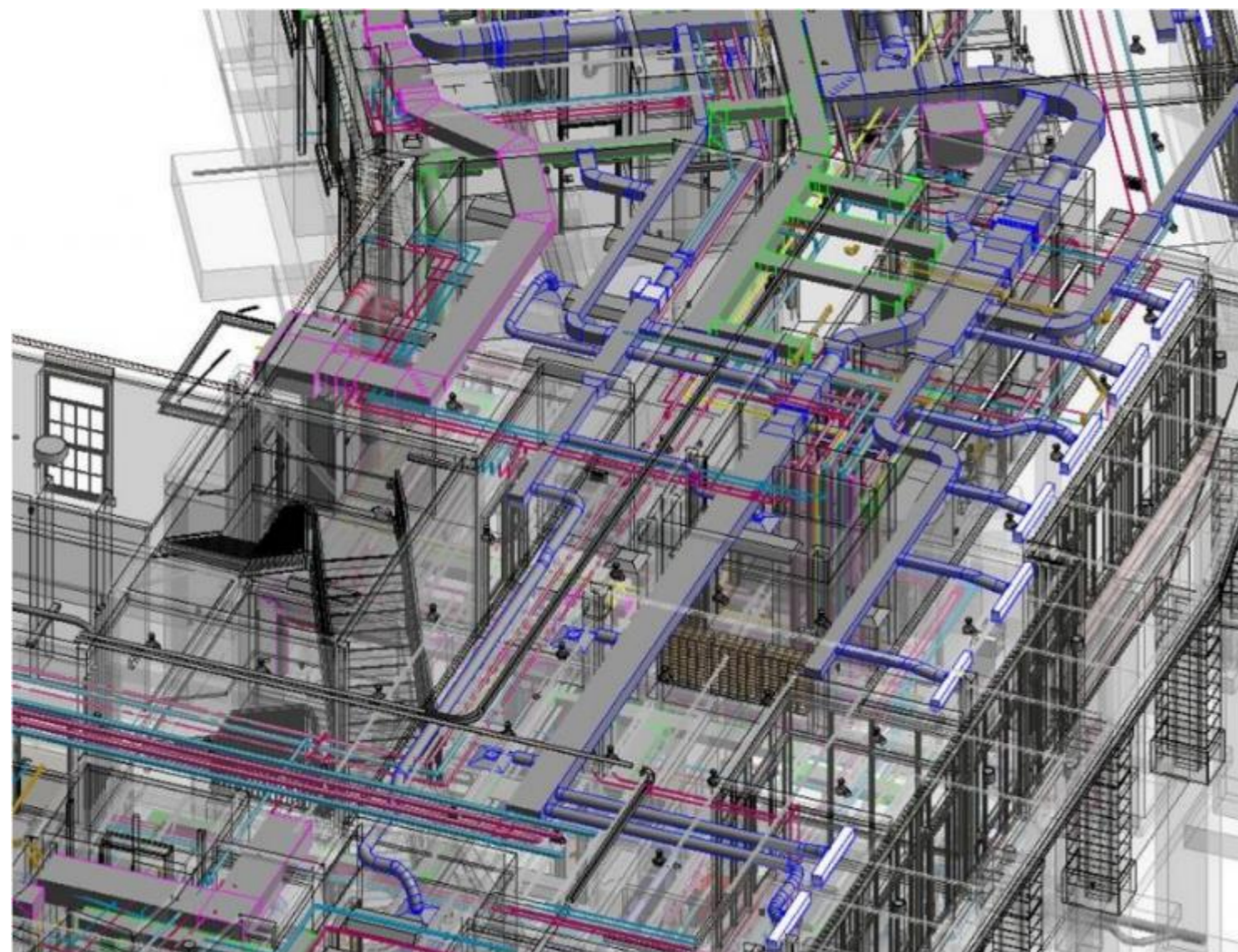
NIBS definition of BIM

Digital Twin

A virtual representation of real-world entities and processes, synchronized at a specified frequency and fidelity.

DTC definition of Digital Twin

openBIM

Enables an accessible digital twin which provides the core foundation to a long-term data strategy for built assets.

bSI definition of openBIM

HOW IS THE DTI-S PERFORMING THEIR WORK?

Governance

With a Chair and 3 Vice Chairs from different sectors, and nearly 50 industry experts, the DTI-S is well positioned to provide broad input and balanced guidance.

Working groups

The working groups ensure the DTI-S develops high-quality deliverables that align with the vision of the subcommittee and address the needs of the industry.

Collaboration

Feedback from committee members and facilitation from the Chairs will lead to consensus. Results will be synthesized into clear findings and guidance on the use of digital twins.

Deliverables

The DTI-S will provide best practices and guidelines for the use of Digital Twins in construction, while also addressing the relationship between Digital Twins and BIM.
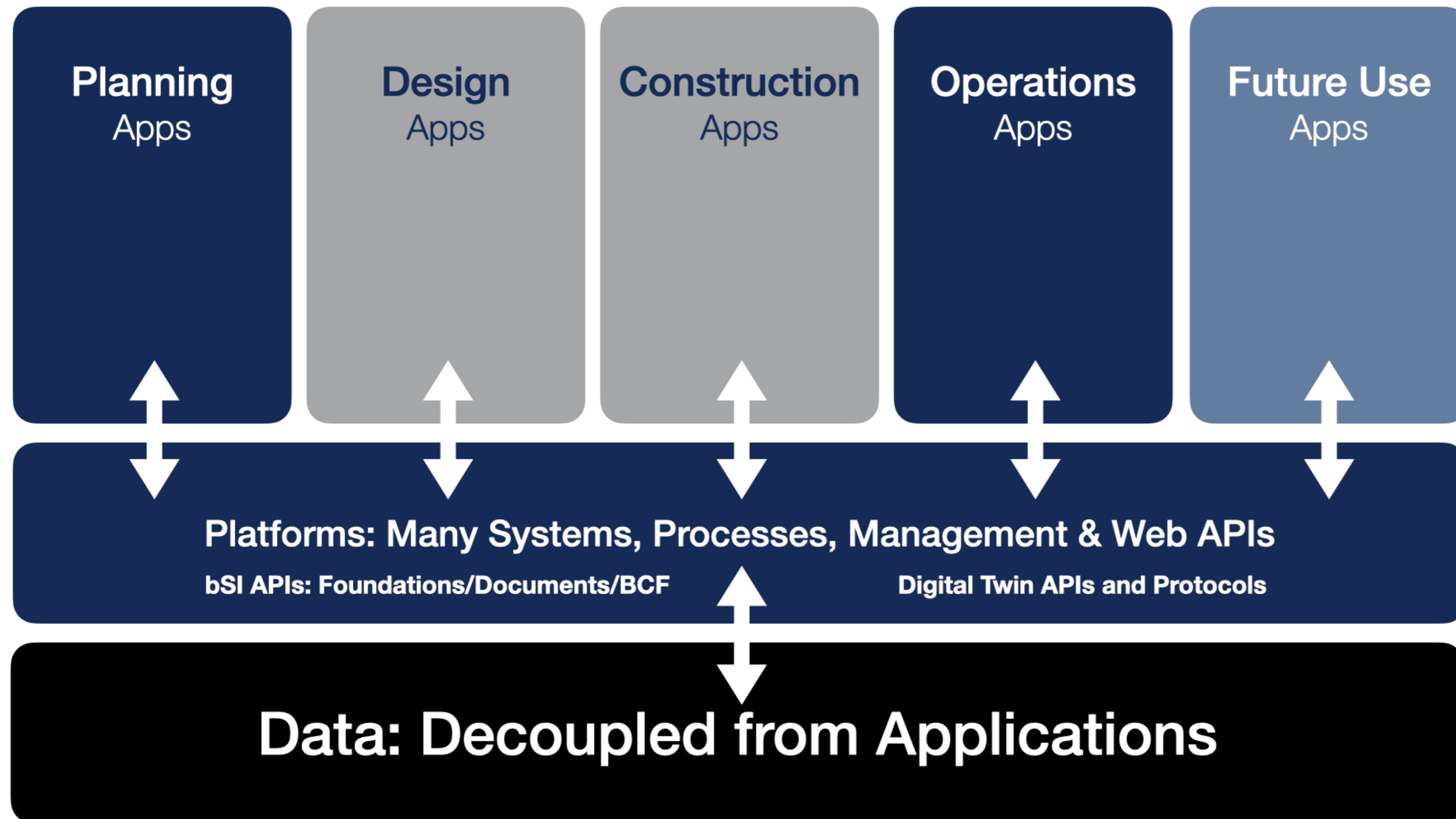
The Data Framework for BIM and DT?

A method to improve digital connections between BIM and DT

Not a data standard - policies and procedures for governance, data quality, integration, and security.

A guideline driven by use cases of how to use existing industry standards and practices

3-Decouple Data from Application Specific Dependencies

To own your data, and be free to use any app to connect to it

Planning Apps	Design Apps	Construction Apps	Operations Apps	Future Use Apps

Platforms: Many Systems, Processes, Management & Web APIs

bSI APIs: Foundations/Documents/BCF   **Digital Twin APIs and Protocols**

Data: Decoupled from Applications

That can be accessed on
Many Platforms

Uses and Execution Positions

1-**BIM and DT are very similar** in terms of uses and very different in terms of their implementation approach to accomplish those uses.

2-Both BIM and DT have data-based **processes utilized in all phases of a built environment asset's lifecycle.**

3-The data connection between physical and digital entities differs in BIM (as a digital model) compared to a digital twin.

4-BIM and DT are fundamentally different in terms of data requirements since DT processes both static and dynamic data.

Uses and Execution Positions

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