digital twin™
CONSORTIUM

Digital Twin Consortium Overview

October 1, 2020

If policy makers and businesses get it right, linking the physical and digital worlds could generate up to $11.1 trillion a year in economic value by 2025.

McKinsey

Who are we?

Our family

Object Management Group

OBJECT MANAGEMENT GROUP®	industrial internet CONSORTIUM®	CISQ Consortium for Information & Software Quality™	digital twin™ CONSORTIUM
Standards	Digital Transformation	Software Quality	Digital Twin

Founders and Groundbreakers

Founders

Ansys

DELL Technologies

GE

lendlease

Microsoft

NORTHROP GRUMMAN

GROUNDBREAKER digital twin CONSORTIUM Member since Day 1

Air Force Research Laboratory	CodeData	Healthskouts	LUNO UAB	Systems Analytics Solutions
Animated Insights	Connector Geek Ltd	IIMBE	Lux Modus Ltd.	Transforma Insights
Asset Management Lab, LLC	ConstruWise, Inc.	IOTA Foundation	Monash University	Trendspek
Association of Asset Management Professionals	CumuloCogitus Inc.	IOTIFY	NSW State Government	Twin Building GmbH
Autiosalo Ltd	Cybertwin	Idun Real Estate Solutions AB	Neural Concept	University of Melbourne
BEC - Blockchain Engineering Council	DIGIOTAI	ieLabs	Padi LLC	UrsaLeo Inc.
BIM6D Consulting	DataCities	IoT Management	Piprate	WSC Technology
Bandora Systems	e-Magic Inc.	imec	PropTechNL	Willow Technology Corporation Pty Ltd
Bentley Systems, Incorporated	Executive Development	Itus Digital	Resonai	Ynomia
Building 4.0 CRC	Gafcon, Inc.	Jitsuin, Inc.	Ricardo	YoGeo, Inc.
Chain Technology Development Co. Limited	Geminus.AI	LINQ Ltd.	Slingshot Simulations	

Our Steering Committee

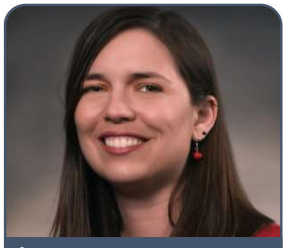
Bill Ruh

Ron Zahavi

Prith Banarjee

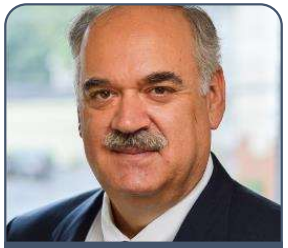
Said Tabet

Colin Parris

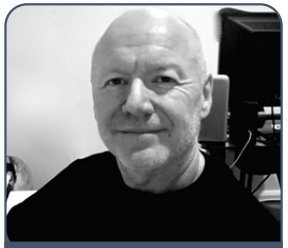


Laura Szypulski

Nicolas Mangon



Richard Soley



Richard Ferris

Sameer Kher

Jon Dunsdon

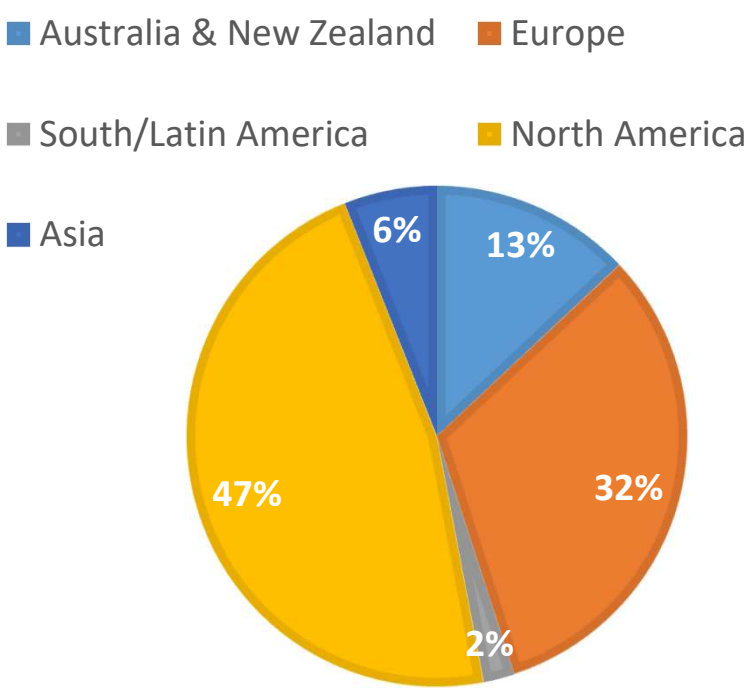
Greg Fallon

Bill Hoffman

Our members


MONASH University
PropTech For Good
Ansys
NORTHROP GRUMMAN
Microsoft
DELL Technologies
lendlease
ar ess gee digital incubator
mystic RIVER CONSULTING
VISUAL INTELLIGENCE
Prasaga
ENSPAN MONETIZE YOUR DATA
AFRL
TRUSCON GROUP
DIGITAL Innovation. Inter-Connected.
CIBERSUR
Berkeley & Imperial
Idun
SPHERITY
effution
YoGeo!
ITUS
MATRAK
magnae
bandora
NEURAL CONCEPT
controlBEAM
TRAX.GD
NSW GOVERNMENT
CHAIN
pryority droneworks.
e-Magic
LastMile TEAM
YNOMIA
LUXMODUS
ED Executive Development
GEMINUS
datacities
Goldratt RESEARCH LABS
Smart Connections Consulting
Thynkli
THE UNIVERSITY OF MELBOURNE
Prasaga
BT&BT Better Today. Better Tomorrow.
WELL ADVISED
HOLZERTIME Slaying generic content
imec
NTT Group
3RDi
VTS
ConstruWise
iveia
parabole.ai
builtstream
sappience.
TELLURIAN TECNOLOGIA
zelin
GVB Geomatics
IOTA
MONOM
PIPRATE
ShookIOT
DIGITAL TWIN TECHNOLOGY
XMPRO
Thynkli
Pacific Northw NATIONAL LABS
AUTODESK.
LINQ SEE. SOLVE. SHARE.
onscale
healthskouts
BEC BLOCKCHAIN ENGINEERING COUNCIL
HOTIFY
JANO CONSULTANCY
jitsuin
Resonai
oemgglobal
ПОЛИТЕХ
UrsaLeo
AMP Association of Asset Management Professionals
NORLEAN
DIGITAL TWINNING AUSTRALIA
BUILDOTS
REIMAGINE DATA
HYBIRD
IIMBE
HALO DIGITAL
BANTA MEDICAL SERVICES
FORTIG
PADI
3RDi
DESIGN+CONSULTING
GVB Geomatics
IP
CyberTwin
RICARDO
DDi
The Value Enablement Group LLC
trendspek
POWERBIM
TRANSFORMA INSIGHTS
building 4.0 crc
ADAGOS PARSIMONIOUS NEURAL NETWORKS
Anagha
ALLOSENSE
numondial
arendai
SPINALCOM
NORLEAN
willow know your world
SLINGSHOT SIMULATIONS
CONNECTOR GEEK
Roadwork
Animated Insights
Bentley
gafcon
twin building

DTC Global Membership



26 Countries Represented

Australia	Lithuania
Belgium	Netherlands
Brazil	New Zealand
Canada	Portugal
Chile	Russia
France	Spain
Germany	Sweden
Hong Kong	Switzerland
India	Turkey
Ireland	U.S.A.
Israel	United Kingdom

Market challenges for digital twin

Limited Interoperability

- There is no standardization, definitions and common language
- Digital twins can be difficult to apply across the product lifecycle
- Often there are multiple digital twins, versions or views that don't interoperate
- Your efficiency could be limited by data silos
- You need to fit digital twin technology within a legacy environment

Market Confusion

- Limited use cases and research available to learn from others
- It's difficult to know where to start to quickly get value
- How do you decide what technologies to use?
- What is your minimally viable digital twin?
- In most cases, your employees haven't done this before.
- Many companies re-brand as "Digital Twin" overnight

High Stakes

- Once you choose a digital twin path you have to stay on it
- The software world does not apply to the digital twin world
- Digital twin projects require heavy investment of both hard and soft costs: money, people, time, equipment
- No defined answers to what to use, when to use it and how to use it
- If you get it right, the payoff is worth the risk

How does a consortium help solve those challenges?

DTC – Facing the Challenges

Digital Twin Consortium drives the adoption, use, interoperability and development of digital twin technology. It propels the innovation of digital twin technology through consistent approaches and open source development. It is committed to accelerating the market and guiding outcomes for users.

Improve Interoperability	Accelerate the Market	Demonstrate the Value

Vision and Mission

- **GOAL** - Become ***THE Authority in Digital Twin*** as it relates to:
  - Policy, Security, Trustworthiness, Interoperability and overall development
- **DEFINE** - Ecosystem, standards requirements, architectures, open source code
- **IDENTIFY**- Gaps - enable solutions to address them
- **PUBLISH** - Publish statements and opinions
- **PARTNER** - with Industry, academia & government in a collaborative open environment
- **DRIVE** - Adoption, use, interoperability and development of digital twin technology.
- **PROPEL** - Innovation of digital twin technology
  - Consistent approaches and open source development.
- **COMMIT** - Accelerating the market and guide outcomes for users

First-year Priorities

Develop use case library

Define open source implementation

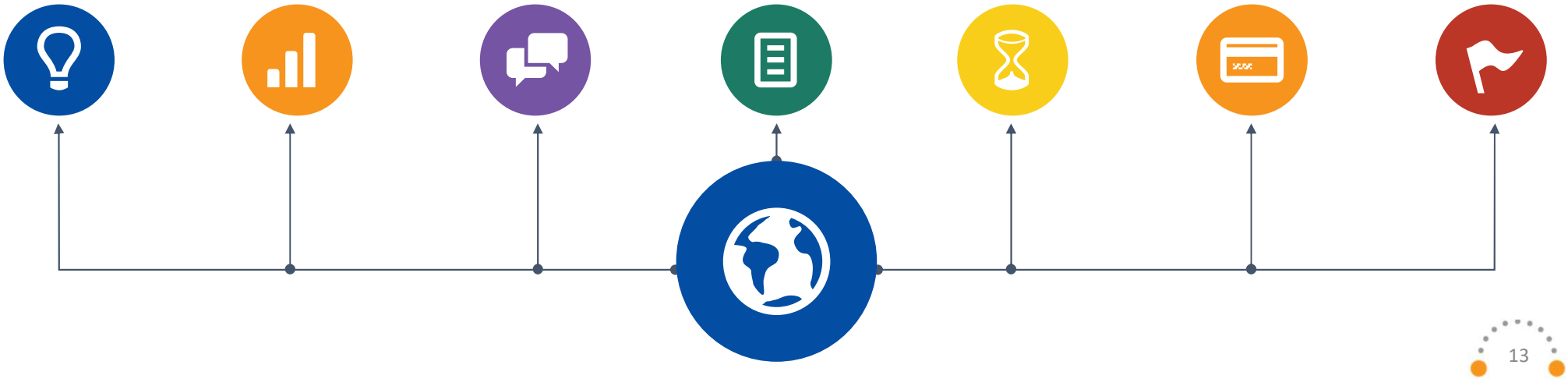
Define terminology & taxonomy

Identify Types of Digital Twins: Process, Simulation, etc.

Identify Product Lifecycle: Design, As Built, As Manufactured, As Maintained

Common Challenges vs. Industry Specific Vertical

Establish Global Digital Twin Conference



Initial Working Groups

Technology, Terminology & Taxonomy

Infrastructure

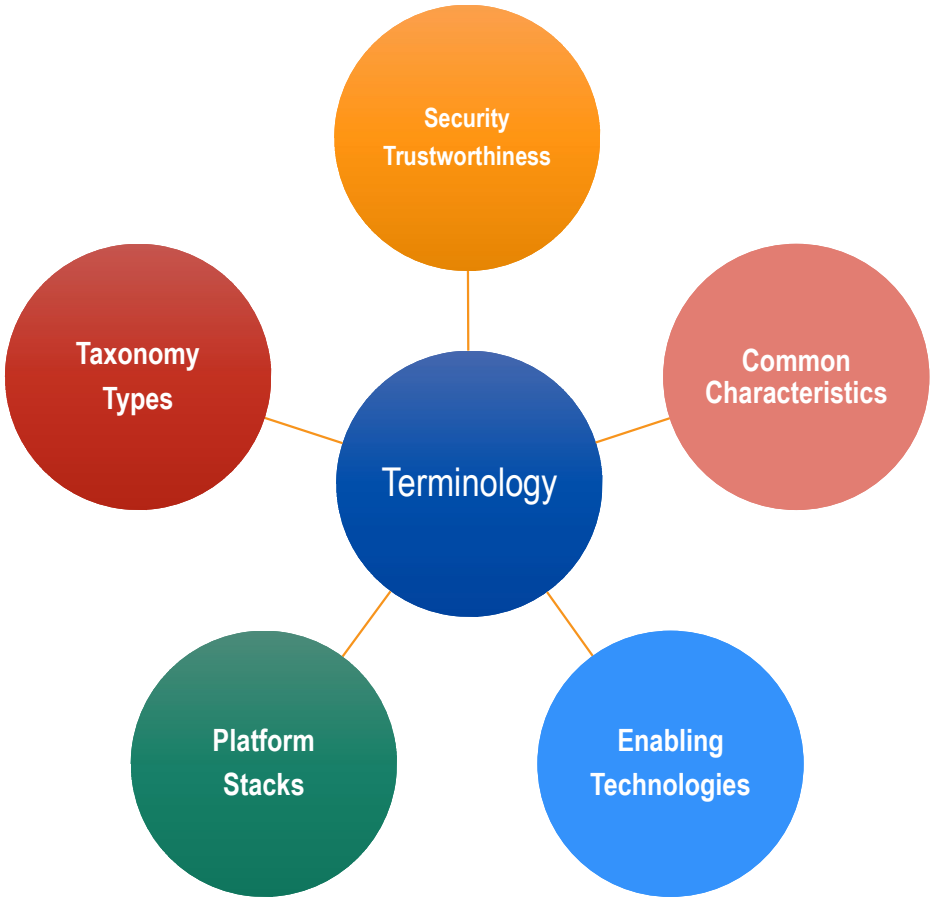
Manufacturing

Natural Resources

Defense & Aerospace

Marketing

Technology, Terminology & Taxonomy Areas



TOP 3 QUESTIONS . . .

What is a Digital Twin?

Why should I care?

How do I get started?

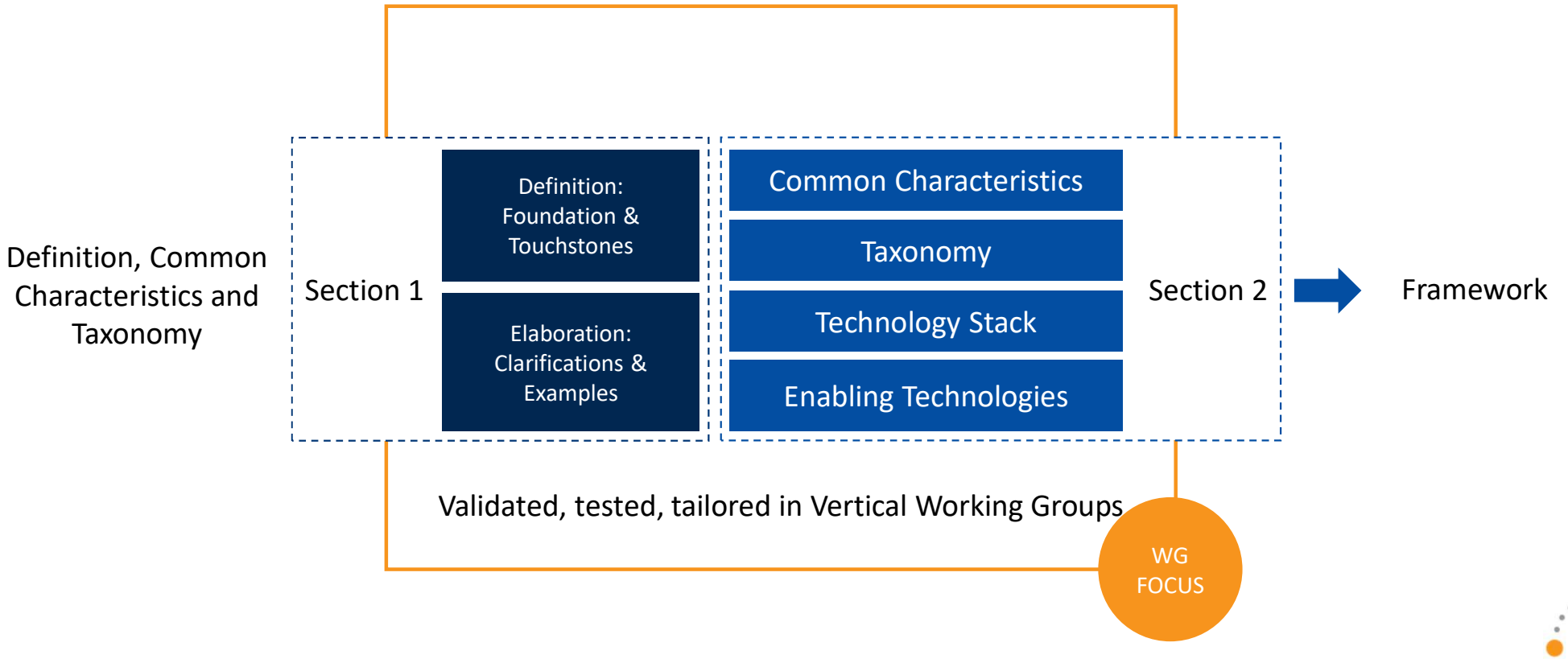
What Is A Digital Twin?

- Provide **semantic scaffolding** for DTC work
- Direct to **commercial audience**
- Center on **outcomes** and **use cases**
- Orient towards **Open Standards**
- **Agnostic** on vendors
- Applicable across **domains**
- Leverage **existing resources** and thought leadership
- Focus on the **what**, not the how
- Structure to accommodate **expansion**, **additional detail**, and **domain-specific specialization**.

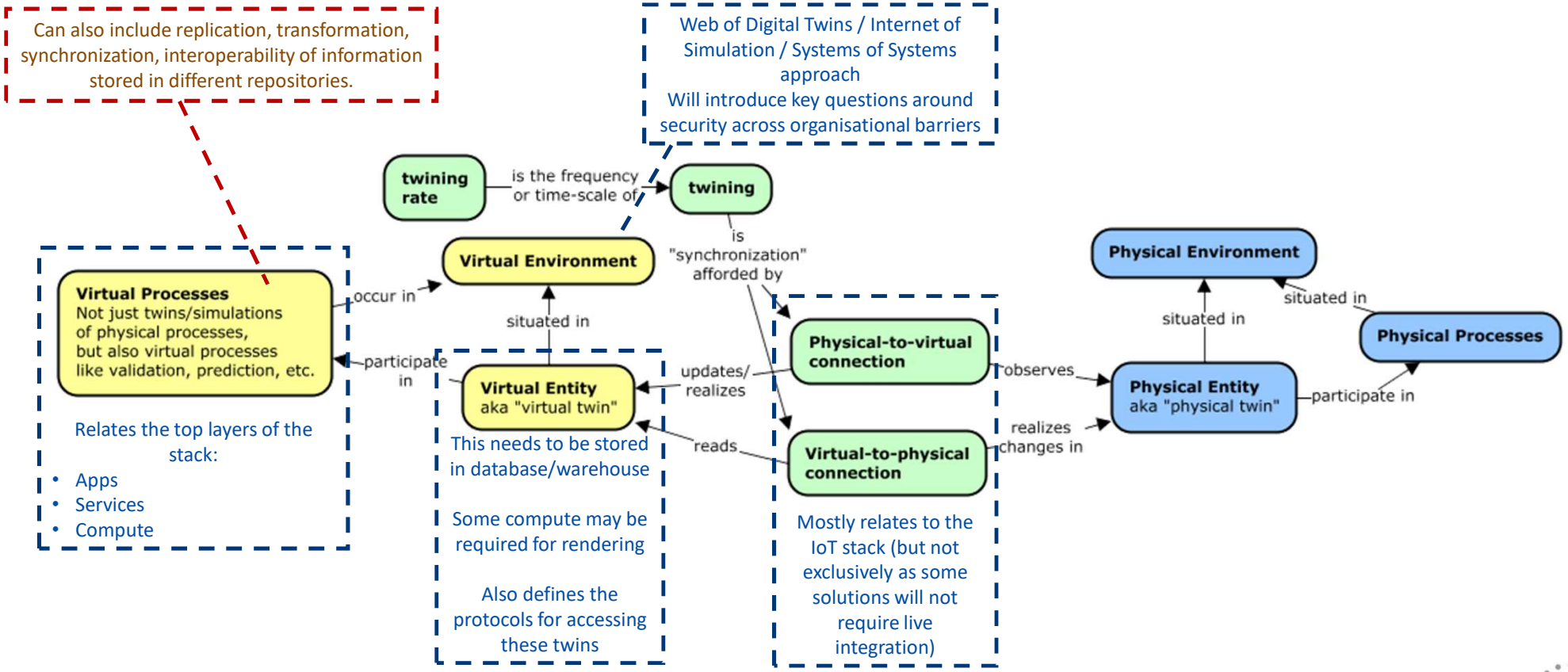
First Principles

- Provide **semantic scaffolding** for DTC work
- Direct to **commercial audience**
- Center on **outcomes** and **use cases**
- Orient towards **Open Standards**
- **Agnostic** on vendors
- Applicable across **domains**
- Leverage **existing resources** and thought leadership
- Focus on the **what**, not the how
- Structure to accommodate **expansion**, **additional detail**, and **domain-specific specialization**.

Definition Framework



Characteristics of Digital Twins



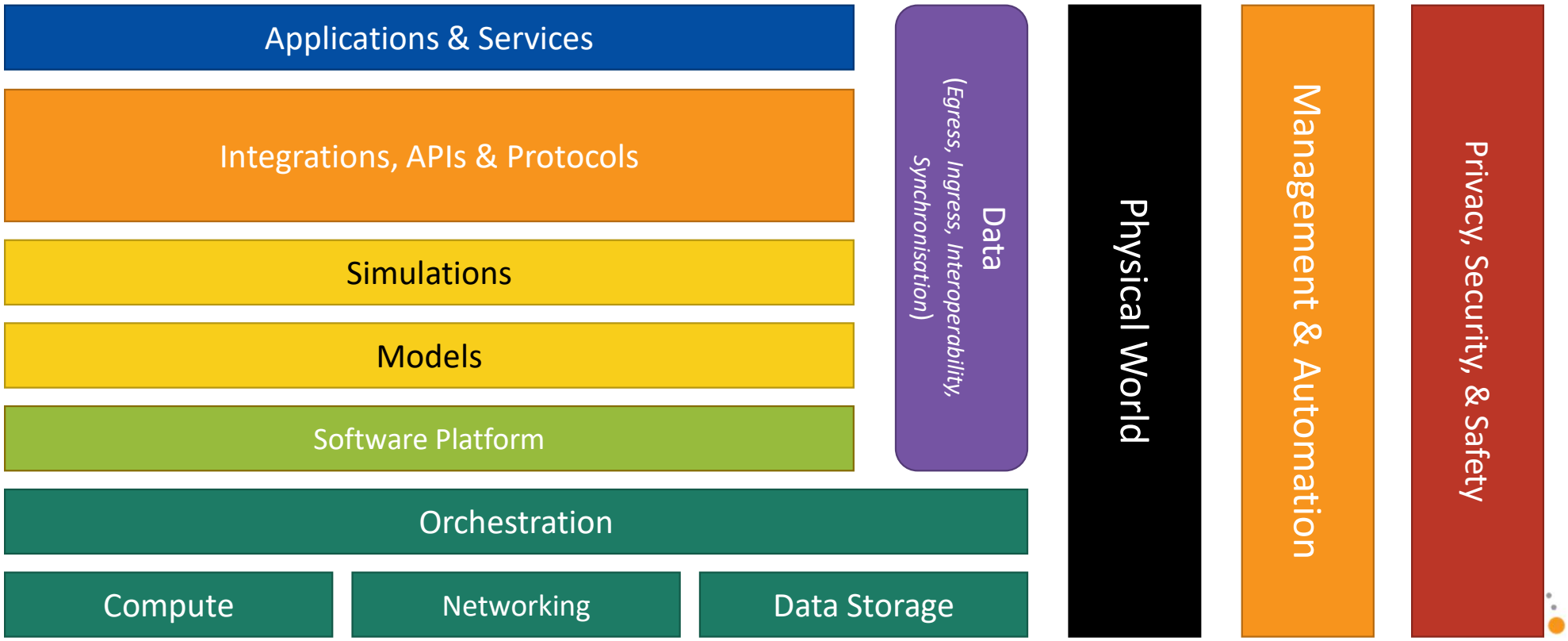
David Jones et al in “Characterising the Digital Twin: A systematic literature review”

Characteristics and Enabling Technology Examples

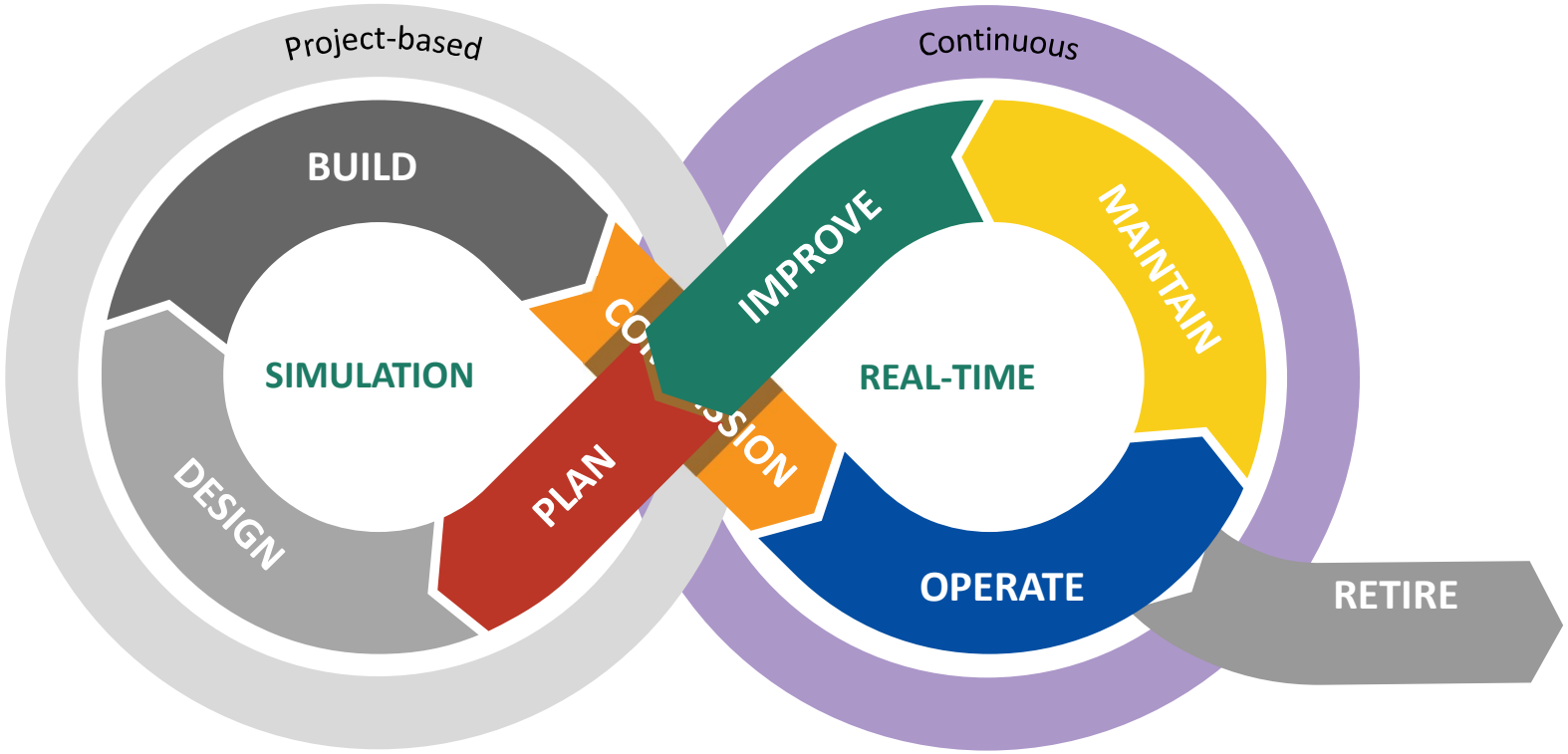
- Accessibility
- Trustworthiness
- Security
- Connectivity
- Analytics
- Data

Artificial Intelligence/Machine Learning
Internet of Things (IoT) (IIoT)
5G
HPC
Big Data / Analytics
Augmented/Virtual Reality (xR)
3D Scanning
Advanced Sensor
Multi-Cloud
Edge Computing
Advanced Modeling
…

Expanded Stack (Preliminary Draft)

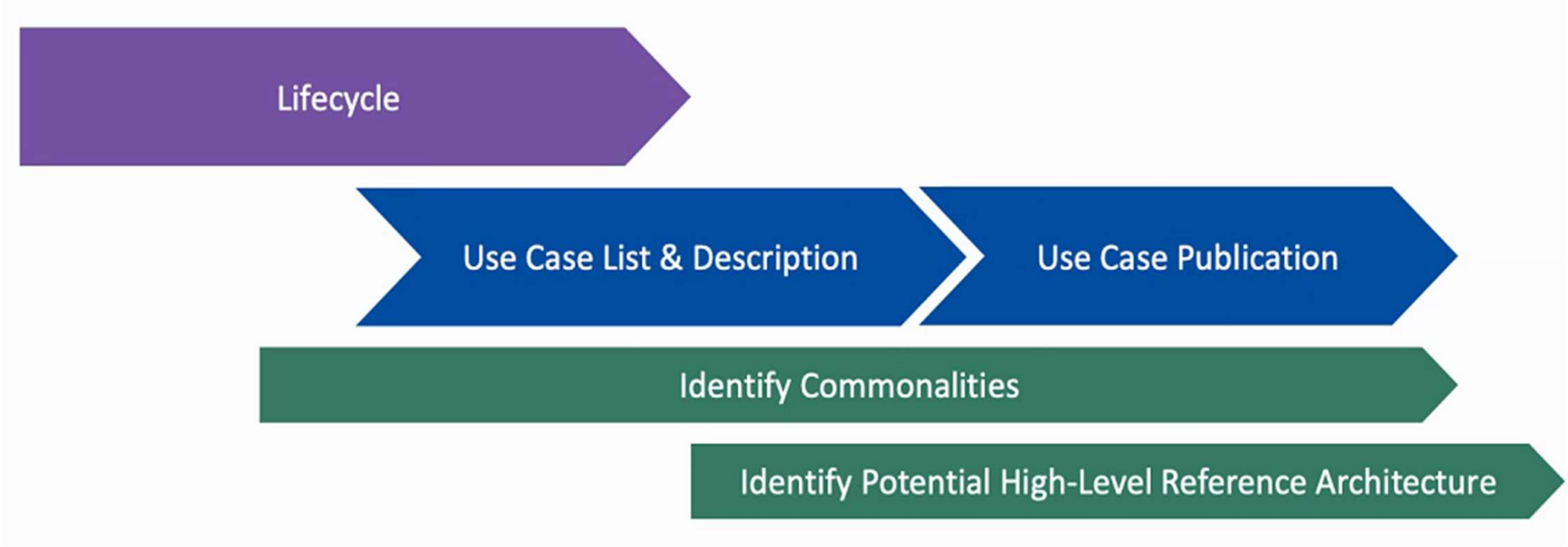


Why Should I Care?

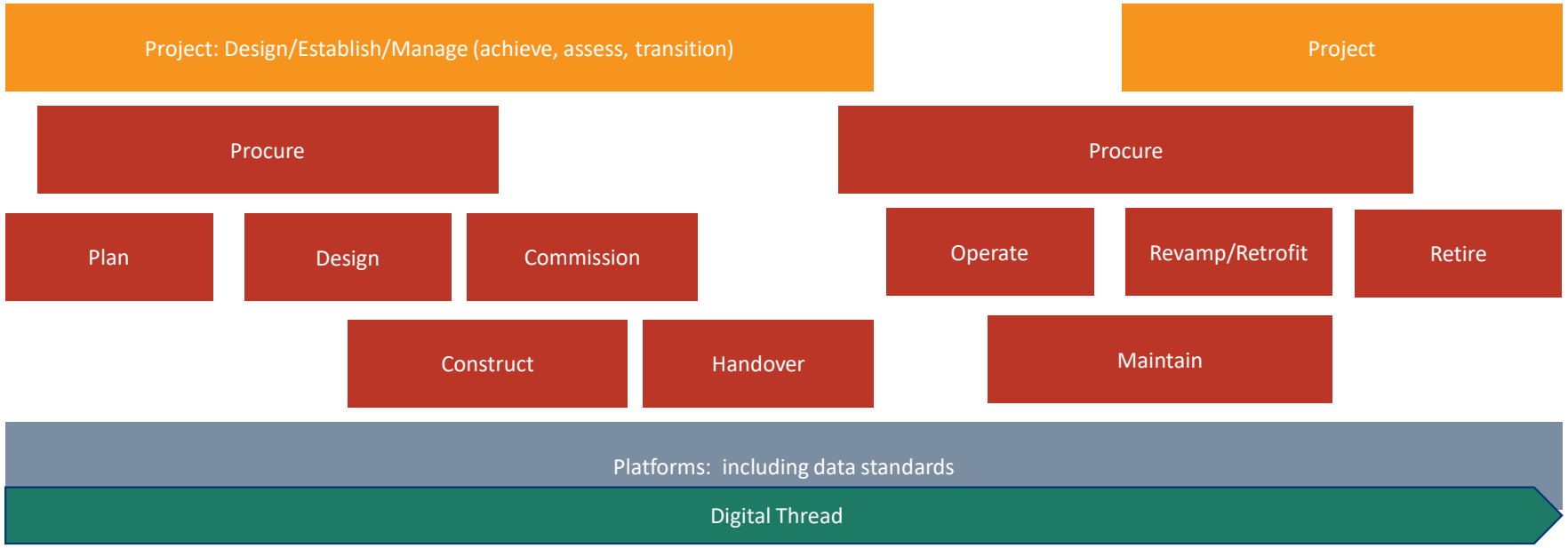


What are the use cases and associated benefits in my industry?

Working Group Deliverables Approach



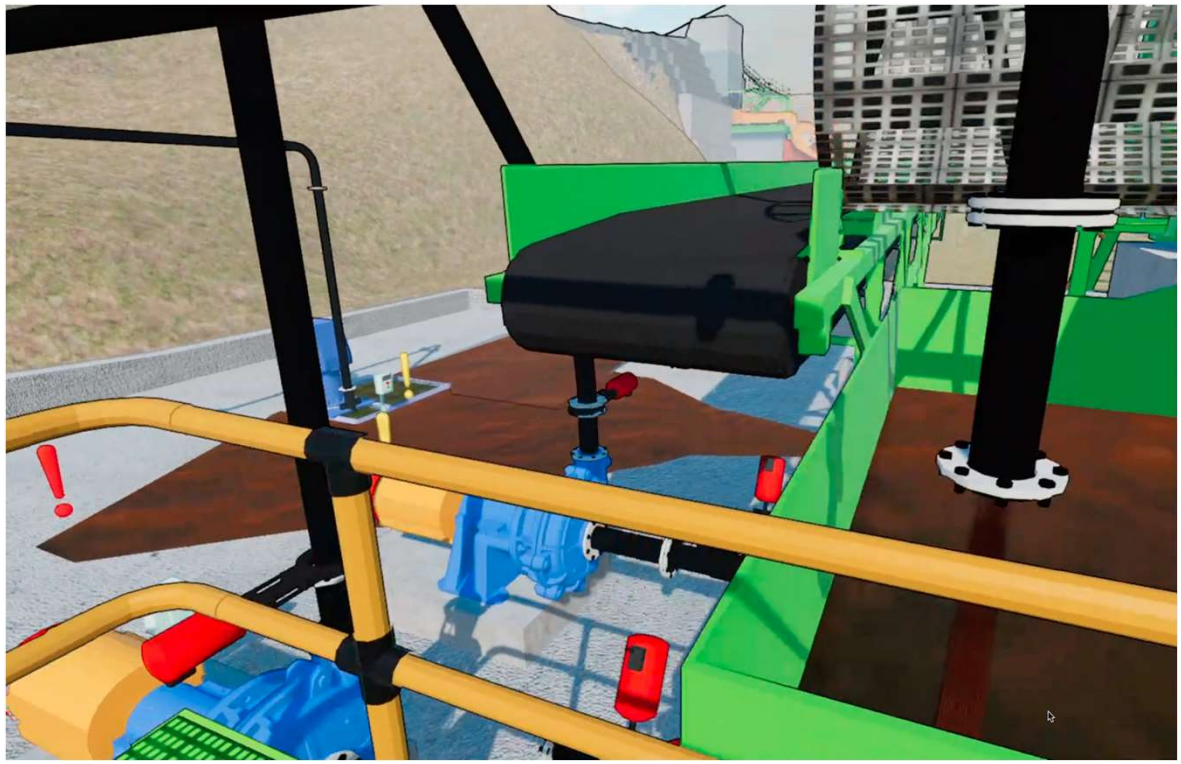
Lifecycle


Project: Design/Establish/Manage (achieve, assess, transition)
Project
Procure
Procure
Plan
Design
Commission
Operate
Revamp/Retrofit
Retire
Construct
Handover
Maintain
Platforms: including data standards
Digital Thread

Typical Use Cases

- Simulation Twin to lower risk with virtual commissioning, training, and startup prior to launch (commissioning – refinery)
- Digital Twin for Coal Handling and Processing Plant (CHPP) during Operations
- Long Conveyor Predictive Maintenance Digital Twin (Maintain)
- Transmission and distribution energy loss analysis using simulation and real twins (operate)
- Simulation twin to do the impact analysis due to catastrophic natural events
- Grid load analysis using simulation and real twins (operate)
- Renewable energy (wind and solar) simulation and prediction using twin
- Blast furnace Digital Twin for Casting Guidance (operate)
- Well Integrity Digital Twin monitor and predict events that focus on critical barrier system stability in a well.
- Training Digital Twin for hazard identification (like flight simulator for process plants) on gaming engine platform with real-time data feeds
- Simulation and evaluation of prototype nuclear reactor support systems

Use Case Example in Mining

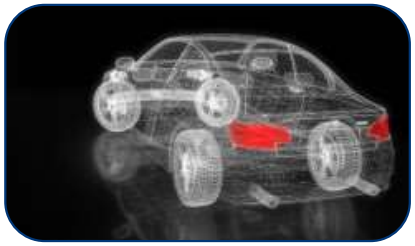


- Real-time process optimization in gold processing plant
- Real-time predictive and condition-based maintenance
- Real-time safety monitoring and hazard assessment

… combined in single twin

Use Case Examples

- Automotive Use Case:
  - Digital Twin-first virtual product development:
    - Typical timeframe for certifying safety critical features: 18-24 mos
    - Simulation-based certification of 150 variants in 3 days
  - Business Outcome: 2 years & <$500M vs. 5+ Years over $1B

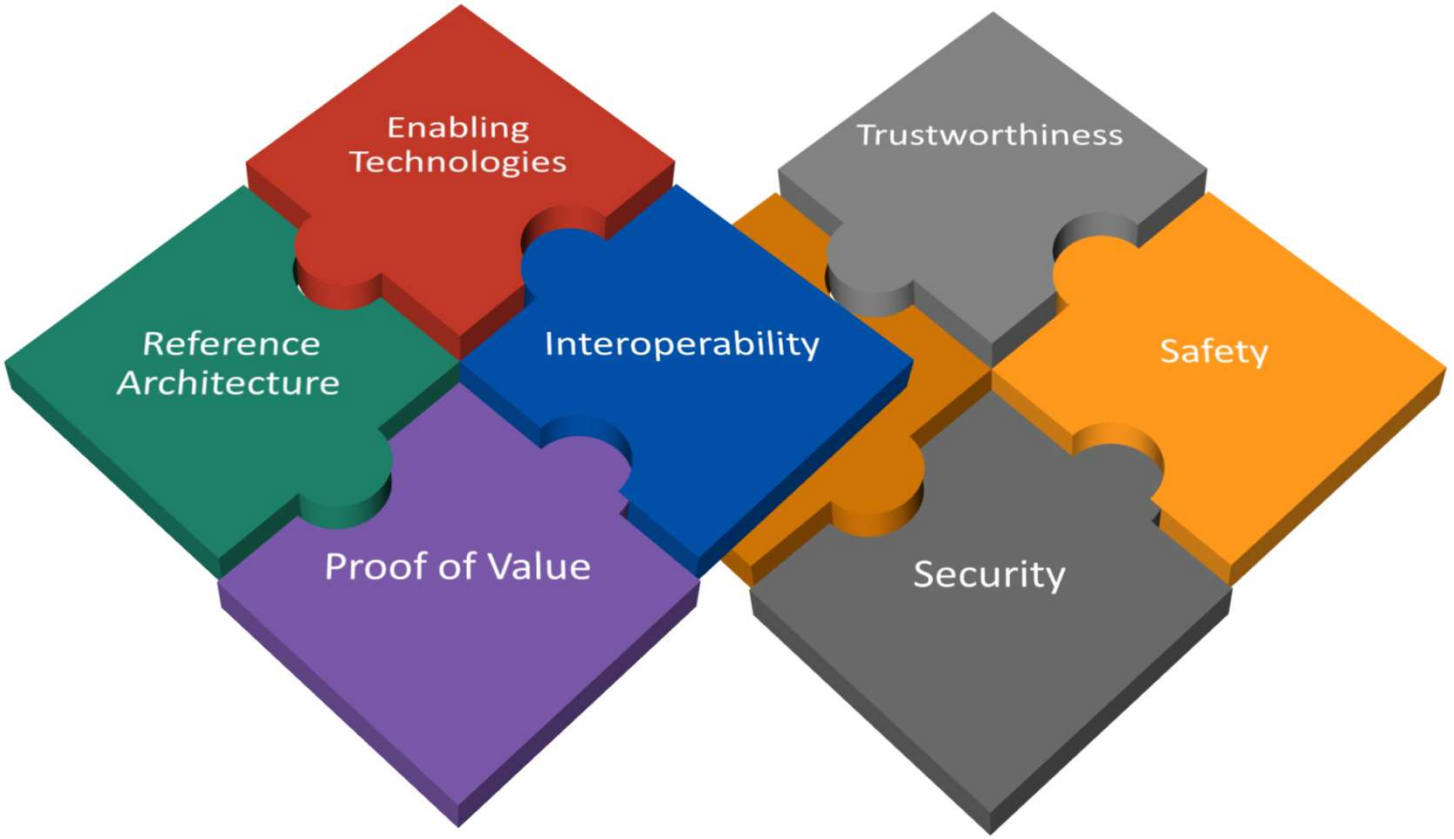


- Real Estate Enterprise Use Case:
  - Digital Twin of Organization: achieve Cost Optimization and Sustainability
  - Reduction in overall operating costs achieved by:
    - Connecting real time data to visualize interdependence between functions, processes and KPIs to drive business outcomes
    - Streamlined asset data collection from Smart Buildings – benchmarked GHG emissions Integrated sustainability KPIs w/ business processes
  - Business Outcome: Reduced overall GHG Emissions across portfolio of buildings
  - Over 10M$ Savings realized from Combined Business Outcomes

General Use Cases

- Real Time Location Services
- Remote Monitoring/Management
- Fault Detection and auditing
- Diagnostics and Self-Healing
- Condition based Maintenance
- Flow Maintenance
- Occupancy and Utilization
- Space optimization and reconfiguration
- Asset management and tracking
- Energy usage optimization/management
- Realtime insights management
- User/visitor experience
- Productivity management
- AI-based simulation
- Video analytics
- Physical safety and Security
- Automated emergency management
- …

How Do I Get Started?



Why Should I Get Involved?

Influence

- Participation in Digital Twin Consortium working groups
- Eligibility to chair working groups
- Influence requirements and future standards for digital twins

Collaboration/Thought Leadership

- Collaborate with industry peers
- Access to Membership Portal and all working group work in progress
- Membership in Digital Twin Consortium speaker bureau

Marketing

- Listing in member directory on Digital Twin Consortium website
- Industry recognition as a leader in digital twins
- Usage of Digital Twin Consortium Membership badge in your personal and corporate marketing materials

Next Steps

Digital Twin Forums

- Virtual: December 3
  - Our sibling IIC co-hosts this event with Fira Barcelona
  - We have several members on the agenda (which will post soon)
- Physical: May 20-21, 2021 – Barcelona
  - **Call for speakers deadline October 16:** https://www.iotsworldcongress.com/get-involved/become-a-speaker/
  - End user co-presenter required

THE STAGE FOR END-USERS

Our audience is interested in hearing the **business outcome metrics** of these end-user companies, and if possible, to hear it directly from the end-user customer.

Outcomes can be defined as improved efficiency, reliability, asset management, remote monitoring, increased productivity, decreased downtime, increased profits, etc.

Learn More

- New Consortium Overview video
  - https://youtu.be/MKo7ZDfzc5g
  - Social media posts to begin tomorrow.

- TTT – September 9, 11am ET
  - Demystifying Digital Twin Terminology, Taxonomy and Technology
- Natural Resources – September 23, 5pm ET
  - Leveraging Digital Twin Technology in Natural Resources
- Infrastructure – October 7, 5pm ET
  - Application of Digital Twin Technology to Infrastructure – Developing Best Practice
- Manufacturing – October 21
  - Digital Twins in Manufacturing – An Enormous Opportunity
- Aerospace & Defense – November 4
  - Applying Digital Twin Technologies in Aerospace & Defense

Our channel: https://www.brighttalk.com/channel/18347/

Thank you!