BUILDING INNOVATION
Emerging Technologies Series

Case Study: Bespoke Digital Twins for Bespoke Client Needs

December 10, 2024
National Harbor, MD

Jacobs

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Introductions

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Digital Delivery Director, Cities & Places

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Director, Visual Media Group

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Challenging today.
Reinventing tomorrow.

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Agenda

- **Digital Advisory Importance!**
- **ArcGIS Indoors Digital Twin**
- **Unreal Engine Digital Twin**
- **Q&A**

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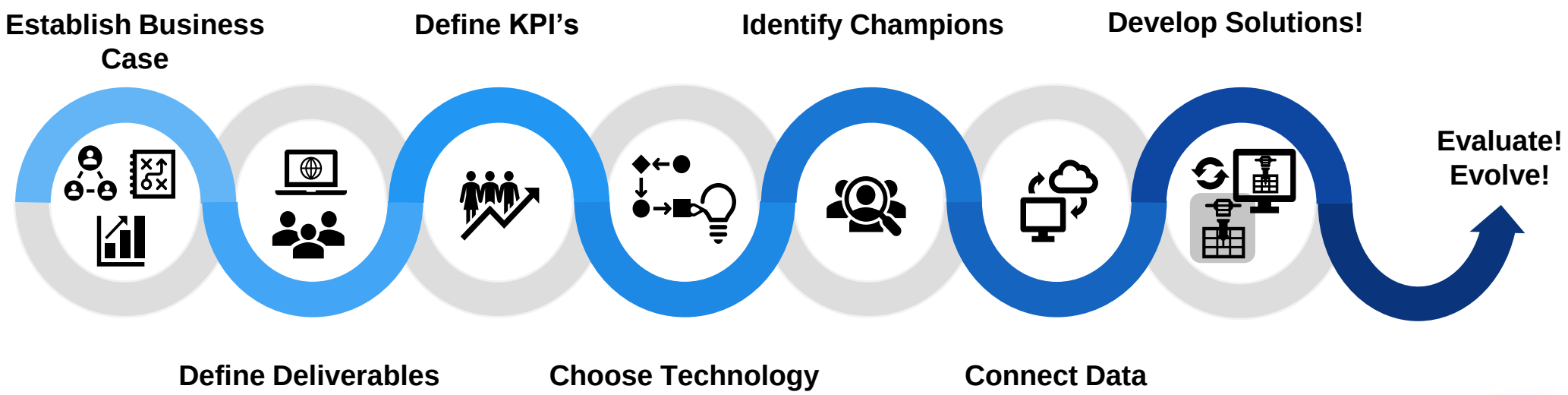
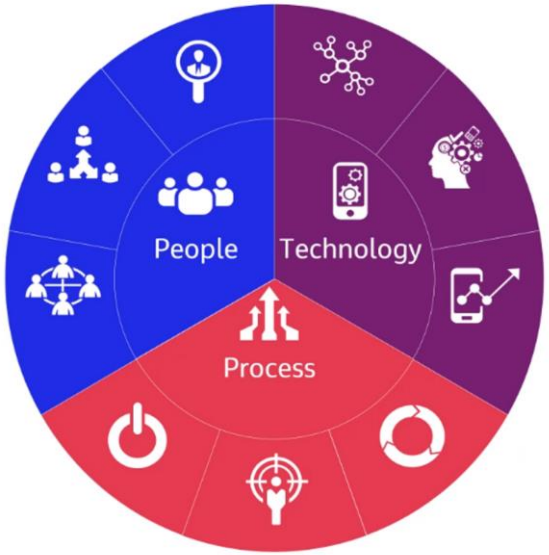
Digital Transformation Prerequisite: Digital Advisory!



70%

of all Digital Transformation efforts Fail!

- **Lack of Stakeholder Support**
- **Too Much, Too Fast**
- **Focus on Technology First**



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Digital Twin Development Process: White Paper

Digital Twin Fundamentals

What is a Digital Twin?

- Facility & Asset Digital Twin
- Process Simulation Digital Twin
- Operational Optimization Digital Twin

Importance and relevance of Digital Twins in today's Industry

Successfully developing a Digital Twin: Key Activities & Pitfalls

Phase 1: Defining vision and strategy

Phase 2: Assessing digital maturity and potential for digital disruption

Phase 3: Reviewing existing technology stack & identifying potential technologies

Phase 4: Execution planning

Phase 5: Application Development & Implementation

Digital Twin Benefits & Use Cases

Facility & Asset Digital Twin

Process Simulation Digital Twin

Operational Optimization Digital Twin

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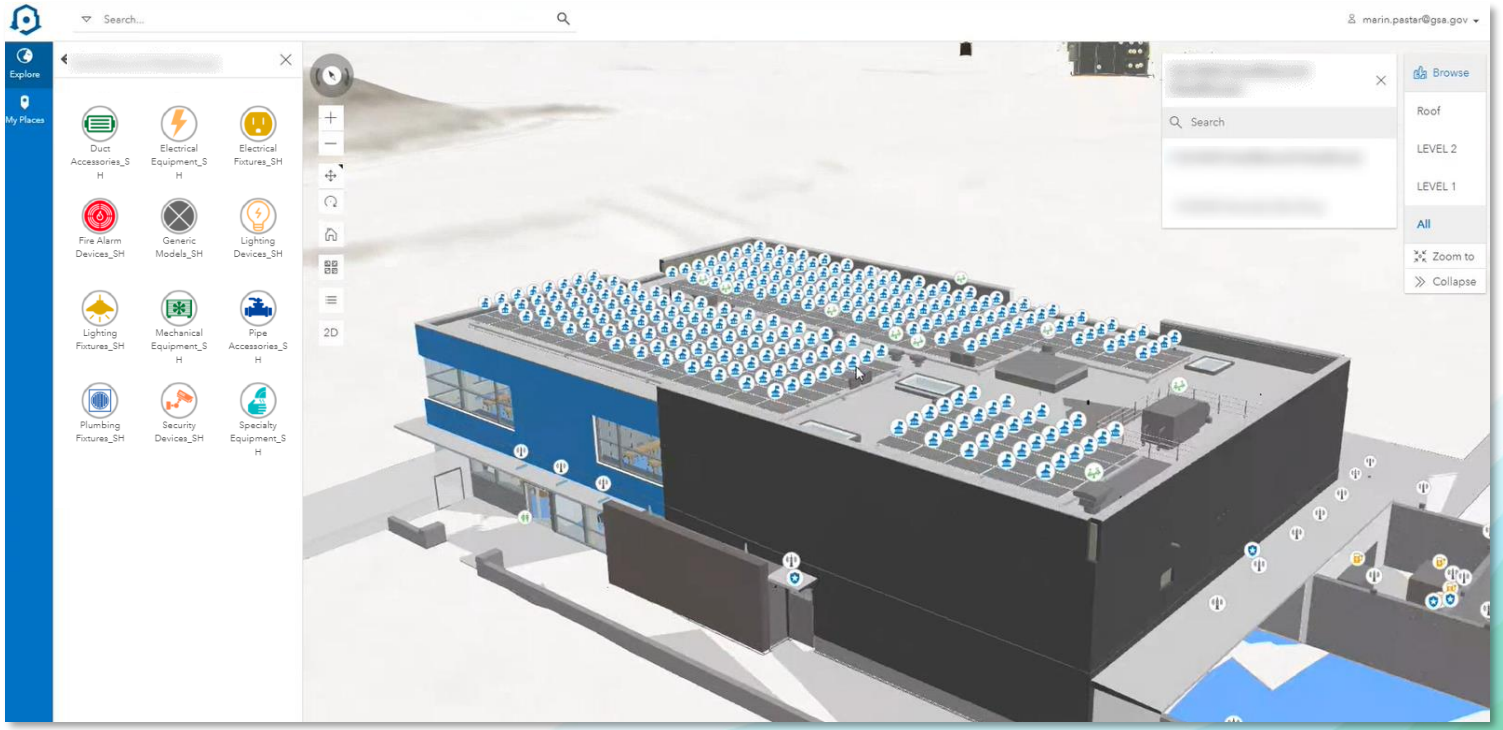

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Case Study #1:

ArcGIS Indoors Digital Twin at the San Ysidro Land Port of Entry (SYLPOE)

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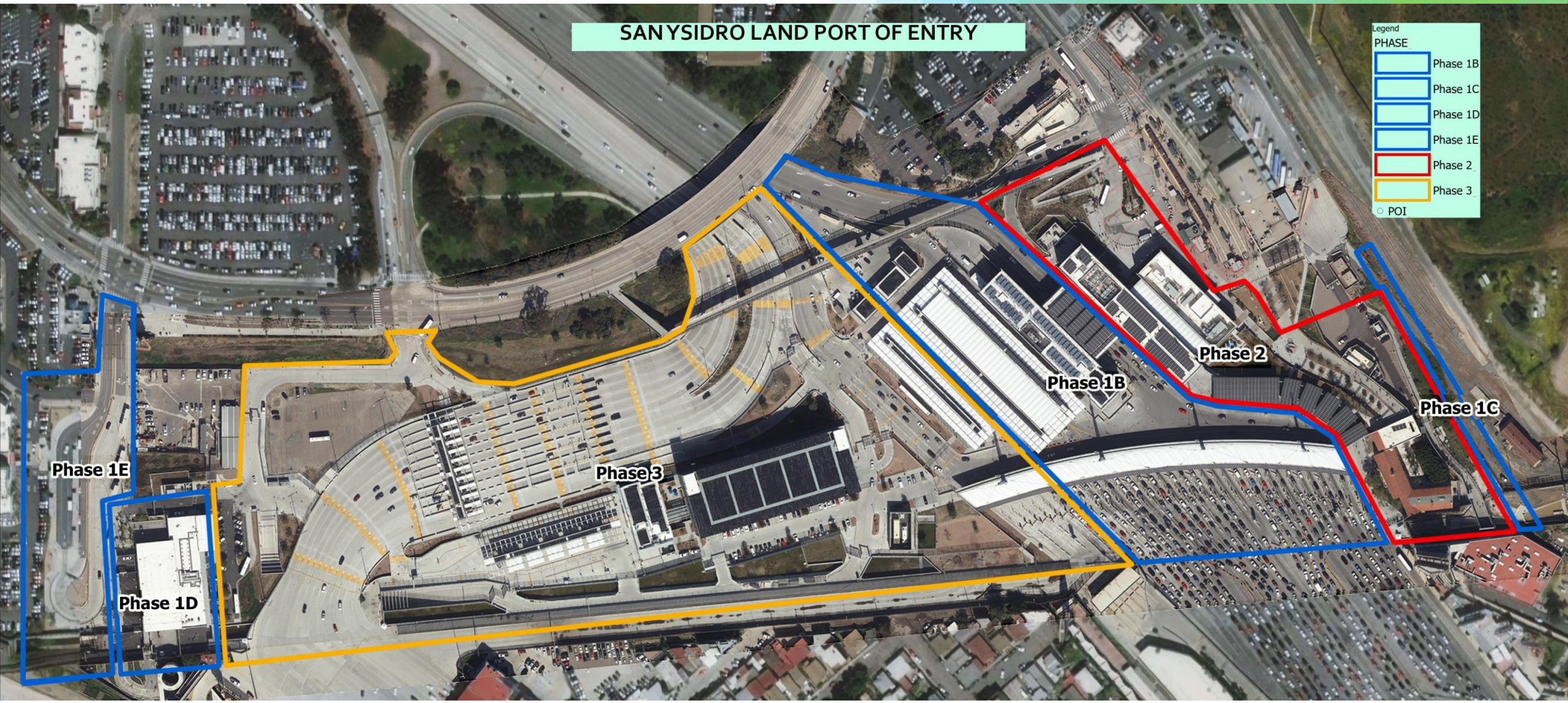
10 year, 3-Phase $1B Campus Expansion & Modernization



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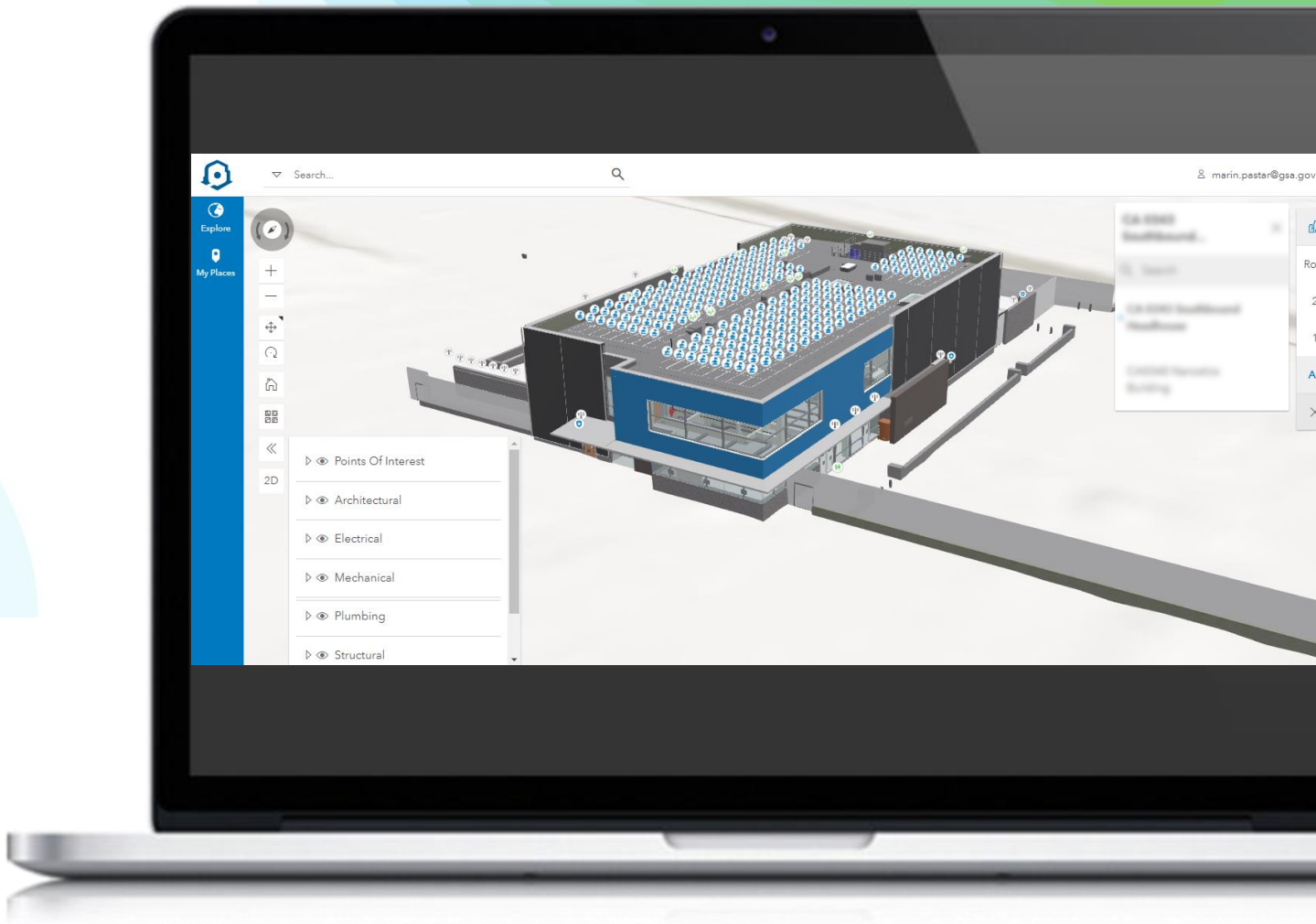
Pilot Project:

Tool for streamlining analog Facility Management Workflows



GSA

procon consulting

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The FM tool had to be accessible in the Field on Mobile Devices.

And FedRAMP Certified!

Req. #	Functional Requirement Name	Description	Priority	Stakeholders	Hardware
WOR-1	Initiate WOR	Allows users to create a work order request tied to a specific room, location (GIS), or asset that needs to be maintained.	High	Service Requestor	Mobile Device; Computer
WOR-2	Provide WOR details	Allows users provide details about the work order request by populating the work order request Input Fields (see WOR Input fields)	High	Service Requestor	Mobile Device; Computer
WOR-3	Capture images	Capture images that can be associated with locations, pieces of equipment, or WORs.	High	Service Requestor	Mobile Device; Computer
WOR-4	Sync Indoors mobile with Indoors	Syncing the information created in the Indoors mobile app with the base indoors application.	High	N/A	Server
WOR-5	Initiate/Sync Indoors WORs in Maximo	Having Indoors connect with Maximo to 1) create the work order request and 2) populate any relevant fields that are used by Maximo.	High	N/A	Server
WOR-6	Assign WOR to FMs	Using Indoors, the data manager will be able to assign a WOR to a specific Facility Manager based on their skill set and the urgency of the request.	High	Data Manager	Computer
WOR-7	View WOR Details	Using Indoors mobile app, the Facility Manager will be able to review the details of the service request, such as the location, a description, status, and, if uploaded, a picture of the issue.	High	Facility Manager	Mobile Device
WOR-8	Mark WOR as Complete	Once the WOR is complete, the FM will be able to mark it as such and attach an image of the completed job (if applicable).	High	Facility Manager	Mobile Device
WOR-9	Verify/Close WOR's completion	After the WOR has been completed, the Data Manager will be able to review the completed WOR, any comments about the completion of the task, and uploaded images to ensure it has been addressed. If so, the Data manager can close out the WOR and (if applicable) alert the Service Requestor.	High	Data Manager	Computer

			Priority	Stakeholders	Hardware
		more buildings e.g. - the	High	N/A	Server
		specific tasks eir level of e, etc.	High	Data Manager	Computer
		their monthly	High	N/A	Mobile Device
		eir PM tasks s such as y, etc.	High	Facility Manager	Mobile Device
PM-5	FM selects task/ views details	FM to select the next PM task in queue, views details such as what steps/ tools are needed, locations, etc.	High	Facility Manager	Mobile Device
PM-6	FM Uses wayfinding to locate asset	FM to be able to select an asset and have wayfinding directions from their GIS location populate on their mobile device.	Medium	Facility Manager	Mobile Device
PM-7	FM Accesses Documents	The FM accesses all pertinent documents about the type or instance of equipment.	High	Facility Manager	Mobile Device
PM-8	FM verifies data	FM compares certain fields on the app (such as SN, manufacturer, etc.) against the nameplate data to verify it matches. If not, the value is either updated on the spot (if the FM has edit rights) or the error is reported to the model manager to fix.	High	Facility Manager	Mobile Device
PM-9	FM marks PM as complete	Once the PM task is complete, the FM will be able to mark it as such and attach an image of the completed job (if applicable).	High	Facility Manager	Mobile Device

			Priority	Stakeholders	Hardware
		f data (including is not correct.	High	All users with permission	Mobile Device
		to upload images h different (S) or e state of an	High	All users with permission	Mobile Device
		back and forth e same location.	High	All users with permission	Mobile Device
		el in 3D, this e what systems ning them sing the context	Low	All users with permission	Mobile Device; Computer
GEN-4	transparent	of the surrounding walls.			
GEN-5	Wayfinding	Select a point, object or space on the map have the application create walking directions there from your GIS location on campus.	High	All users with permission	Mobile Device
GEN-6	Isolate elements/systems	Give users the ability to isolate systems to see only components that are a part of the selected system(s).	High	All users with permission	Mobile Device; Computer
GEN-7	Filter elements in view	Enable users to filter by certain fields, such as equipment category (e.g. - mechanical), GSA Asset Type Code (e.g. AHU), or other fields. to prevent the views from becoming too jumbled.	High	All users with permission	Mobile Device; Computer
GEN-8	Intuitive symbology in 2D	Uses symbols that are intuitive to represent different maintainable assets in 2D views.	Medium	All users with permission	Mobile Device; Computer

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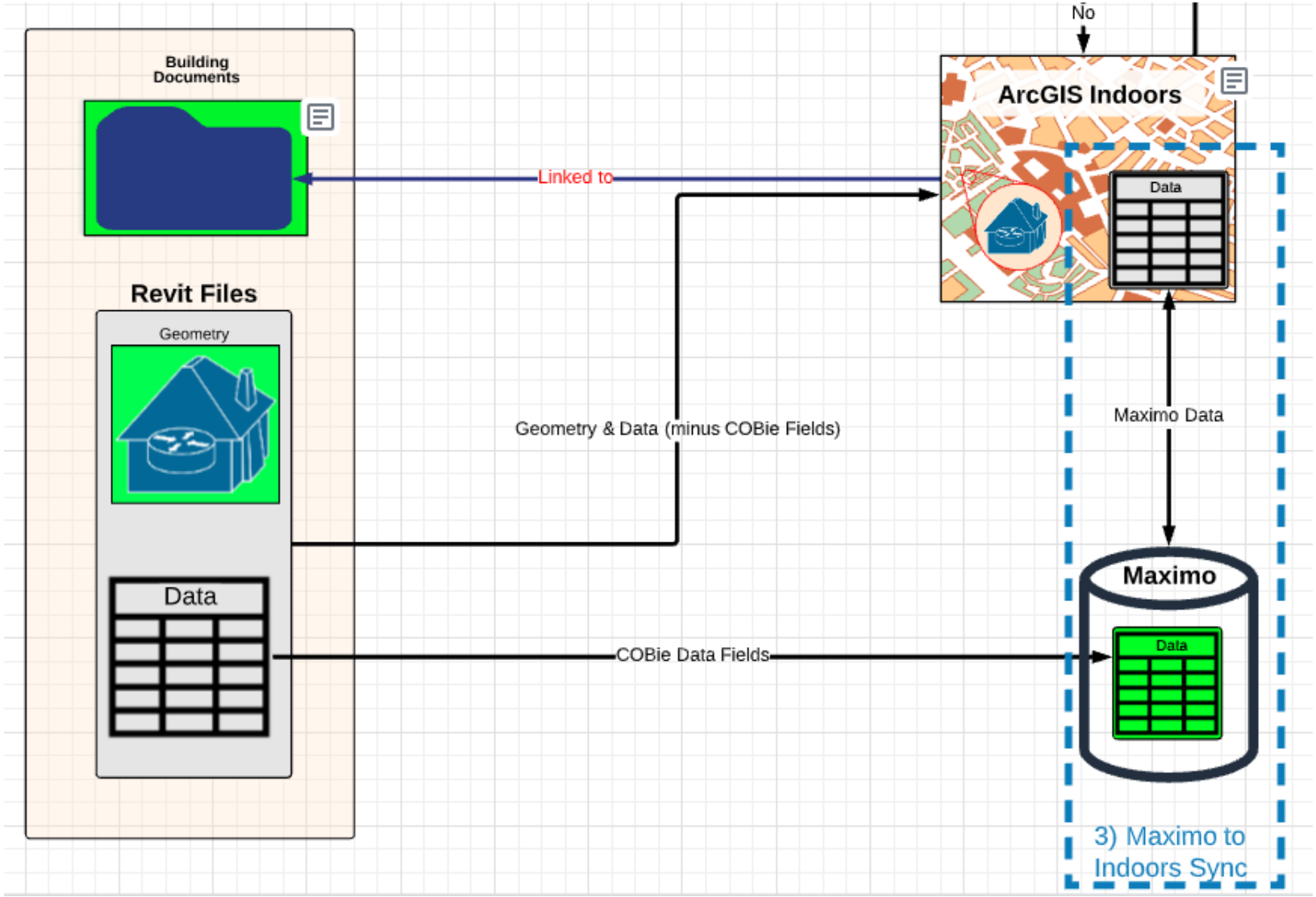
Data Architecture & Sources of Truth



ArcGIS Indoors

FME Server

Survey 123

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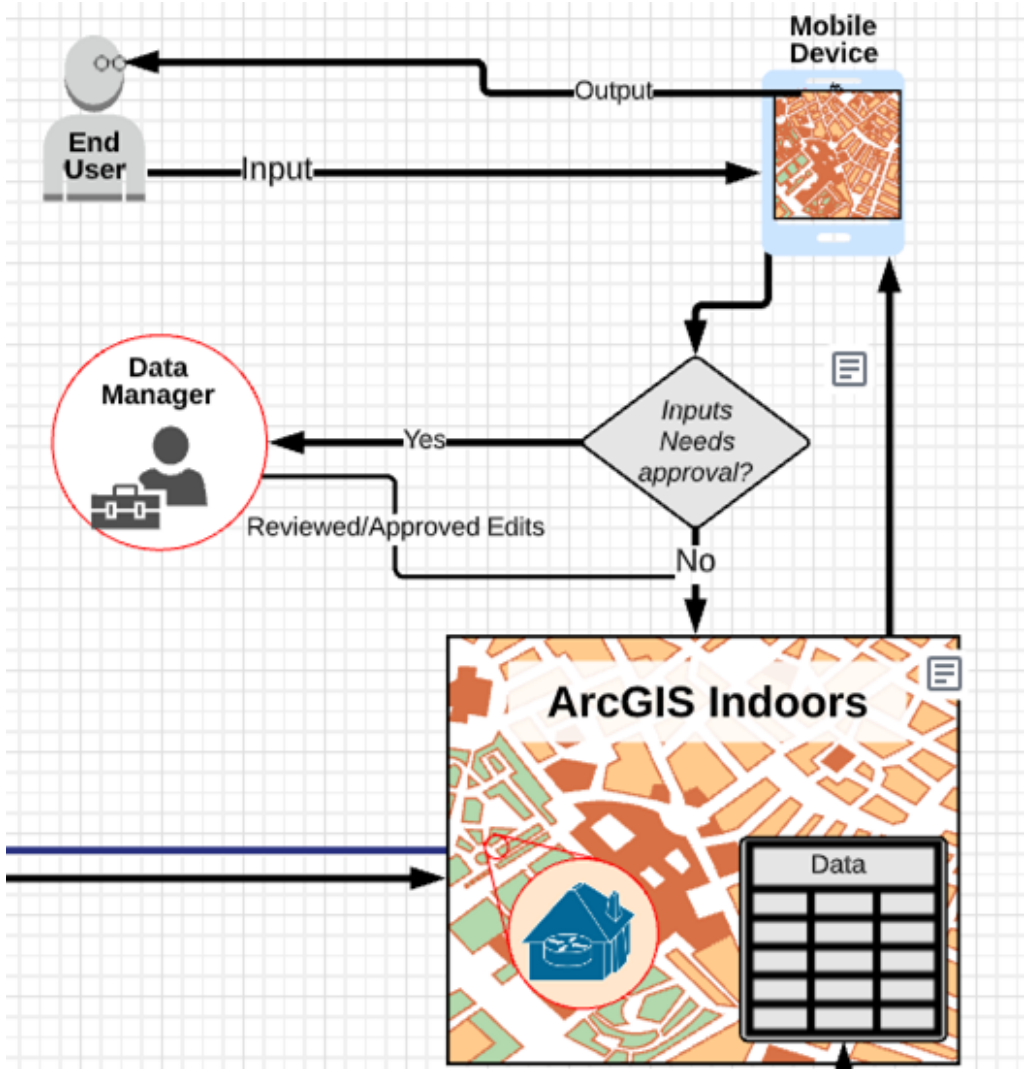
Support for Bi-Directional Workflows



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RealScene℠ by Jacobs

Case Study #2:

Unreal Engine Digital Twin for a Confidential Healthcare Client

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RealScene℠

by Jacobs

RealScene is a multi-platform realtime application development environment developed by Jacobs to deliver powerful and immersive experiences that connect 2D/3D vertical and linear design data to a wide range of client-based data and Jacobs proprietary datasets. RealScene offers a wide range of Digital Twin integration and delivery opportunities.

- > Multi-HMD (VR) Compatible (OpenXR)
- > Six Degrees of Freedom
- > Large Asset Libraries (Over 100)
- > Drag/Drop Assets & Move/Rotate Assets
- > Custom/Editable Hazards & Tags/Messages
- > Data Connectivity through native APIs
- > Custom Interactivity & Navigation
- > Real-world Photogrammetry Integration (Cesium)

- High Quality Visualization (Materiality, Lighting & Environment <
- Particle-Based Effects for Simulated Events <
- AI-Based Simulated/Animated Processes/Traffic (Scalable) <
- Changeable Time of Day (Dawn to Dusk) <
- Changeable Weather (Rain & Snow) <
- Save/Load Previously Prepared Scenes <
- Online Version (Pixel Streamed: PureWeb, AWS Luna) <
- Online Secure Licensing <

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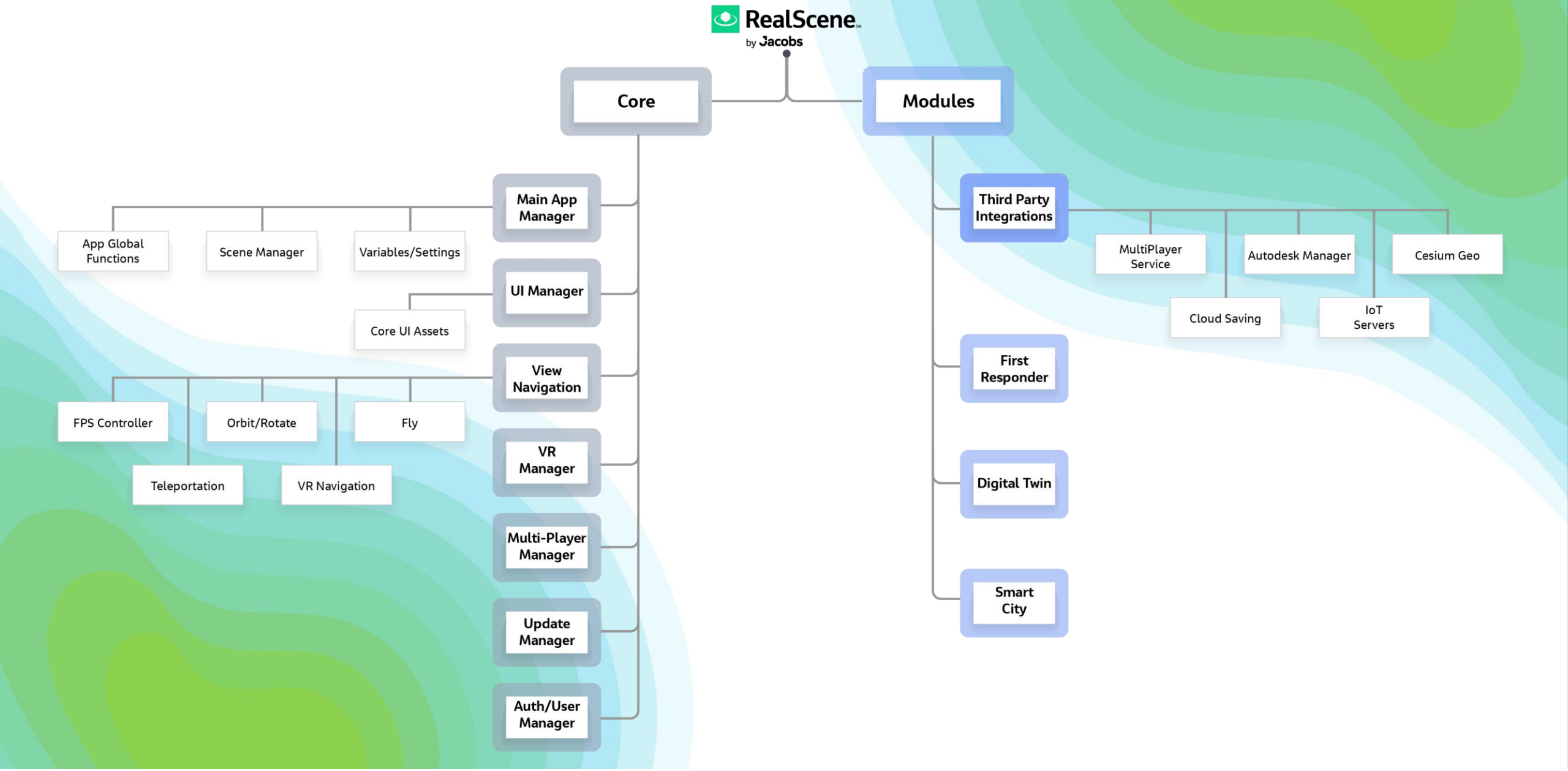
RealScene
by Jacobs
Core
Modules
Main App Manager
App Global Functions
Scene Manager
Variables/Settings
UI Manager
Core UI Assets
View Navigation
FPS Controller
Orbit/Rotate
Fly
Teleportation
VR Navigation
VR Manager
Multi-Player Manager
Update Manager
Auth/User Manager
Third Party Integrations
MultiPlayer Service
Autodesk Manager
Cesium Geo
Cloud Saving
IoT Servers
First Responder
Digital Twin
Smart City

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Current RealScene Jacobs Data Integration

A sampling of some of the unique data and toolsets Jacobs offers to further deliver decision-making applications.

Echo by Jacobs

Echo is a mobile data solution, enabling your organization to incorporate the field data and images you need to make informed decisions and reduce your risk, all while breaking away from inefficient, paper-based documentation systems and lowering your operating costs.

Aqua DNA® by Jacobs

Aqua DNA technology mines your existing sensors and analytics, providing a one-screen view of your wastewater network.

Dragonfly℠ by Jacobs

Dragonfly is a Digital OneWater solution that efficiently provides the accurate data and AI-driven recommendations your team needs to optimize decision-making and refine your system management and intervention strategies.

Flood Modeller by Jacobs

Flood Modeller, a Digital OneWater solution, is an industry-leading software platform which enables engineers and scientists to deliver faster and more accurate results by simplifying the modeling of river, surface water, and urban drainage systems. It enables you to confidently understand flood risk and develop optimal solutions to manage the impacts of climate change.

REPLICA

Built on a foundation of domain knowledge, computational power, data connectivity and intuitive interfaces, Replica enables us to solve your challenges through realistic simulation under a variety of conditions. A Digital OneWater solution, Replica enhances in-depth analysis and leads to improved system design, optimized operations performance and reduced capital and operating costs.

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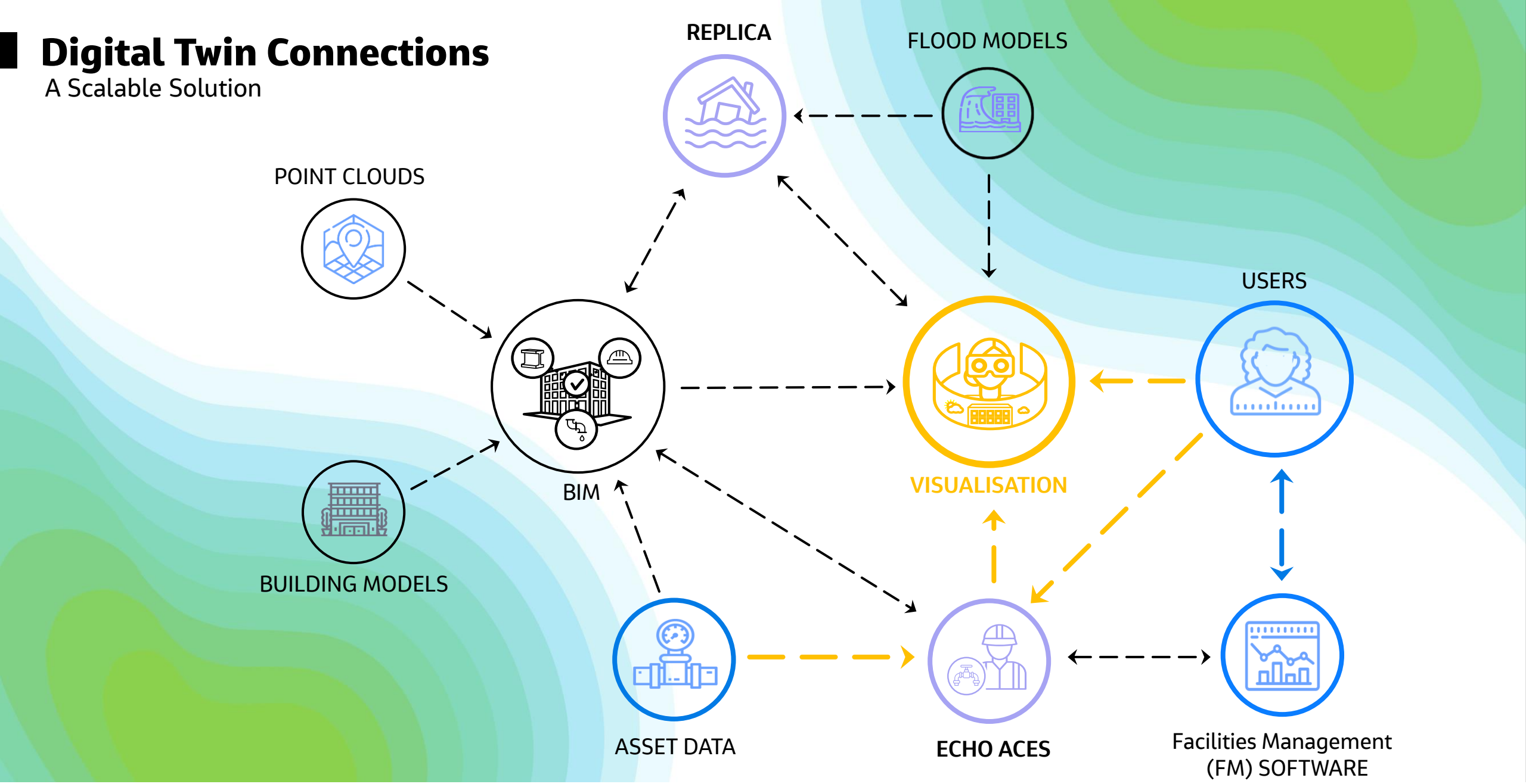
Digital Twin Connections

A Scalable Solution



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https://vimeo.com/1036393192/304094c2e2?share=copy

RealScene

by Jacobs >> Digital Twin

Jacobs acknowledges and pays respect to the custodians and Elders, past present and emerging, of Country and First Nations peoples. We acknowledge the continuation and diverse practices and knowledge systems of Aboriginal and Torres Strait Islanders peoples.

Queensland Government
Queensland Health

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Thank You

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