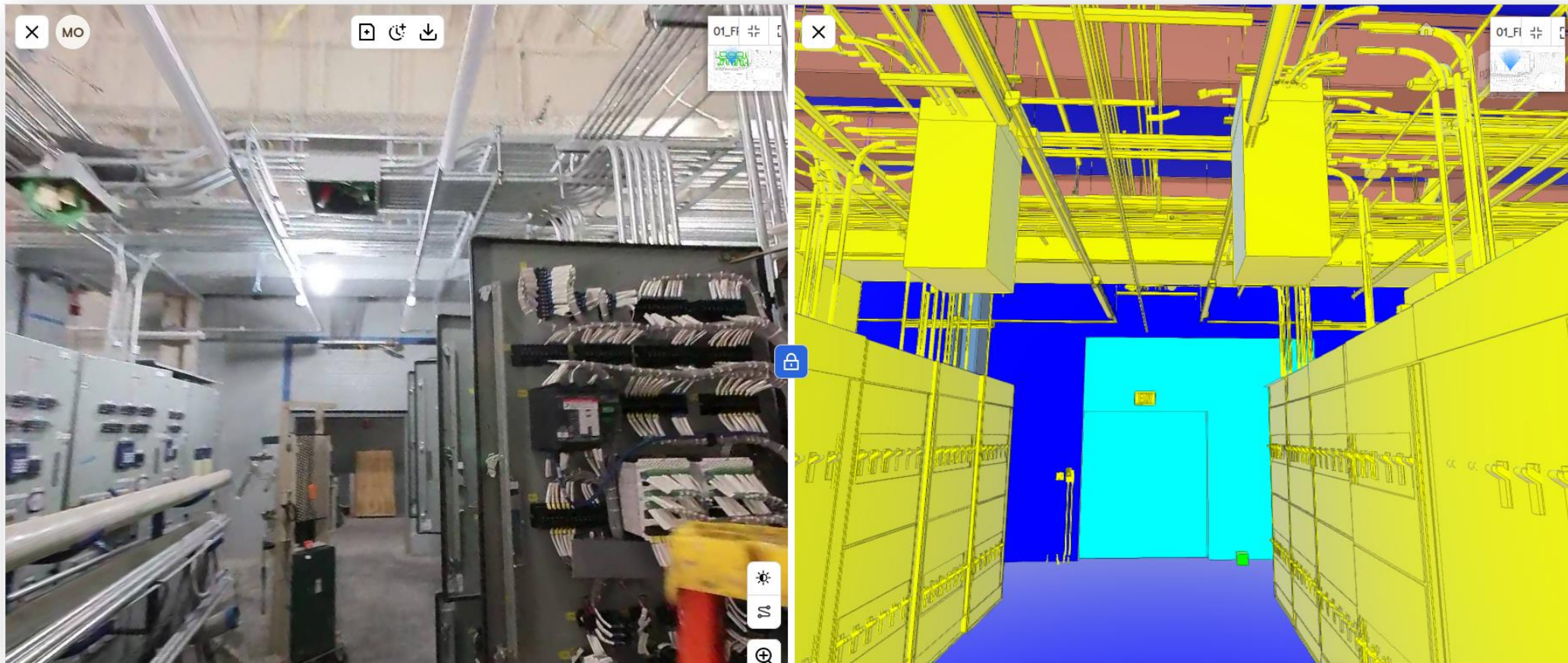


Leveraging BIM and Digital Twins for Enhanced Maintenance in Healthcare Facilities



40th Annual FPC Seminar + Expo

Today's Presenters



Mike Ortega



Leigh Ann Vogel
PE, LEED AP BD+C



Brandon Hensen
PE, CPD

About Syska Hennessy Group

- Integrated Consulting + Engineering + Commissioning Firm Founded in 1928
- 599 Employees in 20 Offices Worldwide
- Ranked Among the Top Engineering Firms by *ENR*, *CSE*, *BD+C* and *EC+M*
- Specialized Healthcare Practice Area
- Leader in High-Performance Design
- Culture of Innovation and Award-Winning Engineering
- Early Adopter of BIM/3D Modeling and MEP Enhancements



Topics

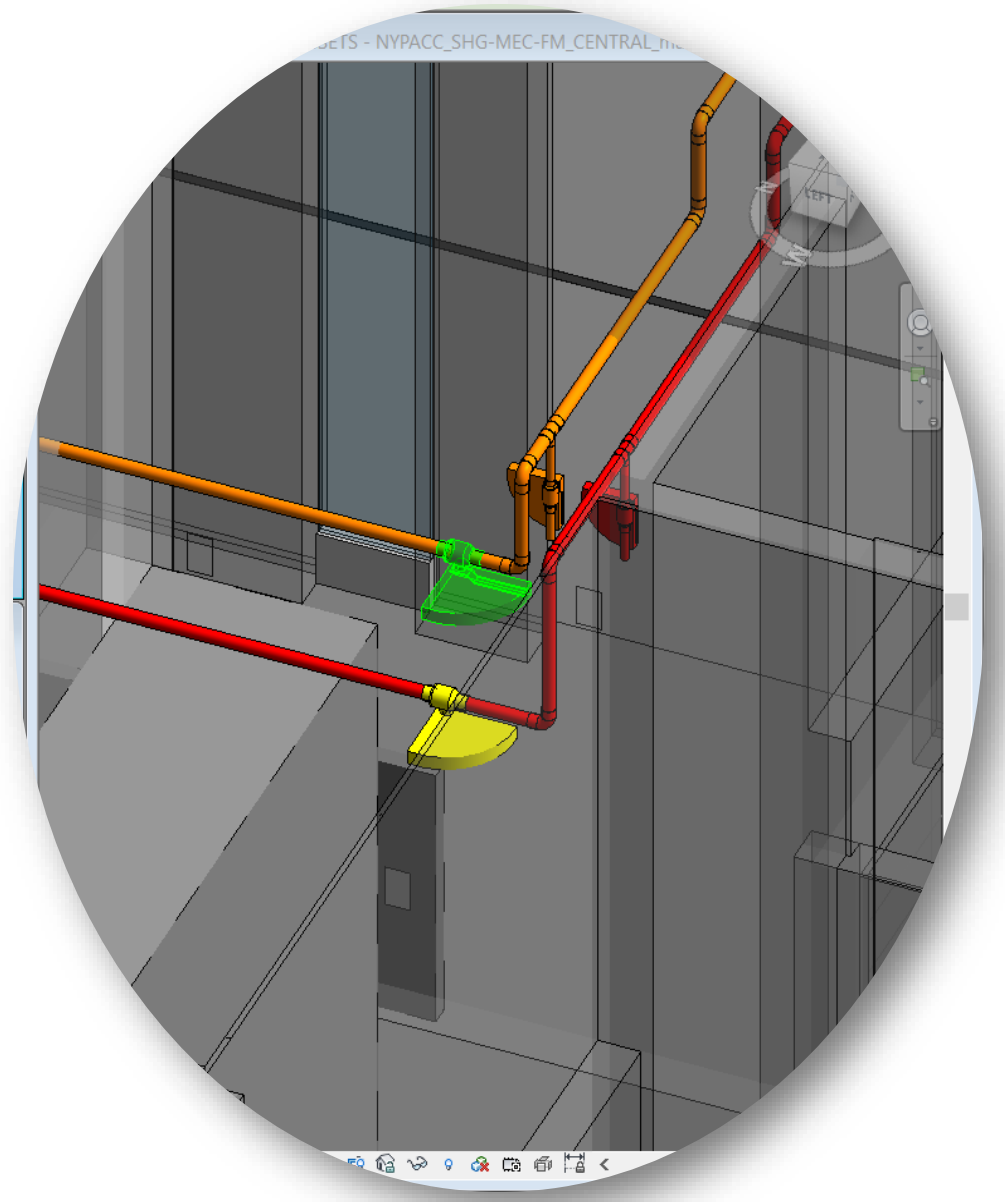
- Who's SHG?
- BIM / Digital Twin by Definition
- Benefits for Digital Twin
- Clients Wants vs Needs
- FM Needs
- Lessons Learned
- Digital Twin Providers

BIM...by definition

- Building Information Modeling (BIM)
- 3D model elements with parametric data representing AEC objects.
- Data rich 3D modeling that can be used for planning, design, construction, and operations.
- Model elements work with each other to allow for a collaborated design.

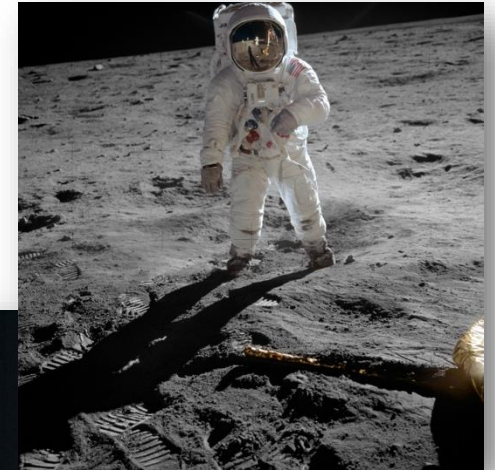
So, What's Digital Twin?

When you recreate the
physical world in a BIM model



Digital Twin...by definition

- NASA's John Vickers introduced a new term—"digital twin"—in 2010.
- NASA pioneered digital twin technology during its space exploration missions of the 1960s
- NASA took data from their missions, applied them to simulators to help predict and recommend solutions.



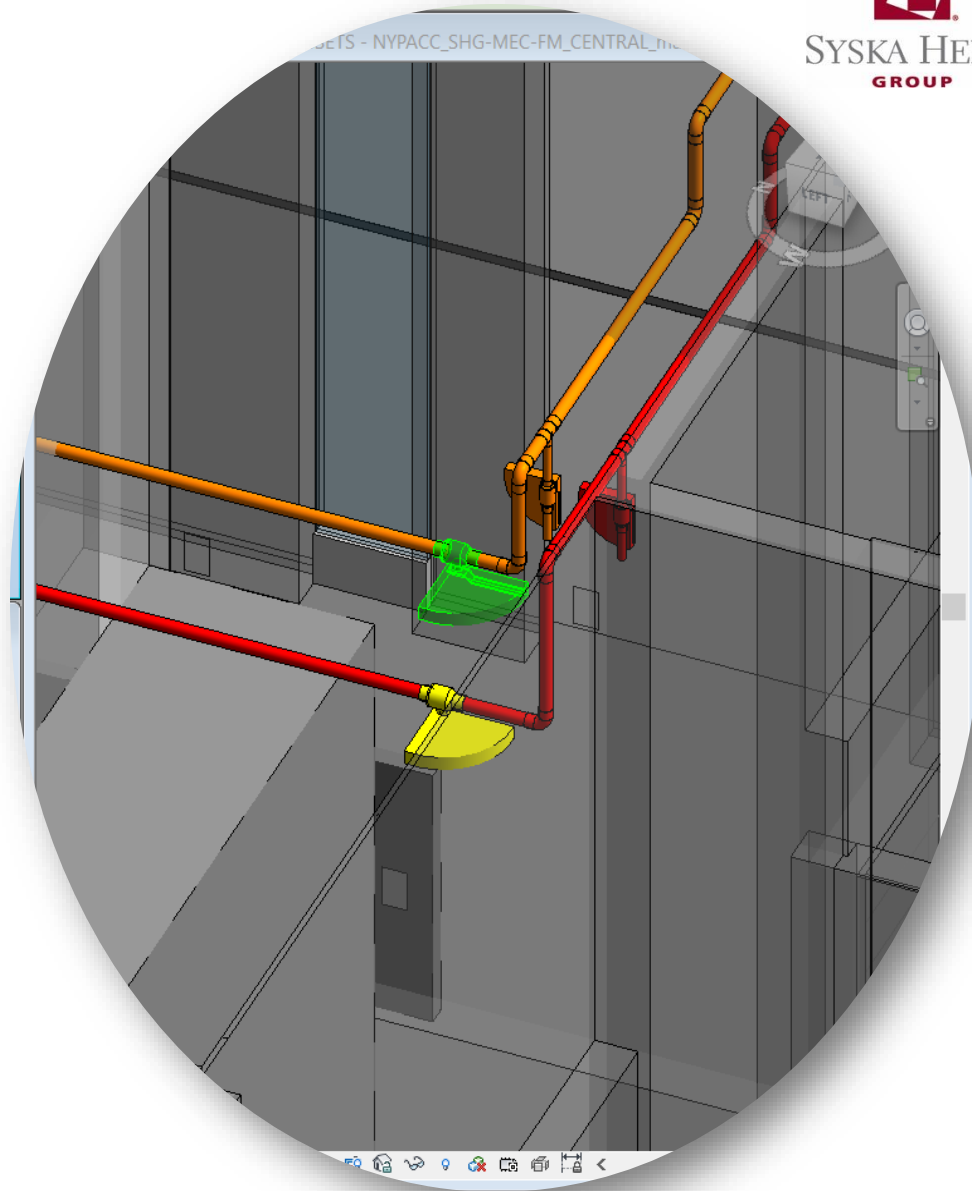
How is Digital Twin created?

Capturing tools:

- Point Cloud Scanning
- 360 Captures

What do you see here?

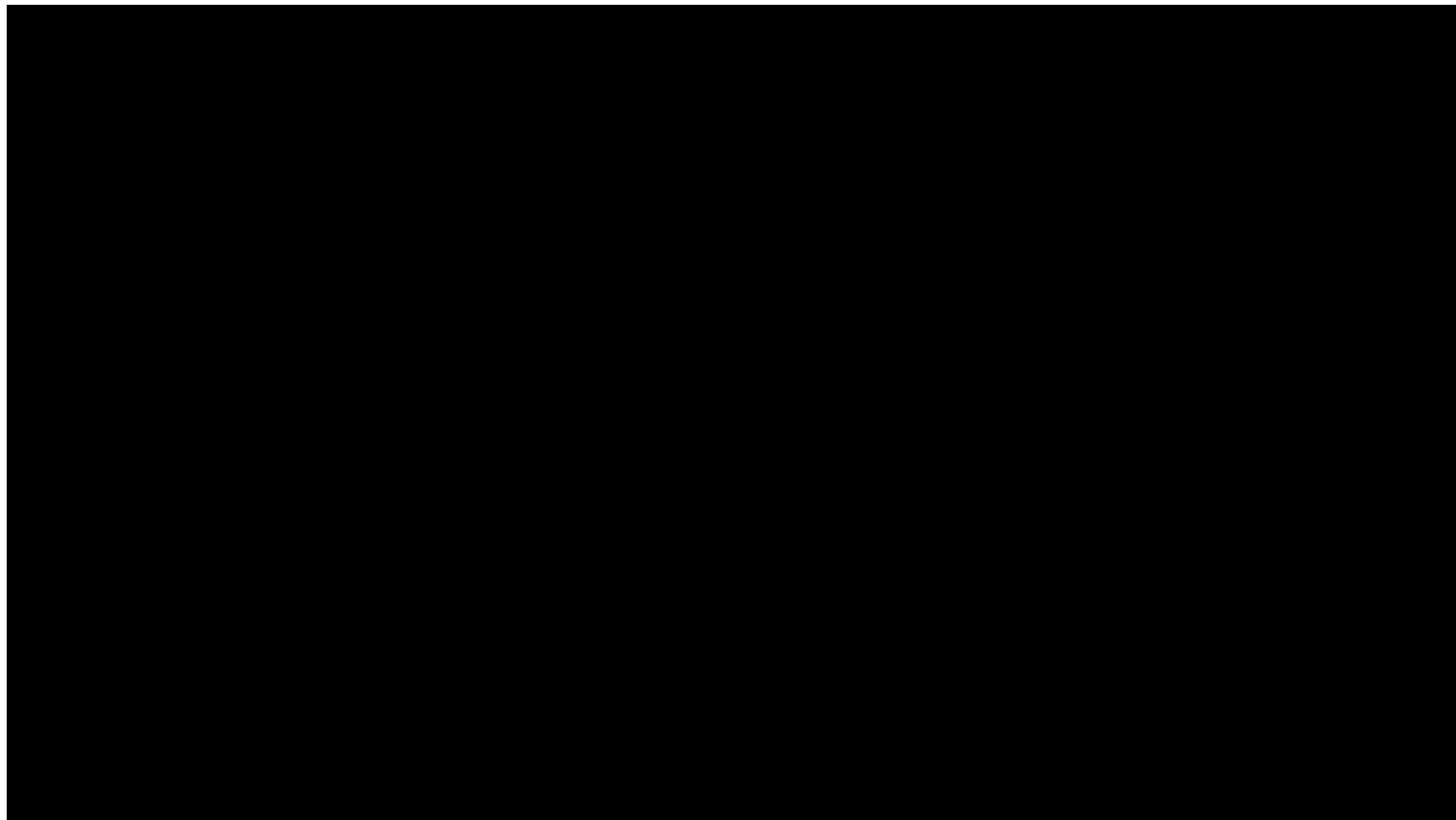
- Some see piping
- Some see a ball valve
- Some see the swing of the ball valve handle



How can it help me?

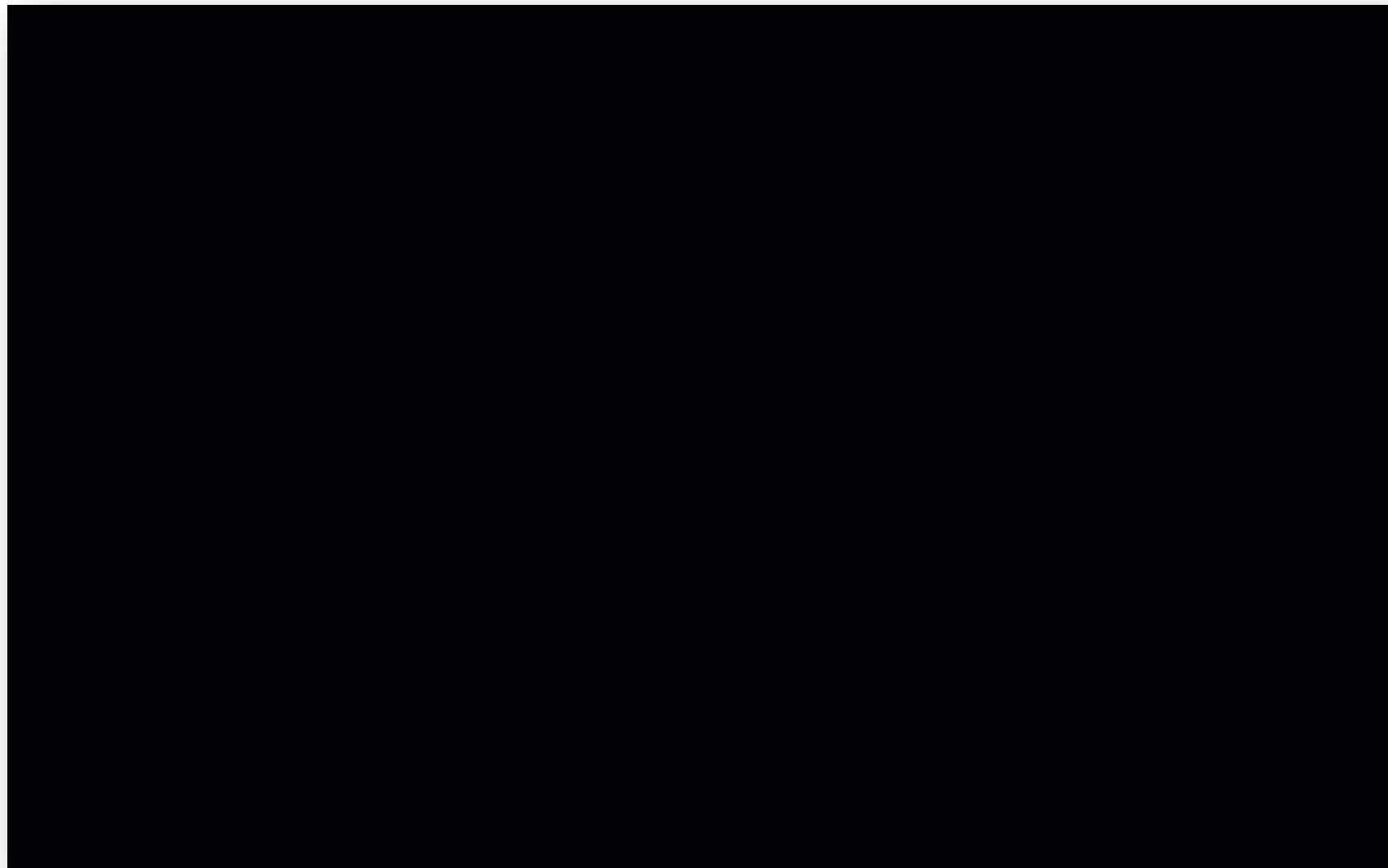
Capturing visual data

Capturing existing conditions
throughout
construction enhances
coordination



Build the Twin...

Keep models true by
adjusting critical
equipment to match
the installed condition

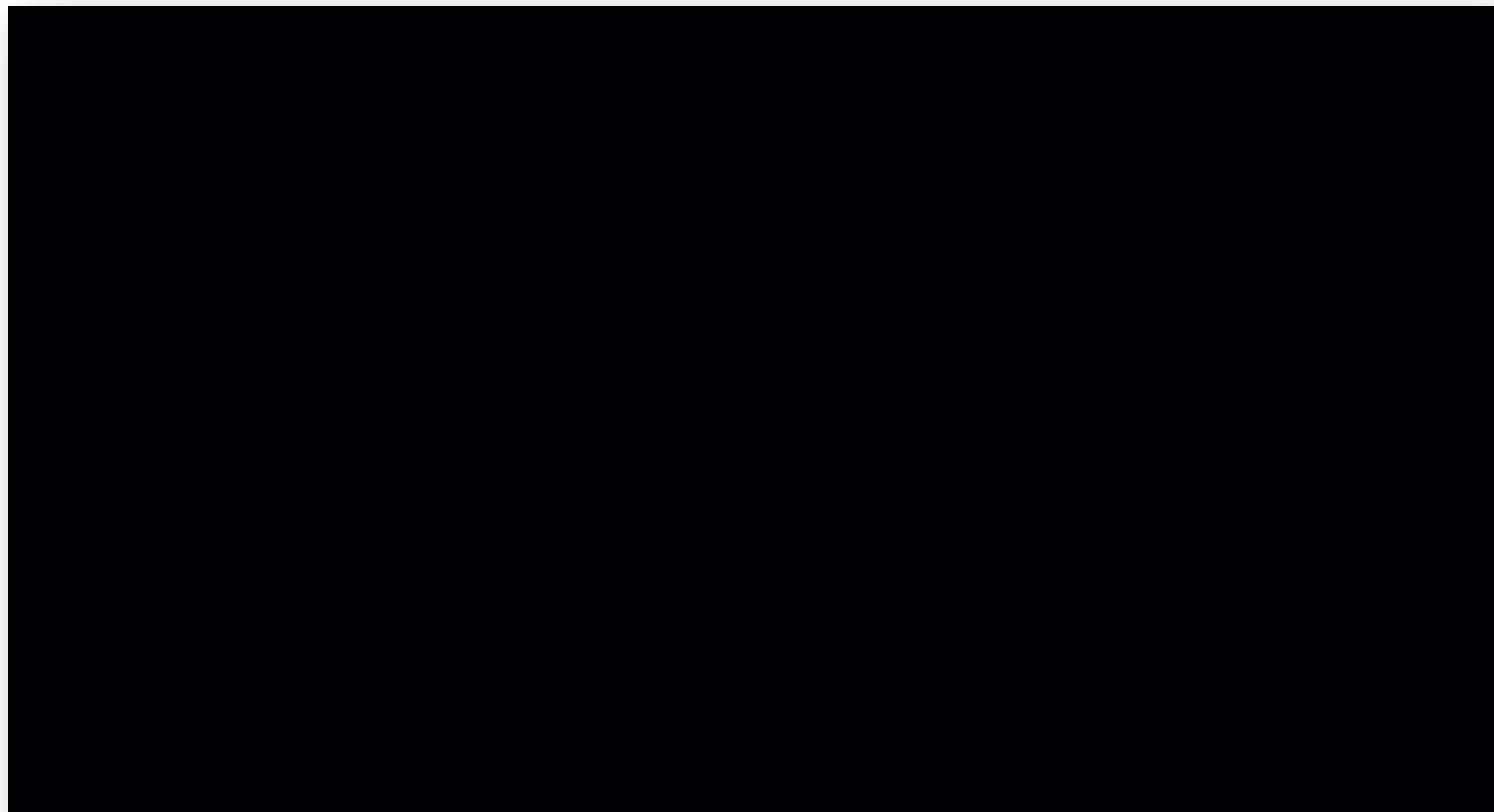


Benefits of BIM into Digital Twin...

Leverage models by
standardizing information

Incorporate existing
workflow data

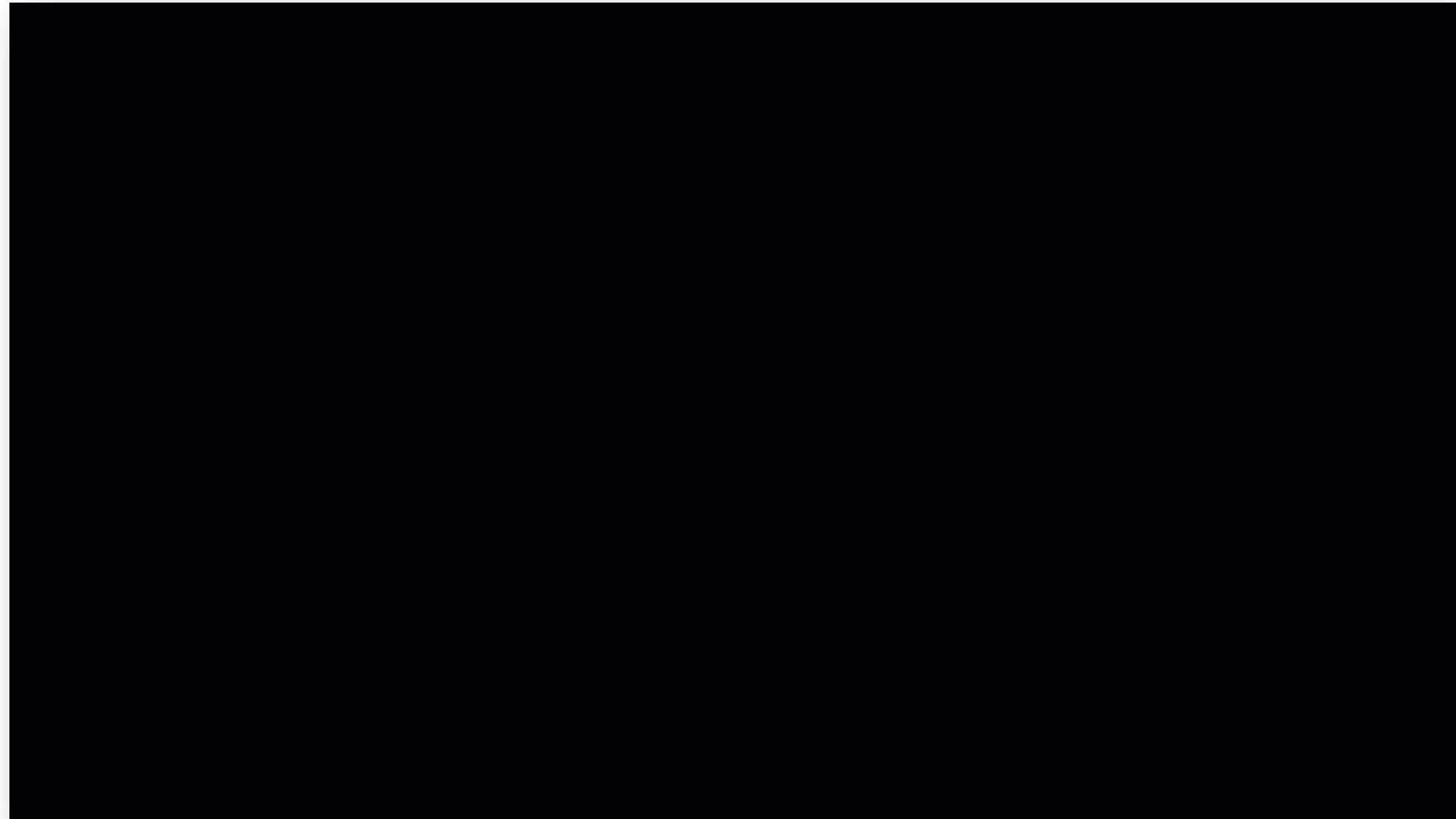
Take models to next
level by
adjusting equipment to
match as-builts



Benefits of BIM into Digital Twin...

Smart building platform enables owners to manage data to improve sustainability, operational performance, increase building value

Data generated by a sensor can provide real time value



Client Wants vs Needs

- Initial request is everything and the...
 - Data for all Equipment/ Devices
 - Virtual Model showing every element (Arch, Struc, MEP, Interiors) as per Spec.
- Primary reasons for “Sky is the limit” request – Misunderstanding of wants vs needs
 - Acquiring and creating the data = \$\$\$
 - Project timeline \neq Demand



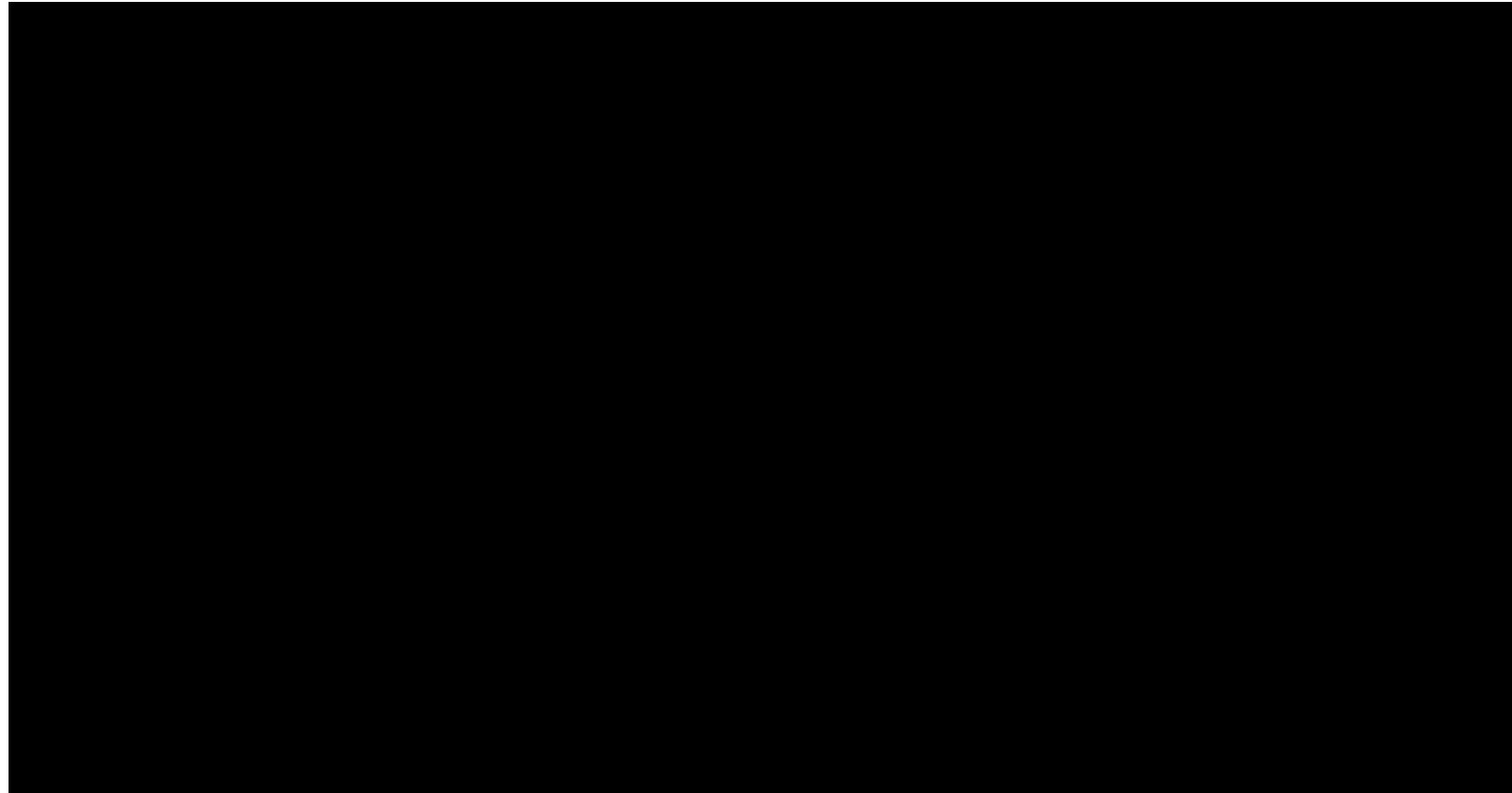
Client Wants vs Needs

- Data Rich model with equipment, devices, system, and furniture that is searchable by:
 - Bar Code
 - Design label
 - Level and Space (Room)
 - And more...
- Meet with the client and address actual needs.
 - Talk them off the ledge of endless data
 - Focus on what the facility management needs



Facilities Management Needs

- Manageable data models to
 - List Assets
 - Predict potential issues
 - Track Issues
 - Can be used by CMS
- Visual representation
 - FM plans and diagrams
 - Adopt digital workflows



Facilities Management Needs

Rectangular Duct
1w Elbow/Beveled Taps

Ducts (1)
Edit Type

Constraints

Horizontal Justificati...
Center

Vertical Justification
Middle

Reference Level
6TH FLOOR

Offset
12' 6 1/2"

Start Offset
12' 6 1/2"

End Offset
12' 6 1/2"

Slope
0° / 12"

Mechanical

System Classification
Return Air

System Type
Return Air

System Name
RA (Source AHU-11-...

System Abbreviation
RA

Bottom Elevation
12' 2 1/2"

Top Elevation
12' 10 1/2"

Equivalent Diameter
8.75

Size Lock
☐

Loss Coefficient
0.112058

Hydraulic Diameter
8.00

Section
1171

Area
16.67 SF

Mechanical - Flow

Flow
300.00

Additional Flow
0.00

Velocity
675.00

Friction
0.1020

Pressure Drop
0.0033

Velocity Pressure
0.0291

Reynolds number
42914.927723

Dimensions

Properties help

Apply

Project Browser - NYPACC_SHG-MEC-F...

Properties

3D View: 06_MEP_Complete-Composite - NYPACC_SHG-MEC-FM_CENTRAL_ma...

Sheet: M-106.00 - 6TH FLOOR PLAN, MECHANICAL - NYPACC_SHG-MEC-FM_CEN...

Properties

Valve Ball - Apollo 70-200 Series Location
1
Valve Ball - Apollo 70-240

Mechanical Equipment (1)
Edit Type

Mechanical

System Classification
Hydronic Return

System Name
HWR Riser 02,HWR 37
MAX AIR P.D.

Mechanical - Flow

Dimensions

Identity Data

Image

Comments

Mark
p

Area Served

Location

Designation Number-S...
2

Comments2
Valve Asset

Serial Number

WH_Phases1

Barcode

Room Code
DHK-06-606

Room Name
CLEAN SUPP

NYP Bar Code
(BARCODE# -)

NYP Building ID
DHK

NYP Uniformat Level 4
D3050.10.c

COBie-Component-Ta...

Submittal Link

Subcontractor Part Na...

NYP Floor Number
6

NYP Field Label
HWS-6-2

Serves

MSI

Buildino Code
DHK

Properties help

Apply

Project Browser - NYPACC_SHG-MEC-FM_CEN...

Properties

Sheet: FM-M-206 - 6TH FLOOR - MECHANICAL PIPING FM ASSET PLAN - NYPACC_SHG...

5TH RISER

HWS-6-2
(BARCODE# -)

HWR-6-2
(BARCODE# -)

Schedule: FM ISOLATION VALVE ASSET SCHEDULE - BARCODE (XLS) - NYPACC_SHG...

(BARCODE# -)	D3050.10.w	CHWS-6-1	6	CHWS 17,CHWS Riser 01	CORR	DHK-06
(BARCODE# -)	D3050.10.w	CHWR(IT)-6-1	6	CHWR(IT) 6,CHWR(IT) Riser 02	CORR	DHK-06
(BARCODE# -)	D3050.10.w	CHWS(IT)-6-1	6	CHWS(IT) 10,CHWS(IT) Riser 0	CORR	DHK-06
(BARCODE# -)	D3050.10.e	HWR(R)-6-2	6	HWR(R) 13,HWR(R) Riser 02	REC SUPPORT	DHK-0
(BARCODE# -)	D3050.10.e	HWS(R)-6-2	6	HWS(R) 12,HWS(R) Riser 02	CLEAN SUPP	DHK-0
(BARCODE# -)	D3050.10.c	HWR-6-2	6	HWS Riser 02,HWS 39	CLEAN SUPP	DHK-0
(BARCODE# -)	D3050.10.c	HWS-6-2	6	HWR Riser 02,HWR 37	CLEAN SUPP	DHK-0
(BARCODE# -)	D3050.30.i	CLPS-6-1	6	CLPS Riser 01,CLPS 9	STF TLT	DHK-0
(BARCODE# -)	D3050.10.e	HWR(R)-6-1	6	HWR(R) Riser 01,HWR(R) 18	STF TLT	DHK-0
(BARCODE# -)	D3050.10.c	HWR-6-1	6	HWR 63,HWR Riser 01	STF TLT	DHK-0
(BARCODE# -)	D3050.10.c	HWS(R)-6-1	6	HWS(R) 14,HWS(R) Riser 01	STF TLT	DHK-0
(BARCODE# -)	D3050.10.c	HWS-6-1	6	HWS 69,HWS Riser 01	STF TLT	DHK-0
(BARCODE# -)	D3050.10.e	HWR(R)-7-3	7	HWR(R) Riser 03,HWR(R) 2	CORR	DHK-07
(BARCODE# -)	D3050.10.c	HWS(R)-7-3	7	HWR Riser 03,HWR 27	CORR	DHK-07
(BARCODE# -)	D3050.10.c	HWS(R)-7-3	7	HWS(R) Riser 03,HWS(R) 16	CORR	DHK-07
(BARCODE# -)	D3050.10.c	HWS-7-3	7	HWS Riser 03,HWS 43	CORR	DHK-07
(BARCODE# -)	D3050.10.w	CHWR-7-3	7	CHWR 17,CHWR Riser 03	CORR	DHK-07
(BARCODE# -)	D3050.10.w	CHWS-7-3	7	CHWS 14,CHWS Riser 03	CORR	DHK-07
(BARCODE# -)	D3050.10.w	CHWR(IT)-7-2	7	CHWR(IT) Riser 02,CHWR(IT) 2	CORR	DHK-07
(BARCODE# -)	D3050.10.w	CHWS(IT)-7-2	7	CHWS(IT) Riser 02,CHWS(IT) 1	CORR	DHK-07
(BARCODE# -)	D3050.10.w	CHWR-7-1	7	CHWR 14,CHWR Riser 01	CIRC	DHK-07
(BARCODE# -)	D3050.10.w	CHWS-7-1	7	CHWS 12,CHWS Riser 01	CIRC	DHK-07
(BARCODE# -)	D3050.30.i	MPS-7-1	7	MPS 3,MPS 4	CORR	DHK-07

3D View: 06_HVAC_PIPING-ASSETS - NYPACC_SHG-MEC-FM_CENTRAL_maortega.rvt

1/4" = 1'-0"

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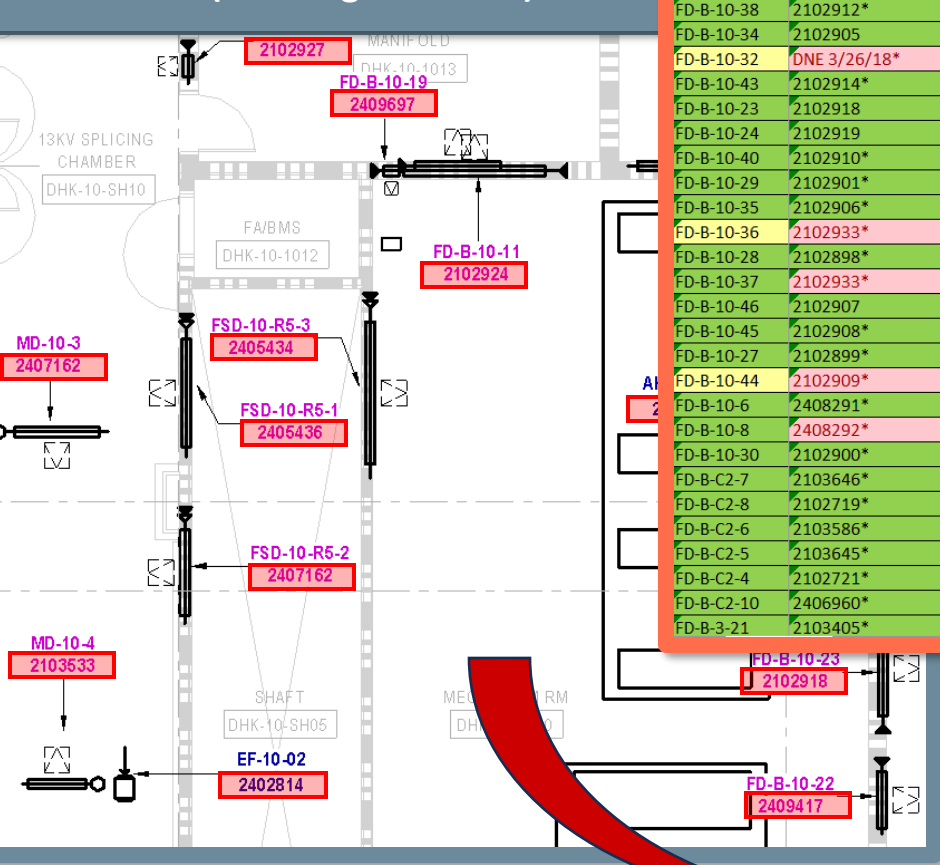
Facilities Management Needs

Barcoding Assets

Received Excel Spreadsheets

EM DUCT ACCESSORY SCHEDULE - BARCODE (XLS)					
NYP Bar Code	NYP Uniformat	Design Label	NYP Floor Number	System Abbreviation	Room Name
2103556	D3050.60.a	FD-B-1-1	1	EA	FA/BMS
2103558	D3050.60.a	FD-B-1-2	1	SA	FA/BMS
2103532	D3050.60.a	FD-B-1-3	1	RA	FA/BMS
2103415	D3050.60.a	FD-B-1-4	1	EA	DRIVE AISLE
2103530	D3050.60.a	FD-B-1-5	1	EA	ELEC
2405314	D3050.60.a	FD-B-1-6	1		DRIVE AISLE VEST N
2405313	D3050.60.a	FD-B-1-7	1	SA	DRIVE AISLE VEST N
2405495	D3050.60.a	FD-B-1-8	1		DRIVE AISLE VEST S
2102736	D3050.60.a	FD-B-1-9	1	SA	DRIVE AISLE VEST S
2102731	D3050.60.a	FD-B-1-10	1	SA	DRIVE AISLE VEST S
2102732	D3050.60.a	FD-B-1-11	1		DRIVE AISLE VEST S
Not installed 3/25/18	D3050.60.a	FD-B-1-12	1	SA	DRIVE AISLE VEST S
2405402	D3050.60.a	FD-B-1-13	1		DRIVE AISLE VEST S
2102862	D3050.60.b	FSD-1-5-50	1	SA	68TH ST VEST
2102861	D3050.60.b	FSD-1-5-51	1	SA	STAIR CC
2405548	D3050.60.a	FD-B-1M-1	1M	EA	FIRE PUMP
2103544	D3050.60.a	FD-B-1M-2	1M	EA	FIRE PUMP
2103633	D3050.60.a	FD-B-1M-3	1M	EA	STAIR A
2103545	D3050.60.a	FD-B-1M-4	1M	EA	FIRE PUMP
2103550	D3050.60.a	FD-B-1M-5	1M	EA	CORR
2103546	D3050.60.a	FD-B-1M-6	1M	EA	SOIL LINEN HOLD
2103549	D3050.60.a	FD-B-1M-7	1M	EA	CORR
2405551	D3050.60.a	FD-B-1M-8	1M	EA	CASH STAGING/LOADING
NOT READY 02.14.2018	D3050.60.a	FD-B-1M-9	1M		TRUCK BERTH
2405551	D3050.60.a	FD-B-1M-10	1M		TRUCK BERTH

Revit Model (Drawing Database)



Shared Excel Spreadsheet

Design ID	NYP Barcode	Ass	Ass	Asset Type		Ci	Bi	Fl	Room/ Area
New Assets									
FD-B-10-41	2102913*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1007A
FD-B-10-38	2102912*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1007B
FD-B-10-34	2102905	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1008A
FD-B-10-32	DNE 3/26/18*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1008A
FD-B-10-43	2102914*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1007A
FD-B-10-23	2102918	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1010
FD-B-10-24	2102919	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1010
FD-B-10-40	2102910*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1007A
FD-B-10-29	2102901*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1008B
FD-B-10-35	2102906*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1008A
FD-B-10-36	2102933*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1007
FD-B-10-28	2102898*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1008
FD-B-10-37	2102933*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1007
FD-B-10-46	2102907	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1006
FD-B-10-45	2102908*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1006
FD-B-10-27	2102899*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1008
FD-B-10-44	2102909*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1007
FD-B-10-6	2408291*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1014
FD-B-10-8	2408292*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1014
FD-B-10-30	2102900*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	10	DHK-10-1008B
FD-B-C2-7	2103646*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	C2	DHK-00-021
FD-B-C2-8	2102719*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	C2	DHK-00-000D
FD-B-C2-6	2103586*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	C2	DHK-00-000D
FD-B-C2-5	2103645*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	C2	DHK-00-019
FD-B-C2-4	2102721*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	C2	DHK-00-019
FD-B-C2-10	2406960*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	C2	DHK-00-021
FD-B-3-21	2103405*	DUCT	FIRE D	D3050.60.a	(DMP.FD) - DAMPER (FIRE)	WC	DHK	3	DHK-03-300F

Lessons Learned

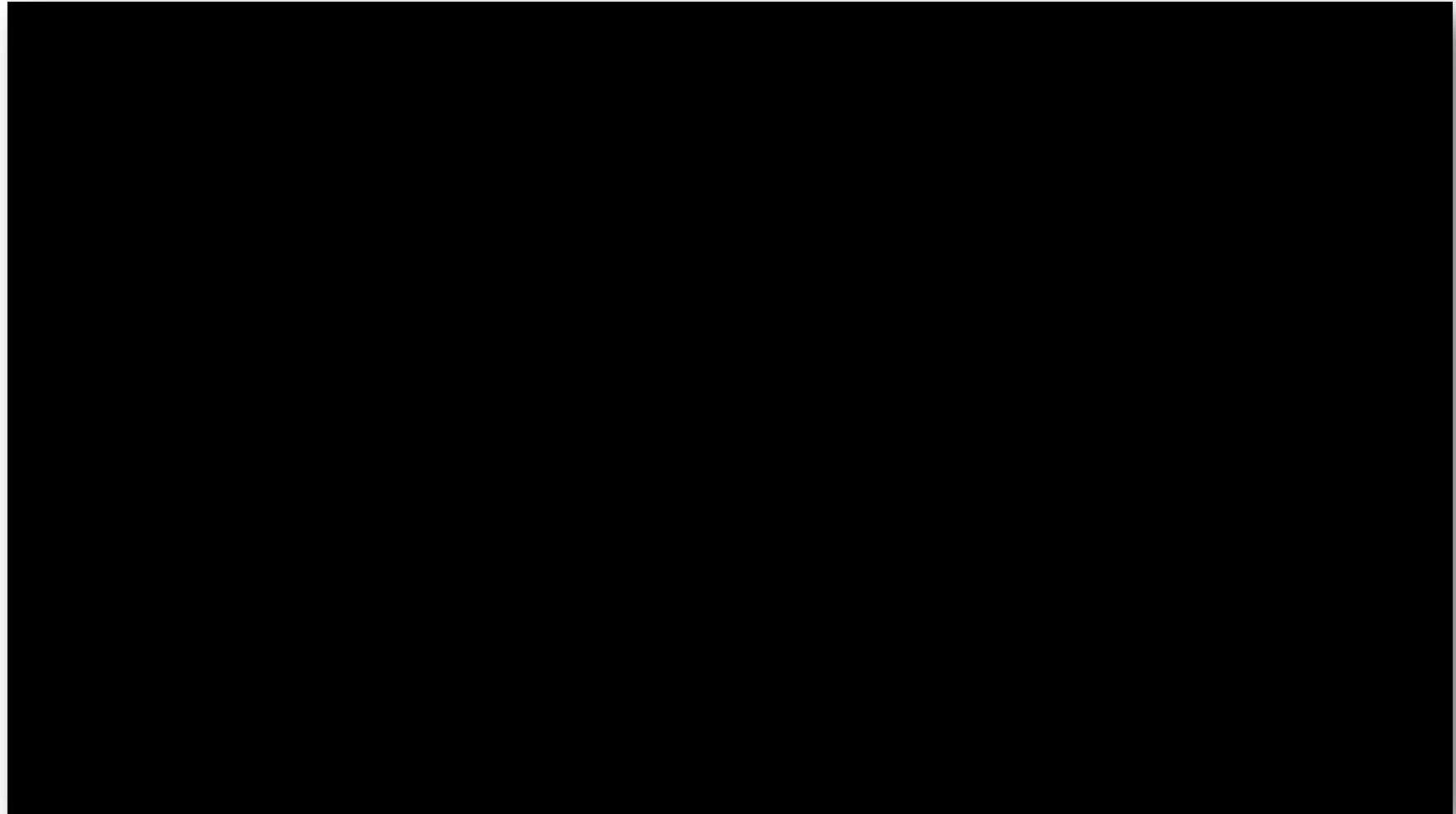
- Governance and Process Development:
 - Establish process for creating and managing BIM models.
 - Develop procedures that make BIM central to the project.
 - Update a single model from a controlled share site
 - Agree on Facility Assets that require maintenance / testing
- Our role as Third-Party Assistance:
 - Guide and implement the BIM process, including:
 - Creating LOD 500 models for operations and maintenance.
 - Codifying the BIM process and guidelines.
 - Managing BIM efforts through the shared site.

Lessons Learned

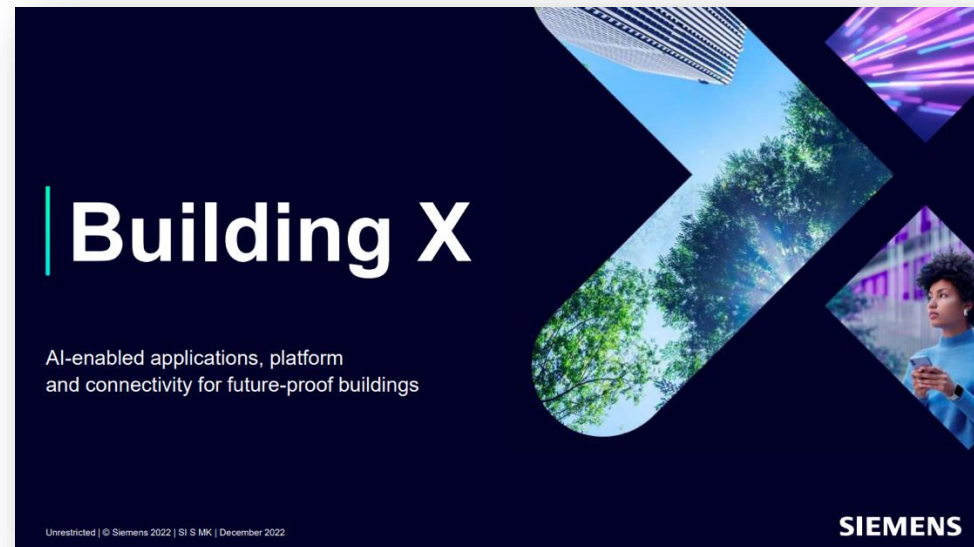
- Focus on coordination early to aid design and construction
- Invest in tools that allow facilities to provide constructive feedback

Lessons Learned

- Stay ahead of the project during CA using site capturing tools





Examples of Digital Twin Platforms



Digital Twin – Check Lists

- Digital Twin platforms
Questionnaire to
understand where FM is
now and what where
they would like to be



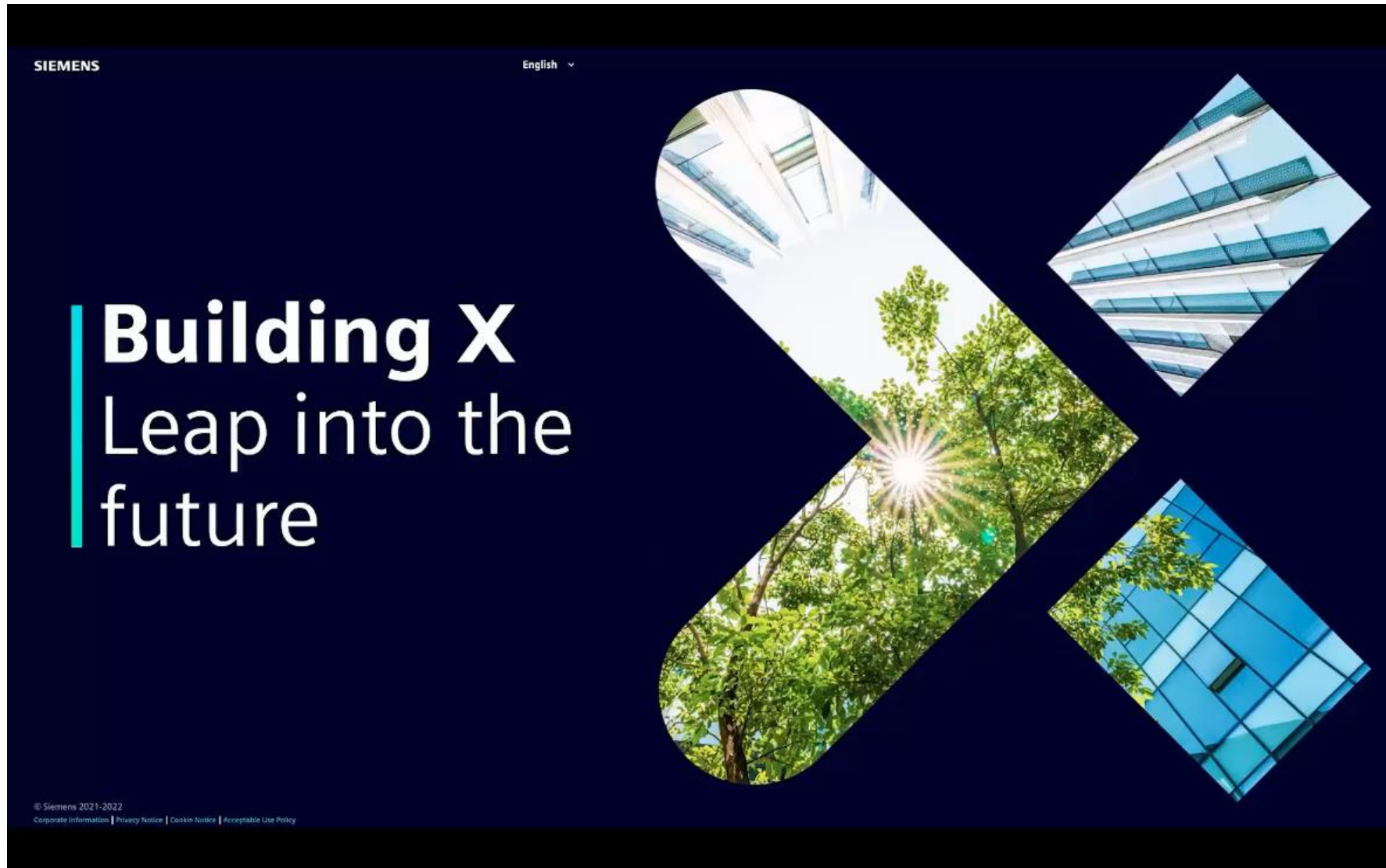
Lifecycle Twin: Customer Questionnaire / Project Scope Checklist for Implementation
This document is designed to gather information to provide a fee proposal based on actual customer project requirements.

General Project Information
Date of Entry: 5/10/24
Partner or Client Name:
Partner or Client Company Info:
Email Address
Region:
Siemens POC Contact Info:
Customer Name:
Project Name:
Project Address:
Number of Buildings:
Project Size
Project Type
Please select

Time and Expense Scope
Please let us know who would perform these services, if known?
Business & Service Analysis (optional) Please select
Solution Architecture* Please select
Project Management Please select
Data Analysis*: Please select
BIM Audit & Consultancy Please select
Integration Solution Design for Connections* Please select
Project Delivery and Implementation
Required
On-Prem Installation and Deployment of Lifecycle Twin Please select
Essential Software Project Configuration Please select
Entry level BIM, Data/Geometry Prep and Onboarding Please select
Optional, depending on project scope
BIM Quality Data and Geometry Prep and Onboarding Please select
Spatial Data Services and Survey, Preparation and Cleaning (mostly for infrastructure projects only) Please select

Project Context & Use Cases Definitions
What are the key objectives the customer is trying to achieve?
Who will be the target users of the solution?
Which of these following use cases are you interested in? Please select

SHG Teamed with



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Any Questions?

Thank you!