



NASM



NMAI



Hirshhorn



AIB



The Castle



Freer



Anacostia



NMAH



NMfAA



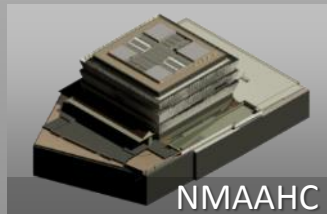
DWRC



NZP-Bird House



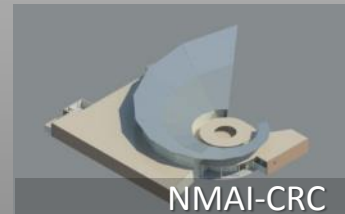
Quad – Haupt



NMAAHC



Front Royal



NMAI-CRC

Mike Carrancho, P.E.

Smithsonian Institution

NSF Large Project Workshop 24 May 2016

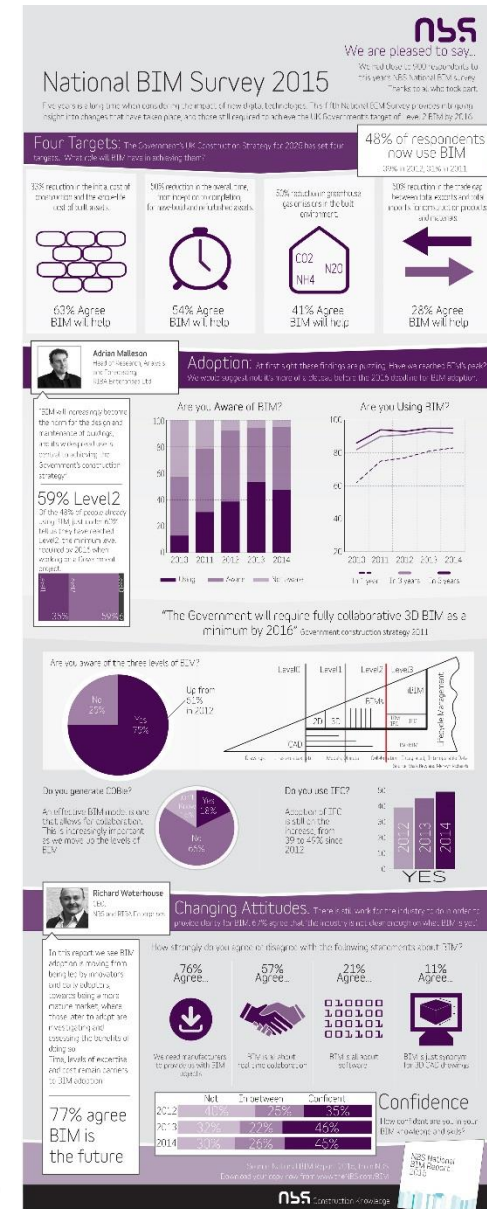


BIM for the ASSET Lifespan

Consider This:

- 92% believe it will be 'de facto' design standard in 3 years
- Only 25% of US owners have 'very high involvement' in BIM
- 75% of these stated that the AEC team used BIM when it wasn't required by the owner
- UK is a leader in BIM with over 98% of owners having some involvement in BIM compared to 59% in the US

(Sources: NBS National BIM survey, 2015; McGraw Hill Construction, 2014)



SF BIM Program Timeline

- 2013: Planning for BIM
 - Market and industry survey
 - Use Case Analysis, SI staff and AEs
 - In-house BIM Technician
- 2014: BIM Pilots, Standards and Wiki Sites
 - Identified major upcoming design project
 - Developed draft language for SOW
 - Create BIM templates & Guidance
 - BIM Viewer and Model Checker recommendations
 - Develop internal BIM Wiki sites using MS Sharepoint
- 2014 – 2015:
 - Updated AE Center, public facing website
 - Refine BIM guidelines and design deliverable requirements through pilot project feedback
 - Implement BIM Viewer
 - Focus on Asset replacement workflows
- 2015 – 2016:
 - Developing AE Scope of work language
 - Developing Div 1000 construction specification language
 - Implement Model Checker





Smithsonian

Establishing a BIM Foundation



SF BIM: Begin with the End in Mind

Required Outcomes of using BIM

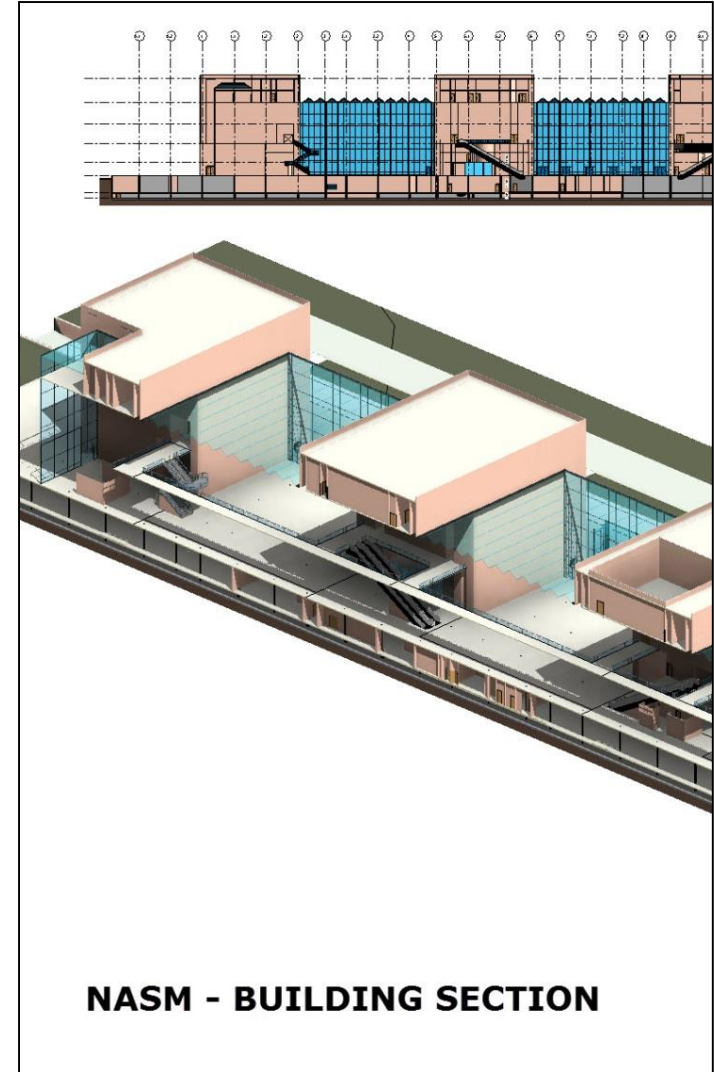
- BIM usefulness required long after design and construction
- Asset management
- Portable for maintenance and operations personnel
- Accessible at multiple user levels across the institution

During Design

- Incorporate specific BIM design review capabilities
- Address multiple user capabilities: equipment & skills
- Develop standards for AE to follow

During Construction

- Define 'As-Built BIM'
- Asset management
- Integration with Computerized Facility Maintenance System (Tririga Facility center)



Use Cases

Capital Program

- Introduce use of 2D and 3D (low detail) to visualize location and extent of capital project areas

Design

- More efficient access to accurate as-builts, shop drawings

Facilities Management

- Support *preventative maintenance* through visualization of work tasks and asset location

Energy Management

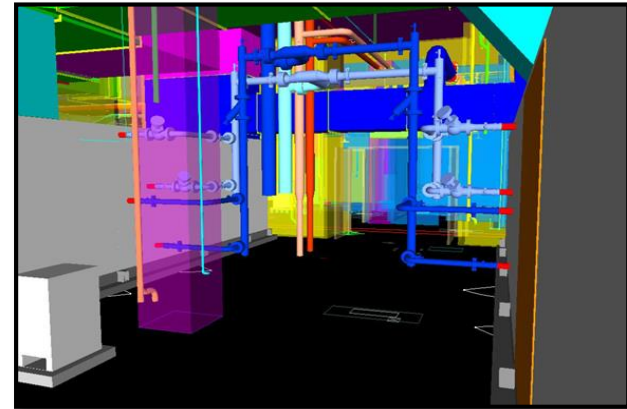
- Introduce geospatial component to existing power and water usage analysis

Smithsonian Gardens

- Support geospatial analysis of exterior spaces

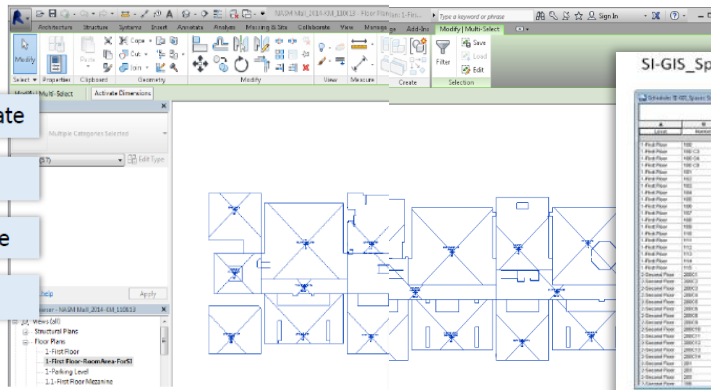
Historic Preservation

- Identify rooms and spaces of historic importance



-

- Architectural Template
- Electrical Template
- Mechanical Template
- Structural Template



Revit “.rte” Template File – Space Plan

SI-GIS_Spaces Schedule

Schedul: 0-05_Span_Schedule: NCMHind_2014_04_20(1)														
0-05_05_Span_Schedule														
	W	T	F	T	F	S	S	S	S	S	S	S	S	S
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Scheduled fields (in order):

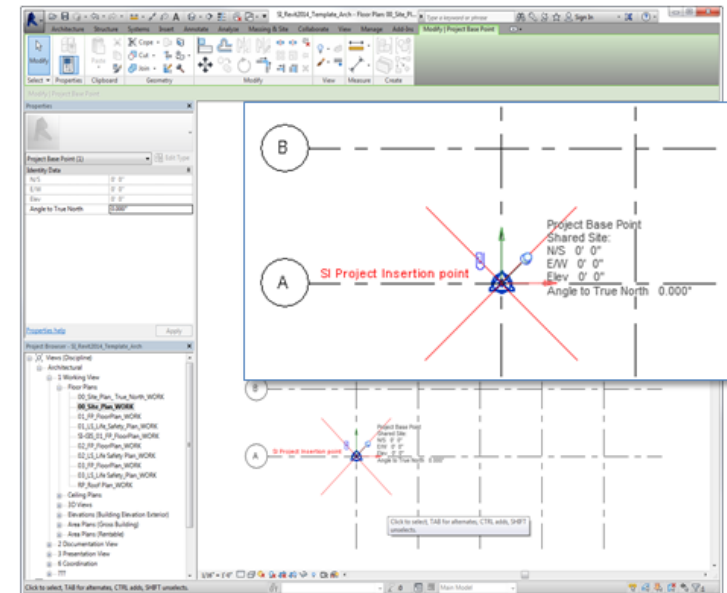
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Number
SI_RoomLinkID
Name
Area
Area_MM2
Perimeter
Perimeter_MM
Volume
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Department
Occupancy
Occupant
Comments
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ACM_MAT_TYPE
ACM_CHANGE
ACM_MAT_COND
ACM_STATUS
ACM_COMMENTS

Revit Template User's Guide

- Guidance for AEC project teams (primarily)
- Develop consistent model development across projects (and in-house)
- Not a tutorial – expect reader to know Revit
- Walks the user through Smithsonian minimum standards
- Based on National CAD Standard (v5) 5
- Customized title blocks, syntax for SI
- Identifies “Best Practices” (items not required)

Note that all SI-GIS plan views must contain SI insertion point symbol family located in the appropriate location (0,0,0) before they are exported to AutoCAD for all SI deliverables.

Figure 2– SI's Project Base Point family located at 0,0,0 coordinates



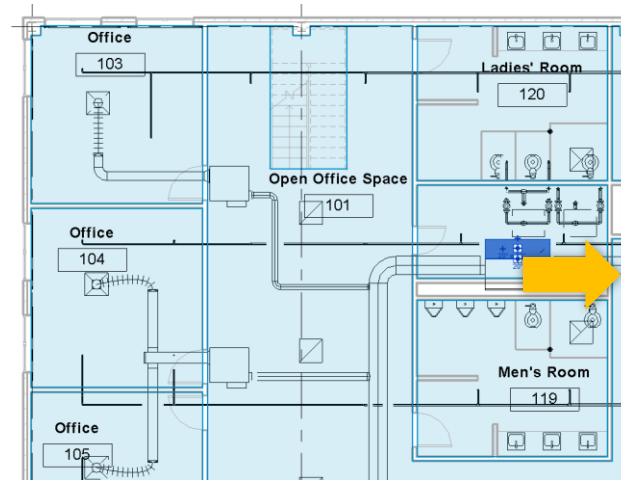
FM BIM: Data Development

IWMS/CAFM

- Provide critical asset data, “ready” for Tririga Facility Center Upload
- Focus: less data and higher quality

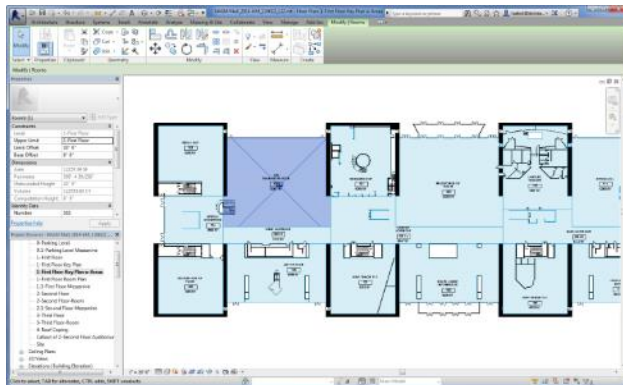
GIS

- BIM exchanges CAD geometry + data attributes for rooms and spaces



BIM to IWMS

SI Asset Parameters	
Asset ID	
Asset Name	
Specification ID	
Specification Name	
Serial Number	
Brand	
Model Number	
Description	
Amps	
Voltage	
KVA	
GPM	
Belt Size	
RPM	
MaxP	
Filter Size	
Ton	
HP	
Gal	
CFM	
BtuH	
Floor	
Room Number	



BIM to GIS



SI Revit templates organize data to be developed in the project BIM, and delivered to SI at project turnover, exported to GIS and IWMS

Guidance for BIM Deliverables

Level of Development Guide (*DRAFT*)

- SI has developed a guidance framework for the level development required for BIM deliverables
- BIM LOD will be identified early in the project (passed on to the team to detail in the project BIM PxP)
- The **Scope of Work** of the project ultimately defines the BIM requirements


Project Stage	Design Model			Design Intent Model				Means and Methods Model			
Time of Exchange (SD, DD, CD, Construction)											
Responsible Party (Information Receiver)											
Receiver File Format											
Application & Version											
BIM Use Title	Model Element (3D)	Model Element (2D)	Data Only (Specs)	Existing Conditions	Schematic Design	Design Development	Construction Documents	Shop Drawings	Construction Administration	As-Built	
Model Element (ASTM Uniform II) Classification	Yes (Y) / No (N)	Yes (Y) / No (N)	Yes (Y) / No (N)	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA
SUBSTRUCTURE											
A1010 Standard Foundations											
Wall & Column Foundations											
Foundation Walls											
Grade Beams											
Pile Caps											
Excavation, Backfill & Compaction											
Footings & Bases											
Perimeter Insulation											
Perimeter Drainage											
Anchor Plates/Bolt Patterns											
Means & Methods (Erection/Sequencing/ Shop Standards)											
A1020 Special Foundations											
Pile Foundations											
Grade Beams											
Caissons											
Underpinning											
Cresting											
Raft Foundations											
Pressure Injected Grouting											
Other Special Conditions											
Means & Methods (Erection/Sequencing/ Shop Standards)											
A1030 Slab in Grade											
Standard Slab on Grade											
Structural Slab on Grade											
Inclined Slab on Grade											
Trenches, Pits, and Bases											
Under-Slab Drainage and Insulation											
Means & Methods (Erection/Sequencing/ Shop Standards)											
A2010 Basement Excavation											
Excavation for Basements											
Structure Back Fill and Compaction											

ASTM Uniform II
Classifications



BIM Project Execution Plan (PxP)

- A living document populated and updated by the project team
- Clarifies and maintains the project BIM development process for the owner, and the team
- Provides a vetting process for any changes made in the BIM development process


Smithsonian Institution
[Project Title] BIM PxP

B. Project Information

1. Basic Project Information

Confirm official SI project name and project number

Project Name	
Project Numbers	[CONTRACT NUMBER, TASK ORDER, OFEO PROJECT NUMBER, ETC]
Project Owner	
Project Location and Address	
Contract Type / Delivery Method	
Brief Project Description	[NUMBER OF FACILITIES, GENERAL SIZE, ETC]
Additional Project Information	[UNIQUE BIM PROJECT CHARACTERISTICS AND REQUIREMENTS]

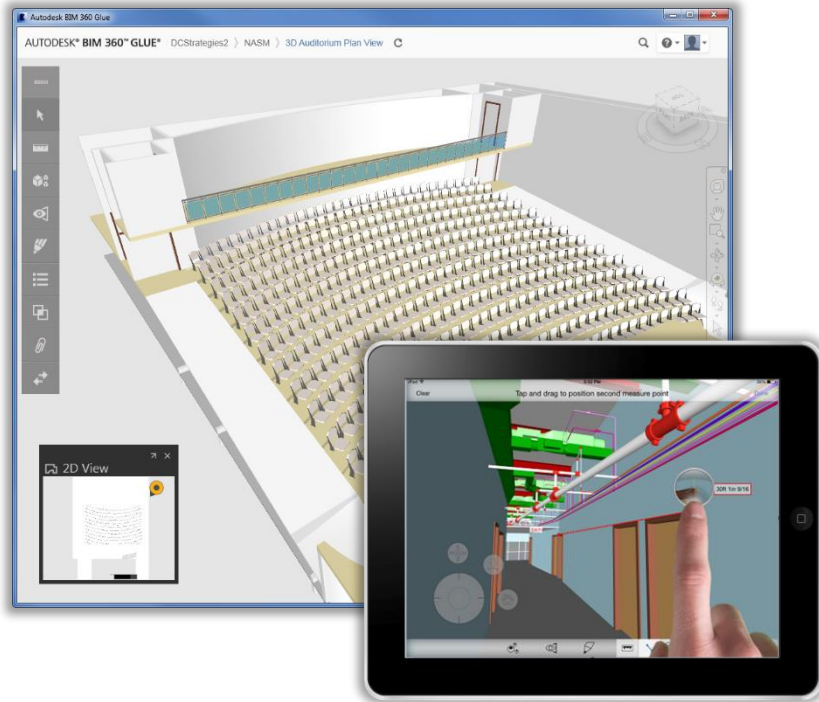
2. Project Schedule

Include BIM milestones, design activities, and any other major activities during the project.

Project Phase / Milestone	Estimated Start Date	Estimated Completion Date	REVISE BIM PLAN	PROJECT STAKEHOLDERS INVOLVED
Preliminary Planning	[Date TBD]	[Date TBD]	[YES/NO]	
Schematic Design	[Date TBD]	[Date TBD]	[YES/NO]	
Design Development	[Date TBD]	[Date TBD]	[YES/NO]	
Bidding Documents	[Date TBD]	[Date TBD]	[YES/NO]	
BOT Approval	[Date TBD]	[Date TBD]	[YES/NO]	
Construction Documents	[Date TBD]	[Date TBD]	[YES/NO]	
50% Construction	[Date TBD]	[Date TBD]	[YES/NO]	
Project Closeout	[Date TBD]	[Date TBD]	N/A	

[Date]
Page 6 of 32

Supporting SI BIM Project Reviews

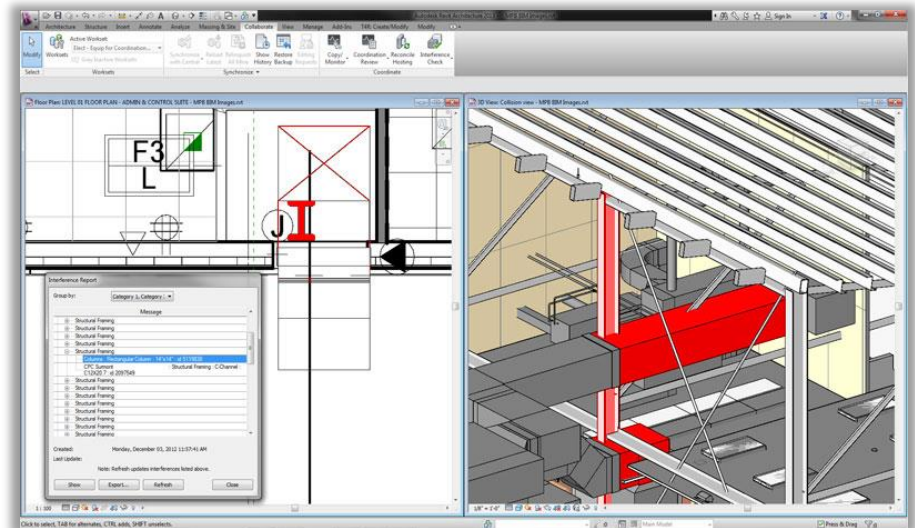


BIM Viewers

- Provides a means to review developing project models by SI users who are not Revit experts
- Offers versatile methods for viewing BIM: PDFs, mobile devices

Model Checkers

- Provides an automated means to check a BIM against a customized rule set
- Useful by SI and by their project consultants





How will it all work?

BIM data improvement over time





How will it all work?

BIM data improvement over time





How will it all work?

BIM data improvement over time





How will it all work?

BIM data improvement over time





Building Information Management Portal

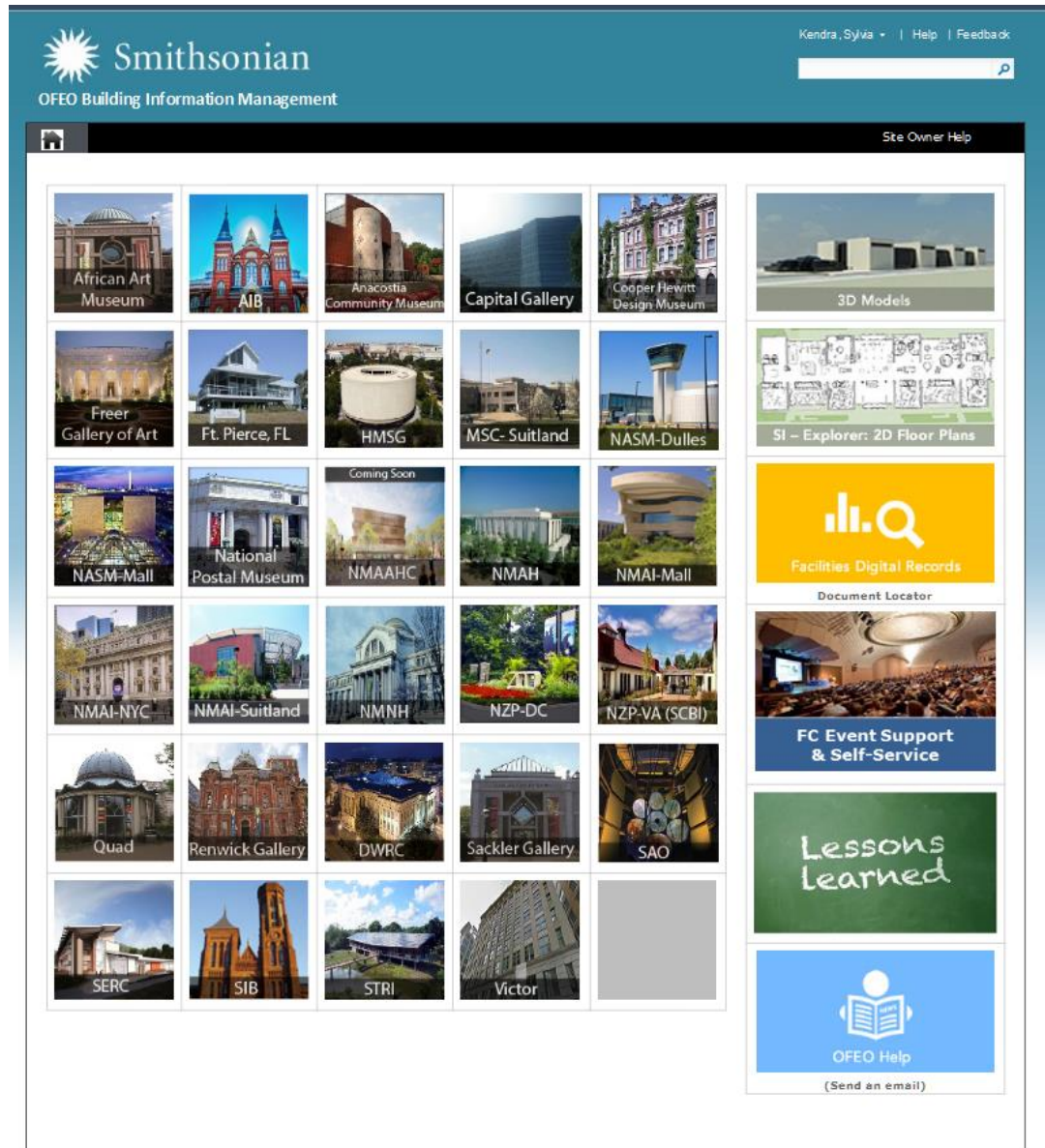
BIM “Wiki”

Develop a go-to source for information about SI facilities

- Highly visual
- Collaborative web-based environment
- Leveraging SI’s SharePoint expertise

Provide links and information from existing SI systems

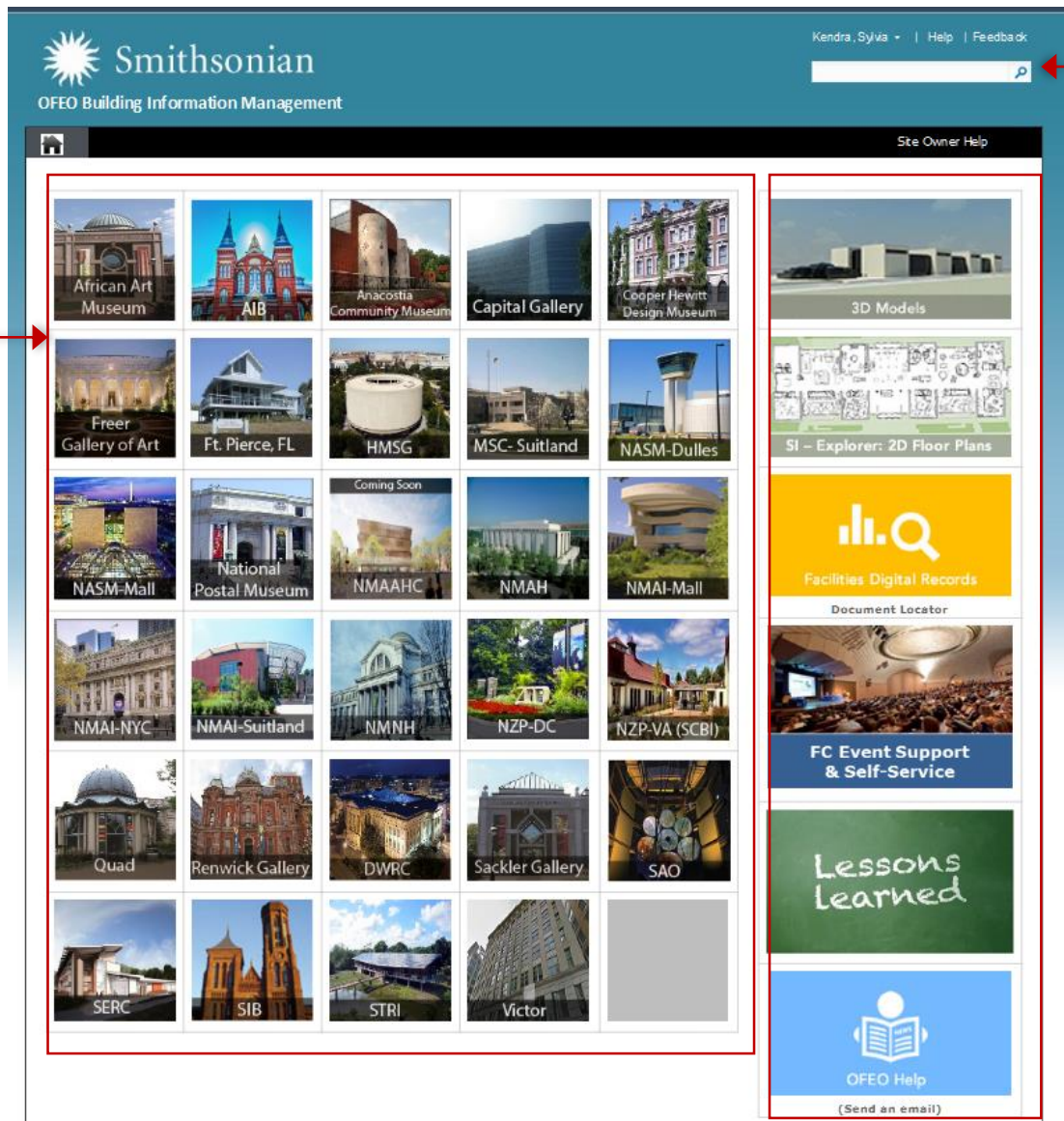
- No new data, just a clearinghouse for existing systems
- SI campus specific
- Simplifies access to critical facilities information





BIM “Wiki” – Home Page

Top level page – access to all building pages and support documentation



Access:
Individual
Building Wikis

Search

Access:
Top level
access to OFEO
systems



3D Models



3D Models



SI - Explorer: 2D Floor Plans



Facilities Digital Records

Document Locator



FC Event Support
& Self-Service




Lessons
Learned



OFEO Help

(Send an email)


Direct Download of
Autodesk Revit Files



Smithsonian Facilities

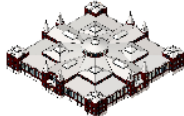
OFEO BIM Wiki • 3DModels

Home | Site | Feedback

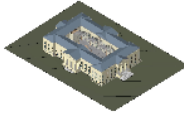


Building Information Models

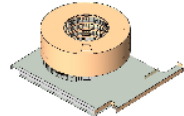
Arts and Industries Building
(Click here to download the revit file)




Donald W. Reynolds Center
(Click here to download the revit file)



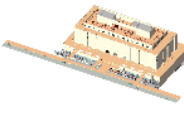
Hirshhorn Museum and Sculpture Garden
(Click here to download the revit file)




National Air and Space Museum
(Click here to download the revit file)




National Museum of American History
(Click here to download the revit file)



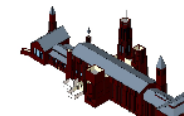
National Museum of American Indian
(Click here to download the revit file)



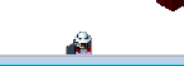
National Museum of American Indian - Suitland
(Click here to download the revit file)



Smithsonian Institution Building
(Click here to download the revit file)




Smithsonian Quadrangle
(Click here to download the revit file)







SI Explorer – GIS Mapping & Viewer



3D Models




SI – Explorer: 2D Floor Plans




Facilities Digital Records


Document Locator



FC Event Support
& Self-Service

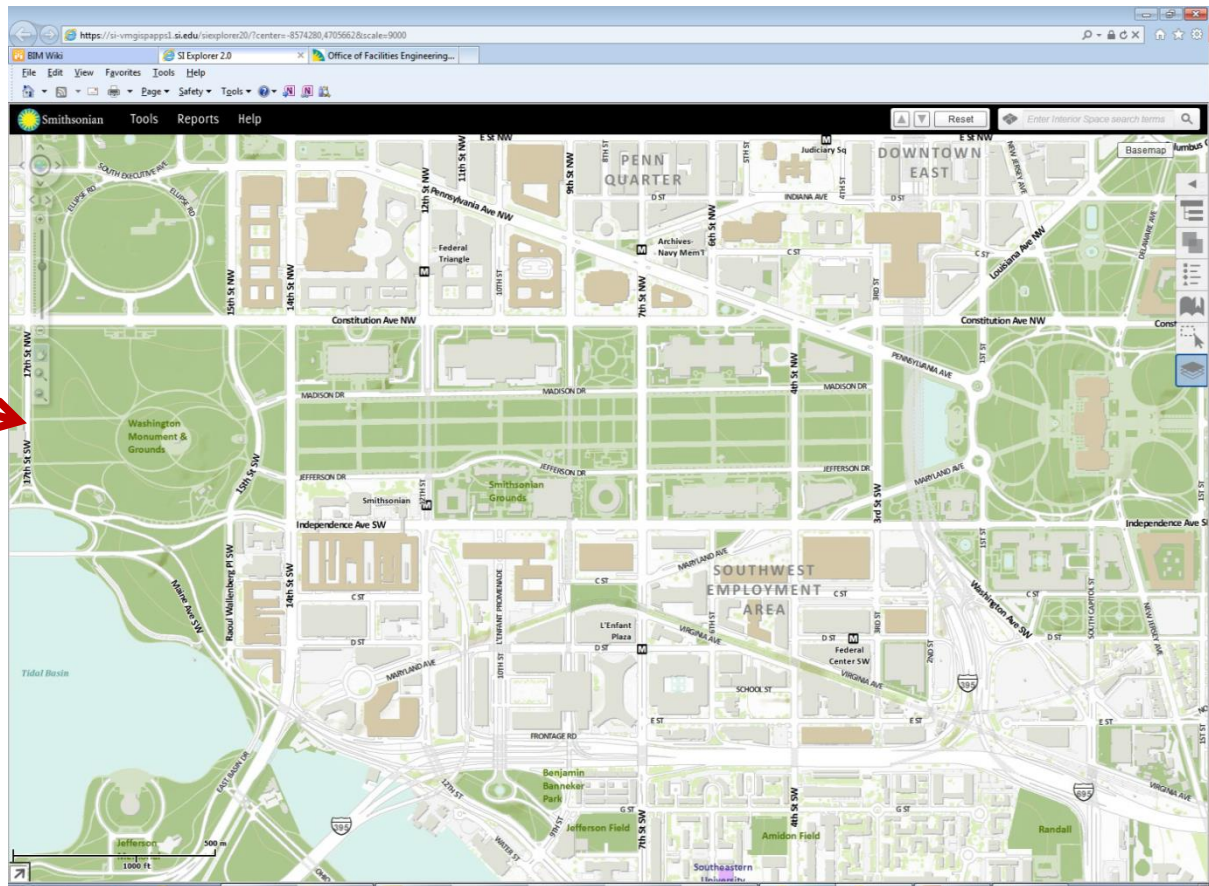


Lessons Learned



OFEO Help

(Send an email)



Visualize 2D drawings and sites



Document Locator



3D Models



SI - Explorer: 2D Floor Plans



Facilities Digital Records

Document Locator



FC Event Support
& Self-Service




Lessons
Learned



OFEO Help

(Send an email)





Smithsonian
Institution

Authentication:

Server Name:

Repository:

Aperture Cards

Aperture Cards

BIM Models

Project Lessons Learned

Microfiche Images

ZOO

Horticulture

SI Disaster Management

Reference

Master Records

NYC

North Mall

West Mall

South Mall

East Mall and VA

Gallery Place

Suitland

SAO

SERC

Multi-Facility

STRI

OEDC Central File Room

Waste Diversion

WebTools Admin

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A different way of getting to document locator
- - same data



The screenshot shows a web browser window with the URL <https://collab.si.edu/sites/OUSFA-OFEO/BIM/LessonsLearned/Pages/default.aspx>. The page is titled "Smithsonian OFEO Building Information Management • Project Lessons Learned". It features a navigation bar with "Lessons Learned Home" and "Site Owner Help". The main content area is divided into two sections: "Welcome to the Lessons Learned SharePoint Site!" and "LL Document Library".

The "Welcome to the Lessons Learned SharePoint Site!" section contains a box titled "To Begin using the Lessons Learned (LL) database:" with the following instructions:

- 1) Click the link under Document Locator Lessons Learned to activate the site.
- 2) Use the search box to search lessons learned related to a key word.
- 3) Or expand "Documents" to browse the library.

The "LL Document Library" section displays a table with the following columns: Type, Name, Modified, and Modified By. The table contains four rows of data:

Type	Name	Modified	Modified By
Document	1_Lessons Learned Instructions_Web Version	4/29/2015 12:18 PM	Canaday, Charity
Document	Add New Lesson Instructions	6/3/2015 10:40 AM	Canaday, Charity
Document	Create New Lesson	4/29/2015 12:11 PM	Canaday, Charity
Image	images	4/29/2015 12:13 PM	Canaday, Charity

Below the table is a link to "Add document".

The "Projects Lessons Learned" window is open, showing a file explorer view. The "Locator:" field is empty, and the "Address:" field shows "Project Lessons Learned/Documents". The "Folders" pane on the left shows a tree structure:

- Project Lessons Learned
 - Documents
 - _New Lessons Here (16)
 - Analysis
 - Archive (17)
 - Templates (4)
 - Searches
 - Workflow
 - Recycle Bin
 - Projects


The "Files and Sub-Folders" pane on the right shows a table with the following columns: Name, Tracking Number, Version, and Checked Out By. The table contains four rows of data:

Name	Tracking Number	Version	Checked Out By
_New Lessons Here		1	
Analysis		1	
Archive		1	
Templates		1	


Below the table is a file named "Start Here First - READ ME.docx" with a Tracking Number of 9.




Other OFEO resources




3D Models



SI - Explorer: 2D Floor Plans



Facilities Digital Records

 Smithsonian Institution

Home Open In New Window

Self Service Requests

Building Services

Interior Service Requests

Event Request

Request for OFEO event support

Exterior Services

Exterior Service Requests

Safety Data Sheets

Find Material Safety Data Sheets (MSDS)

Transportation & Moves

Request for moves and vehicle repair

Reminders

Notices

Self-Service Reports

My Active Requests

My Request History

Event Request History

My Active Requests

Last Visited



FC Event Support
& Self-Service



Lessons Learned



OFEO Help

(Send an email)

Untitled - Message (HTML)

File Message Insert Options Format Text Review Document Locator

Paste

Clipboard

B

I

U

ab

A

Basic Text

Address Book

Check Names

Attach File

Attach Item

Signature

Follow Up

High Importance

Low Importance

Zoom

To...

CC...

Subject:

OFEO-Help



Building - Home Page (NMAI)

SharePoint functions

Building Photos

Views of floor plans

Projects List
(Excel download – live link to MOPS)

NMAI IFT Calendar

Smithsonian

OFEO BIM Wiki - NMAI

NMAI Home | Site Owner Help

National Museum of American Indian

NMAI Floorplans

Please choose a floor below

Basement

1st Floor

2nd Floor

3rd Floor

2nd Floor Mezzanine

4th Floor

4th Floor Mezzanine

5th Floor

Penthouse

Click on the floorplan image to enlarge it

View NMAI in ST Explorer (requires Flash)

Projects List

Active | Cancelled | In CA Services | On Hold

Project Name	Design Manager	Sum of Design Award
Architectural		
NMAI-Mull 121	Taloren Lu	\$30,078.34
In House		
NMAI-Mull 121	Sandy Caballero	
Quinn Events		
NMAI-Mull 121	Sandy Caballero	
TR0		
NMAI-Mull 121	Sandy Caballero	
IHS		
NMAI-Mull 121	Sandy Caballero	
External water Feature Repairs		
NMAI-Mull 121	Jimmy Hong	
Grand Total		\$30,078.34

Download the copy of the Excel file (click here)

NMAI IFT Calendar

August, 2014

S	M	T	W	T	F	S
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

Recent Projects - Document Locator

Go to Doc Locator NMAI Projects Folder

BIM Models

Go to Doc Locator NMAI BIM Folder

Architectural Master Records

Go to Doc Locator NMAI Architectural Master Records Folder

Reports

Type Name Modified Modified By

There are no items to show in this view of the "Reports" document library. To add a new item, click "Add document".

Related Links

NMAI IFT SharePoint Site

NMAI Website

NMAI IFT Contacts

Last Name	First Name	IFT Role	Business Phone	Email Address
Shaw	Josh	Construction Manager	202-633-4072	shawj@si.edu
Fitzgerald	Gene	Civil Engineer	202-633-4247	fitzge@si.edu
Khoury	Harry	Design Branch Chief	202-633-4263	khouryh@si.edu
Caballero	Santiago	Design Manager	202-633-4239	caballero@si.edu
Stratt	David	OPS Support	202-633-5679	stratt@si.edu
Thompson	Colleen	OPS Support	202-633-5675	thompson@si.edu
Batra	Hardeep	OPS Support	202-633-2675	batra@si.edu
Goldberg	Dan	OPS Support	202-633-3688	goldberg@si.edu
Goldman	Elyn	Project Manager	202-633-6553	goldman@si.edu
Drumming	Sarah	Resident Engineer	202-633-6777	drumming@si.edu
Bier	John	Site Manager	202-633-2673	bierj@si.edu

NMAI BIM Wiki Administrator

Sylvia Kendra 202-633-6262 kendras@si.edu

SharePoint functions

Building Photos

Document Locator:
Building specific shortcuts to Projects, BIM, Architectural Master Records


Reports

Related links

NMAI IFT contacts




Architectural History – second tab

**Smithsonian**

OFEI Building Information Management • NASM • Historic Information

Kendra Sylva • | Help | Feedback

 NASM Home | **Bldg Facts** | Site Owner Help

NASM Historic Information

Architectural Description

History:

The National Air and Space Museum, designed by Gyo Obata of Hellmuth Kassabaum and Obata, is a series of alternating masses of Tennessee marble and glass. Four sections are clad in this marble, chosen to complement the National Gallery of Art's west building.

The marble alternates between glass in three recessed exhibit bays; flooded with even, north-facing light, these glass areas feature heavy truss systems to support the planes suspended above. Window walls were placed at the end of each building to bring in large artifacts; the one at the west end is still active.

In 1988 the original architects designed a restaurant at the east end with panes of glass to echo the original building. The grounds of the museum contain several sculptures:

- *Delta Solar* by Alejandro Otero (1921-90),
- *Continuum* by Charles O. Perry (b.1929)
- *Ad Astra* by Richard Leopold (1915-2002).

The building features exhibition spaces that show airplanes suspended against the natural backdrop of the sky.

For more information, please contact Amy Ballard, BALLAAM@si.edu, Senior Historic Preservation Specialist

Building Facts

Location:

600 Independence Ave SW
Washington, DC 20056
Coordinates: [38°53'17"N 77°01'12"W / 38.888°N 77.020°W](#)

Building Measurements:


Gross Exterior:
747,877 sq ft (69,478 sqm)

Gross Interior:
668,507 sq ft (62,104 sqm)

Rentable:
589,058 sq ft (54,723 sqm)

Construction History:
Completed in 1976
Architect: Gyo Obata
General contractors: Gilbane Building Company

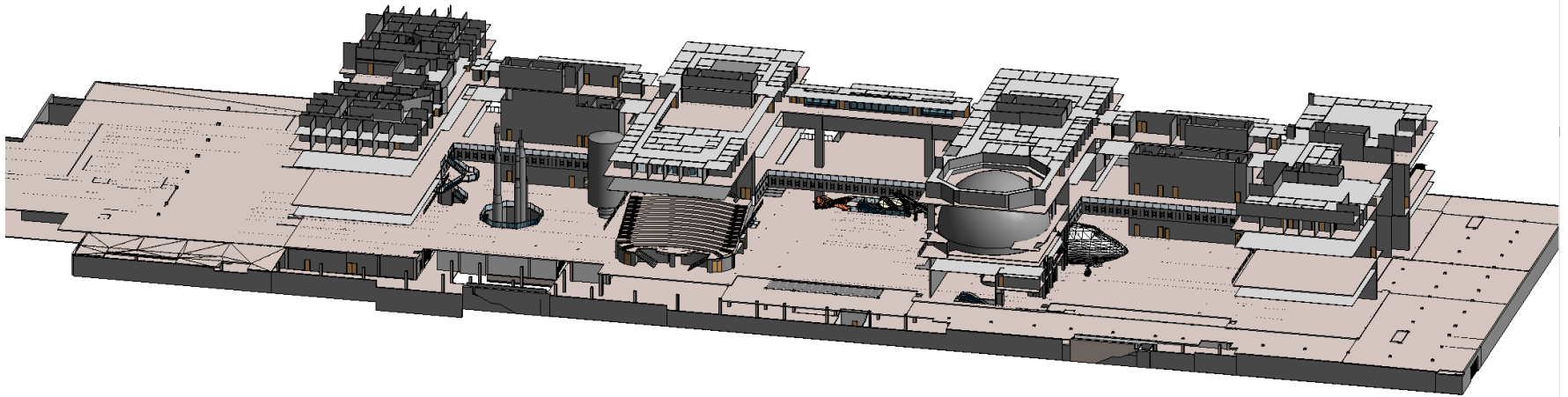
Historic Image Gallery





Future Plans

- More templates – life safety and security templates
- BIM Viewer – easy to use -- to facilitate early project visualization by clients and reviewers
- Model Checker to assist both contractors and SI staff in verifying data accuracy – especially in complex deliverables.





Questions



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Smithsonian Institution

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Design and Construction

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