BIM Technologies

Industry Advisory Panel

13 December 2007

DESIGN & ENGINEERING

BIM – OBO Initiatives

Technologies

- Building Information Modeling (BIM)
- Dprofiler
- Laser Scanning
- COBIE (Construction to Operation Building Information Exchange)

Implementation

BIM – OBO Initiatives

Technologies

- Building Information Modeling (BIM)
- Dprofiler
- Laser Scanning
- COBIE

Implementation

"Digital representation of the physical and functional characteristics of a facility throughout its lifecycle"

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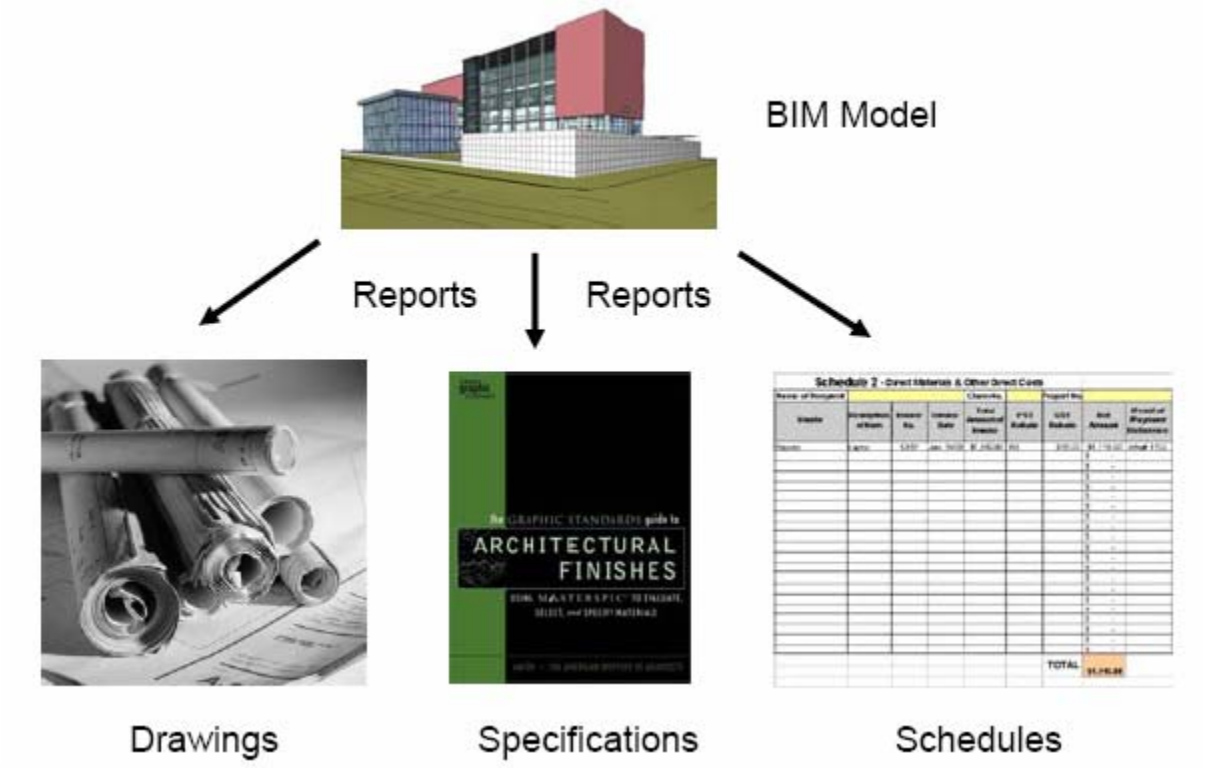
BIM

BIM-Based Coordination



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Original Graphics: CADD Microsystems, Inc.

BIM

BIM Data Exchange

Planning	Design/Construction	Facilities Management
Project Definition and Coordination	Design Review	Electronic O&M Management
Cost and Scheduling	Job Sequencing	Lifecycle Facility Tracking
	As-Built Model	

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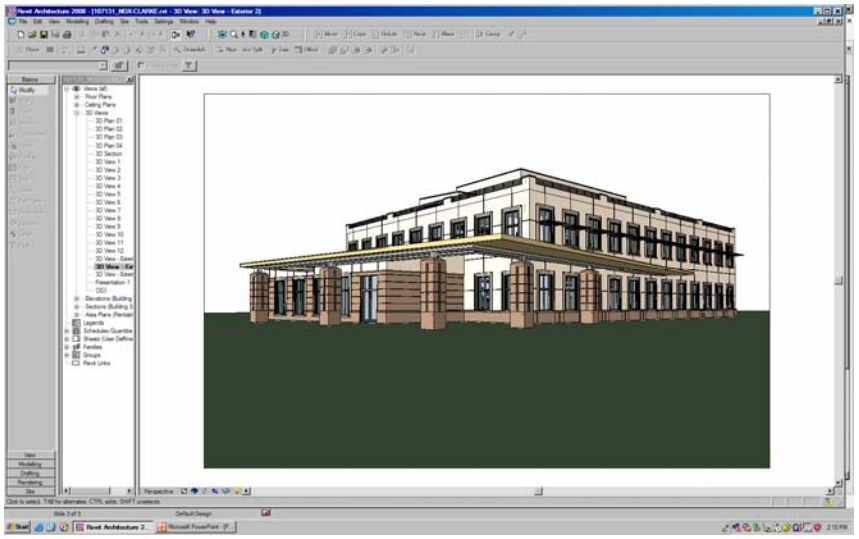
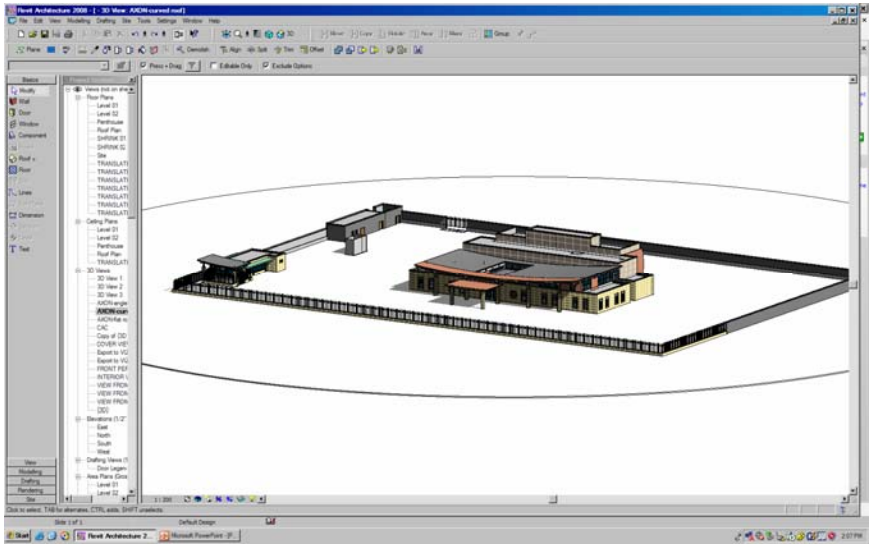
BIM - Early Adopters



Contractor-Initiated:
Kingston NOX
(2005)



OBO-Initiated:
Super Small SED
(2005)

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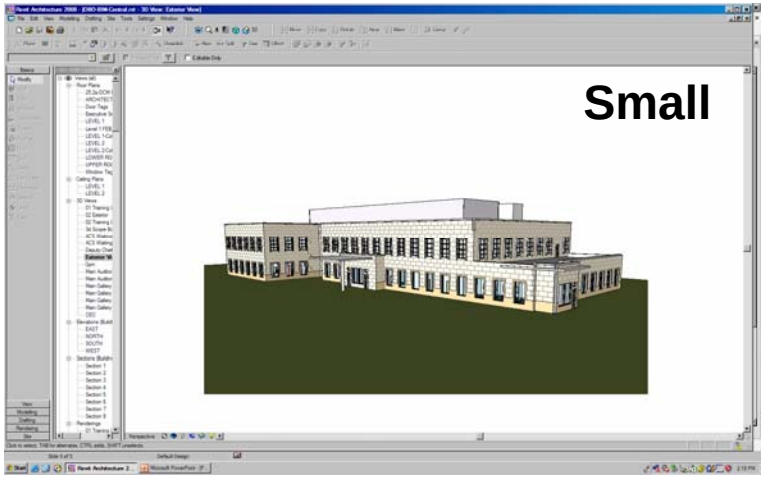
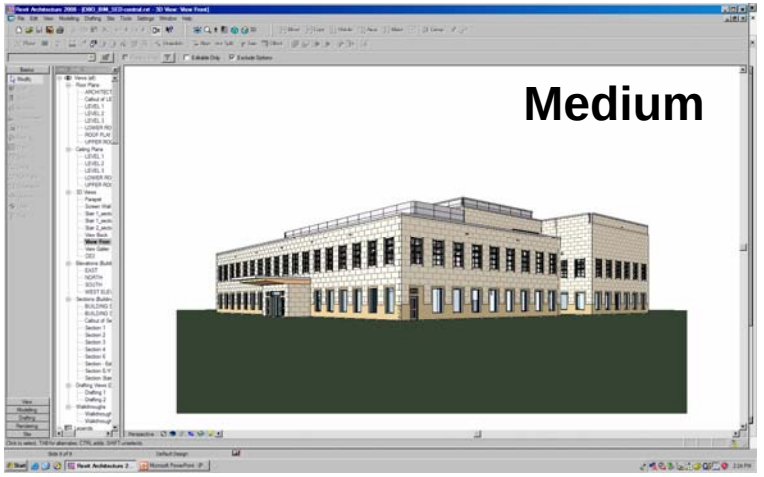
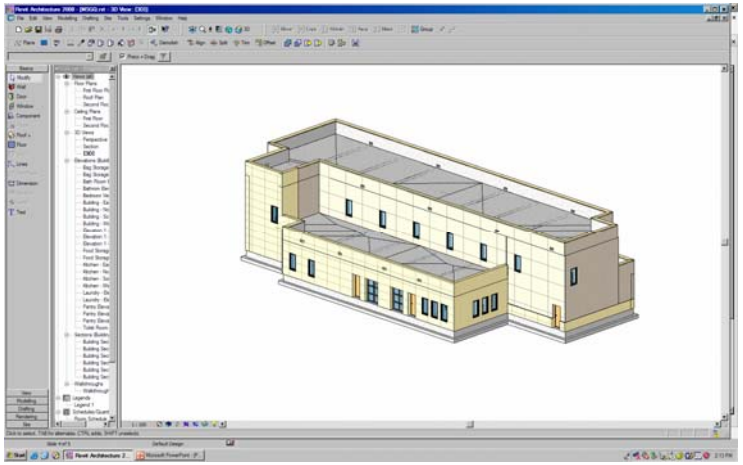
BIM - Standard Embassy Design Models







Marine Security Guard Quarters

DESIGN & ENGINEERING

Dprofiler

Technologies

- Building Information Modeling (BIM)
- Dprofiler
- Laser Scanning
- COBIE

Implementation

"A modeling software that captures the basic engineering and cost assumptions at the pre-design stage of a project. Facilitates the site adaptation and planning decisions-making process."

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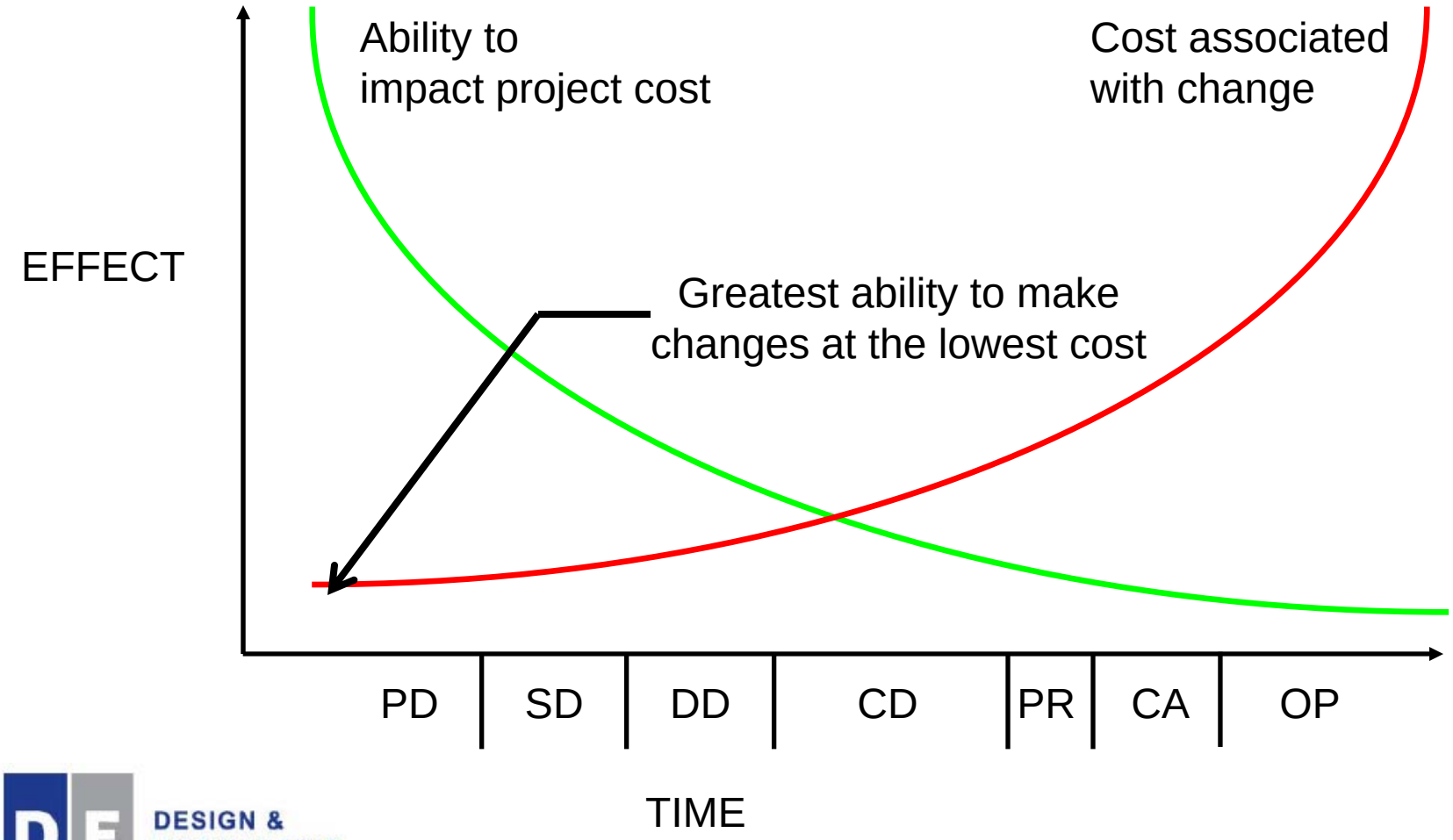
Dprofiler



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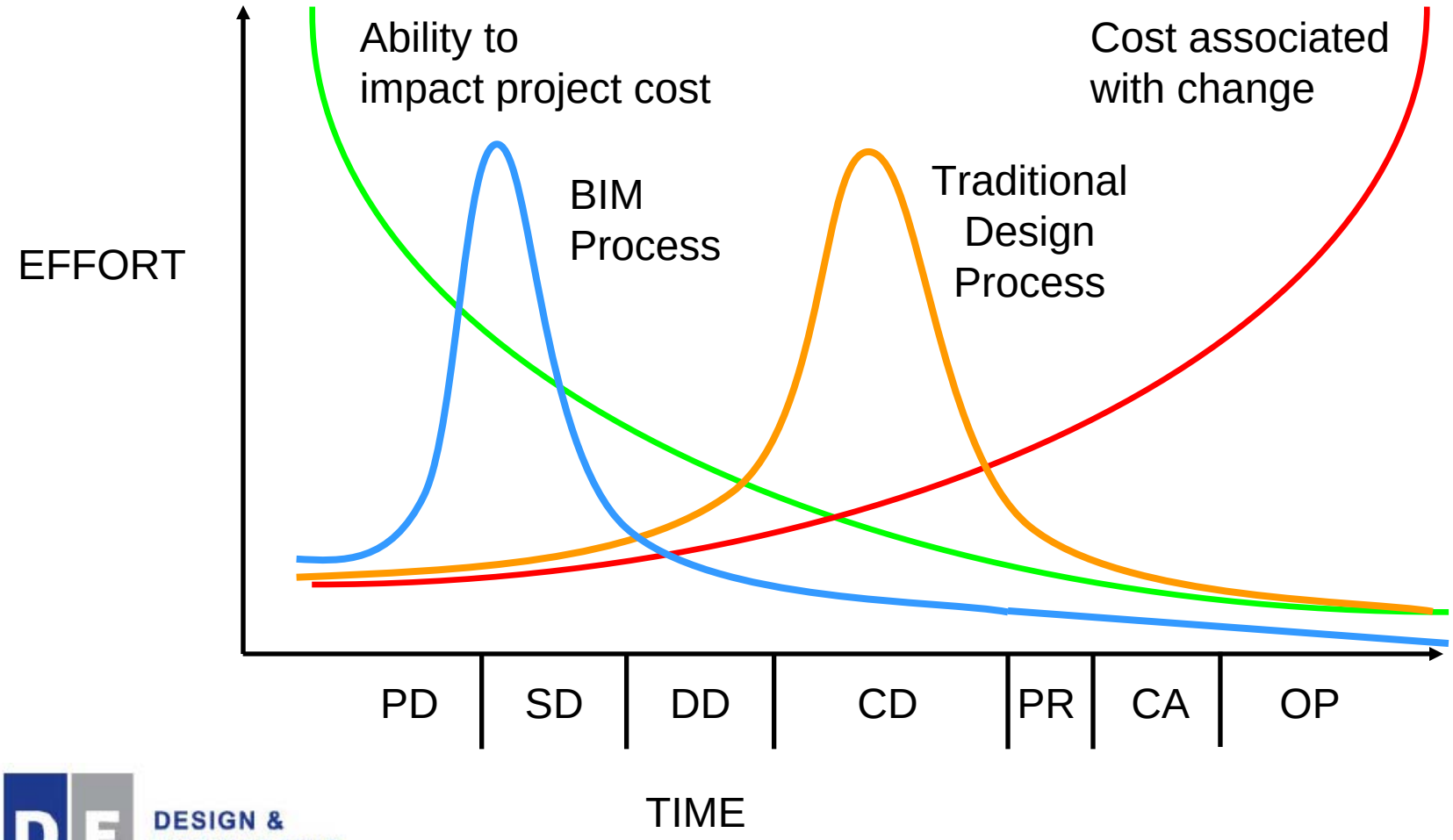
Original Graphics: Patrick MacLeamy AIA/HOK

Dprofiler



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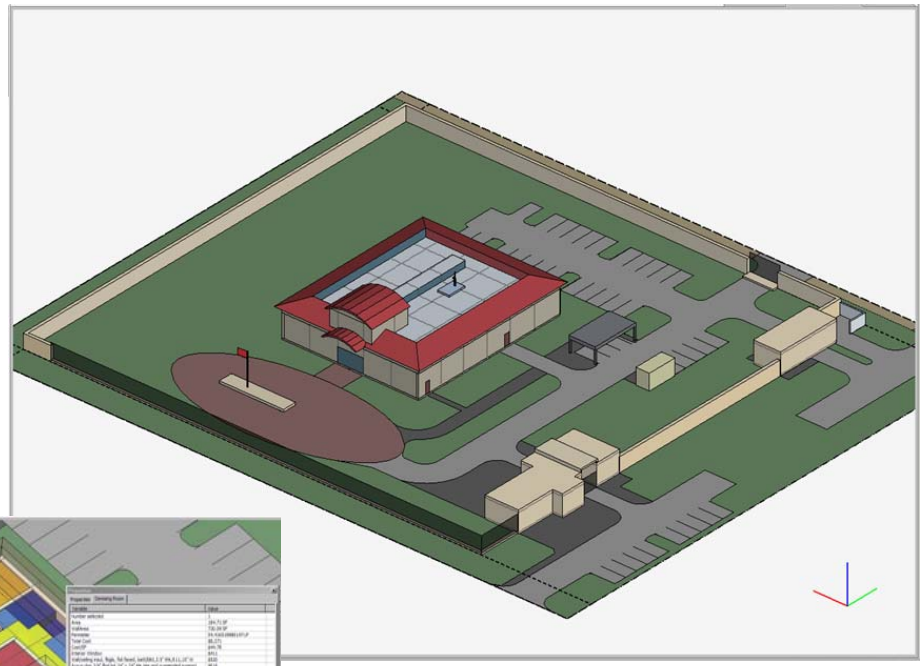
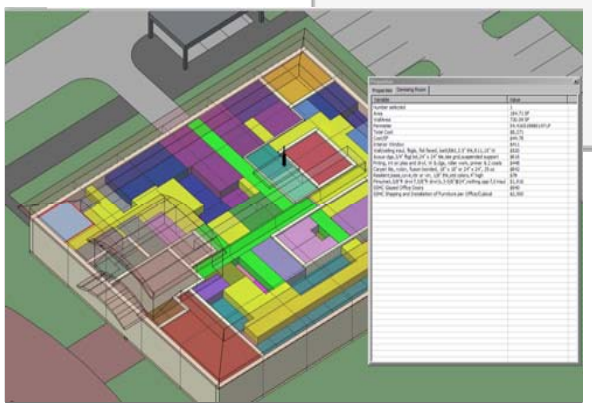
Original Graphics: Patrick MacLeamy AIA/HOK

Dprofiler

Planning Benefits:

- Planning phase modeling
- Evaluation of alternatives
- Real-time cost comparisons
- Properties of Space





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Dprofiler

Cost Estimating Benefits

- Predict costs early
- Produce reliable and defendable estimates based on RSMean's or internal cost data
- Develop cost and design data simultaneously

Traditional Estimating
240 Hours (2 estimators 120 hrs)
Deliverable: project cost estimate

DProfiler
20 Hours
Deliverable: project cost estimate, ***and***
Project Proforma
Design Criteria Document
Three-Dimensional Model

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Laser Scanning

Technologies

- Building Information Modeling (BIM)
- Dprofiler
- Laser Scanning
- COBIE

Implementation

"The capturing of the shape and placement of physical objects in a digital format using 3D laser survey technology"

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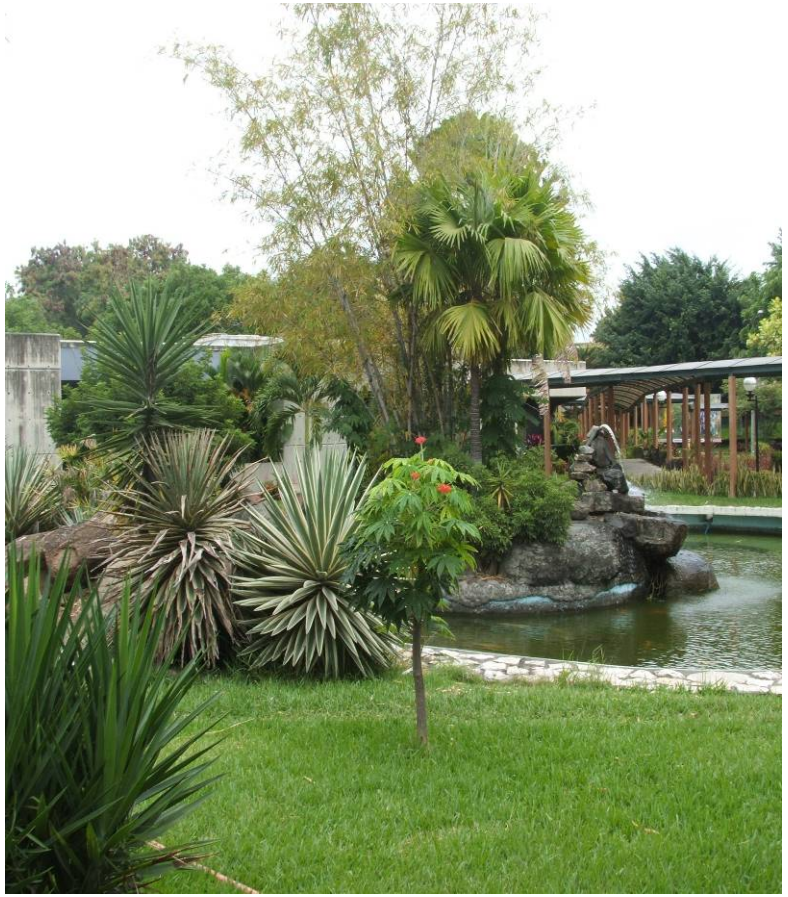
Laser Scanning

- Laser Survey Pilot Study
- Holcim Cement Factory Headquarters
- Guayaquil, Ecuador
- Summer, 2007



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Laser Scanning

Purpose of Survey

- Document existing site, buildings, and landscaping
- Evaluate efficiency and effectiveness of laser scanning technology

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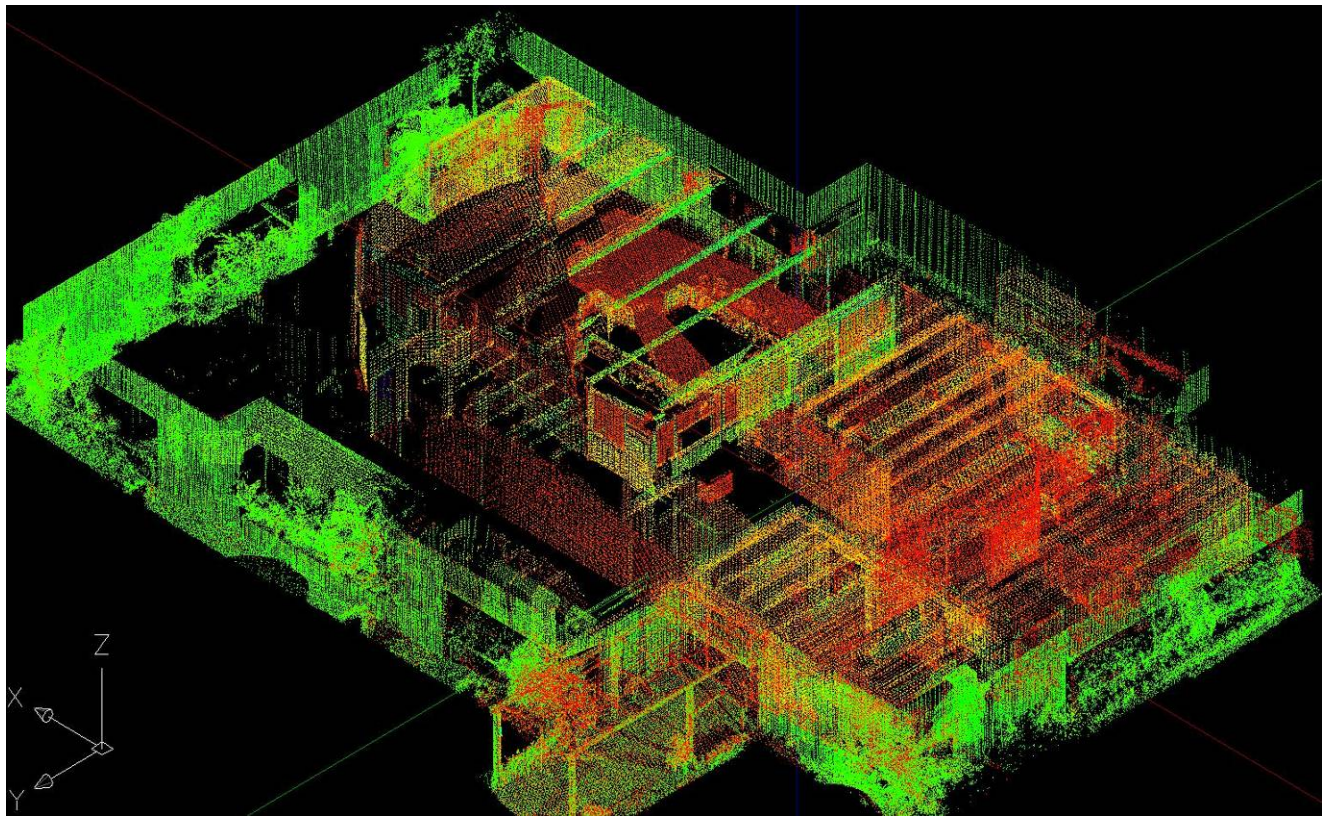
Laser Scanning

Point cloud imported into Autodesk ADT



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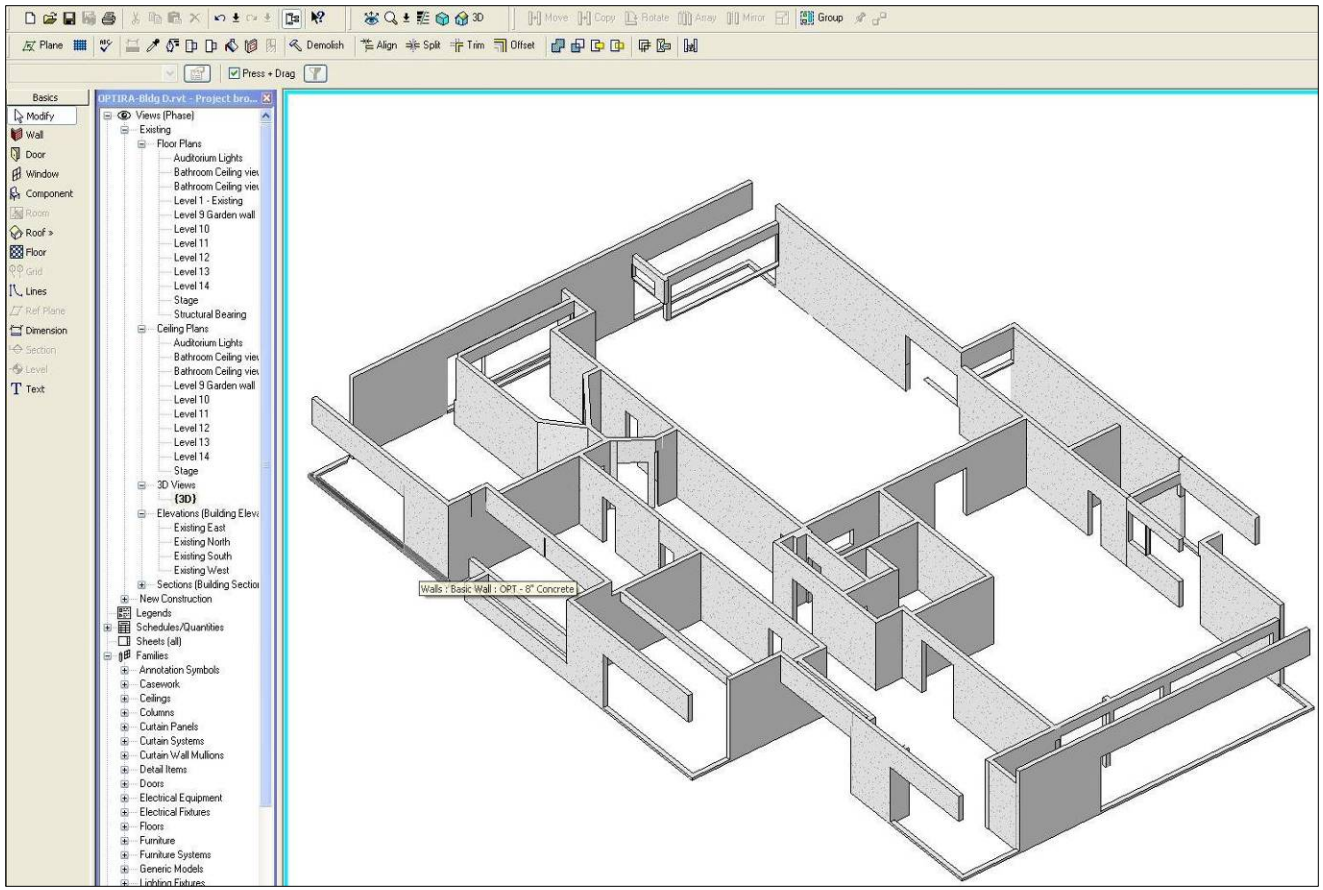
Laser Scanning

ADT model imported into Autodesk Revit



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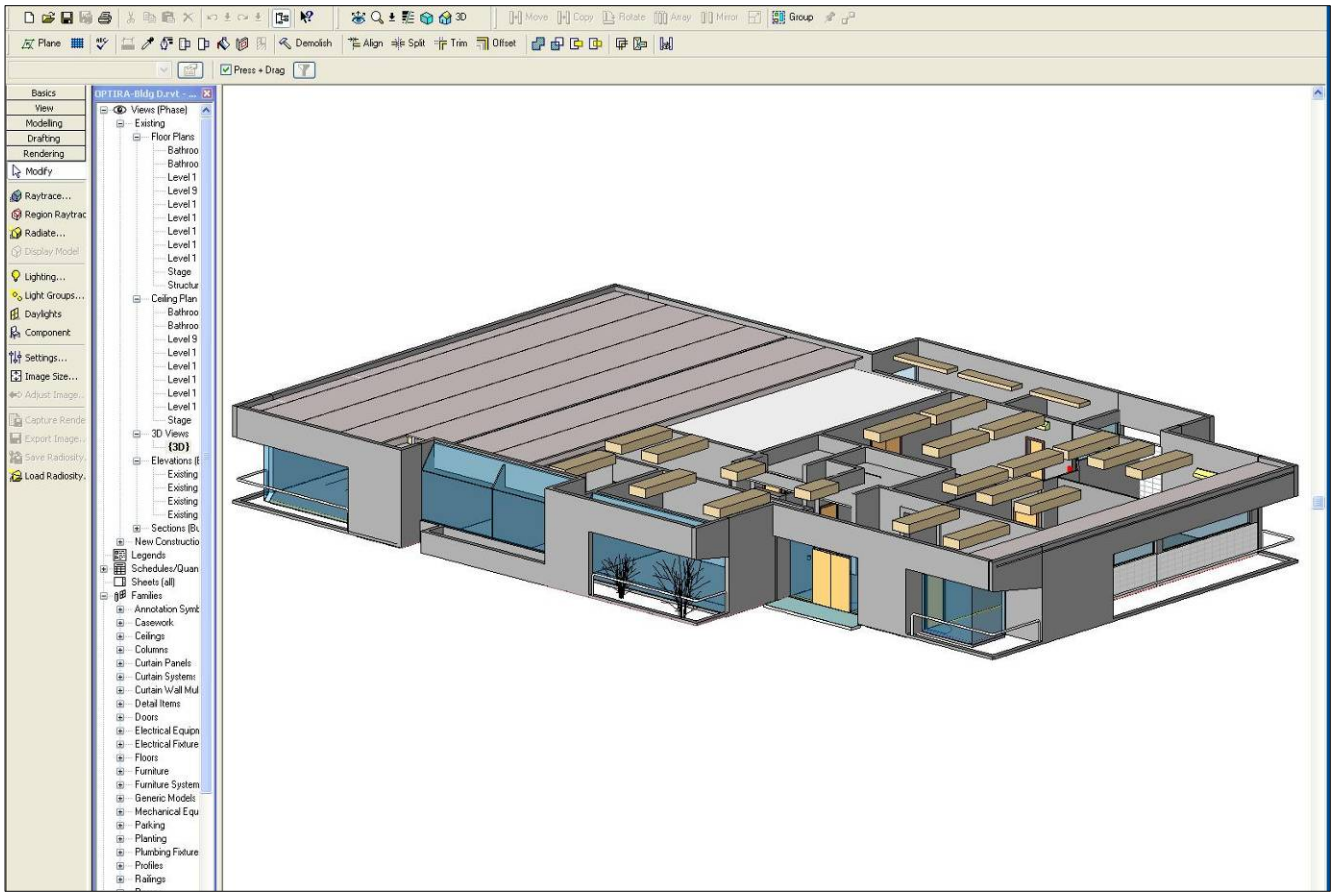
Laser Scanning

BIM model finalized in Revit



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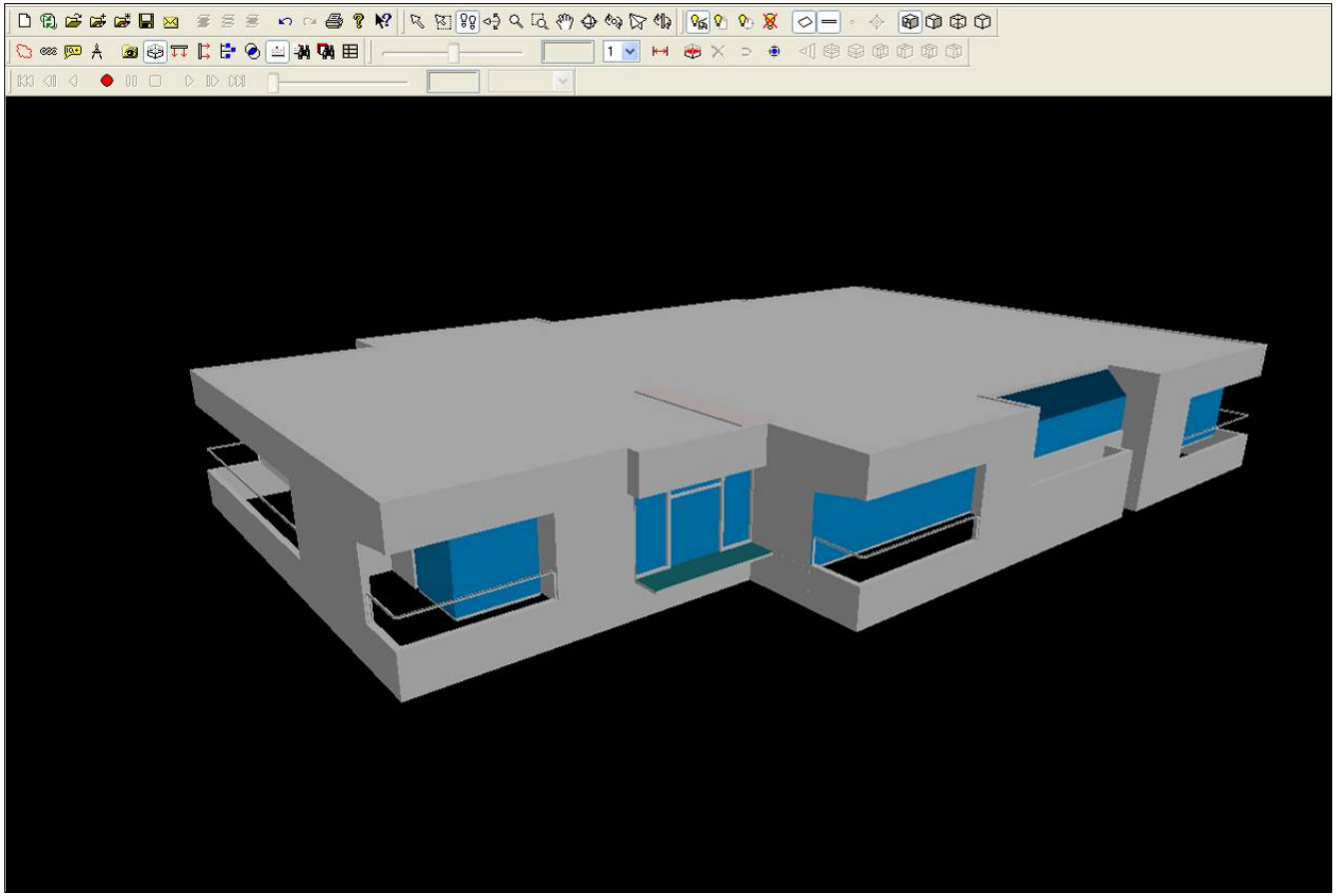
Laser Scanning

Model checked for interference using Navisworks



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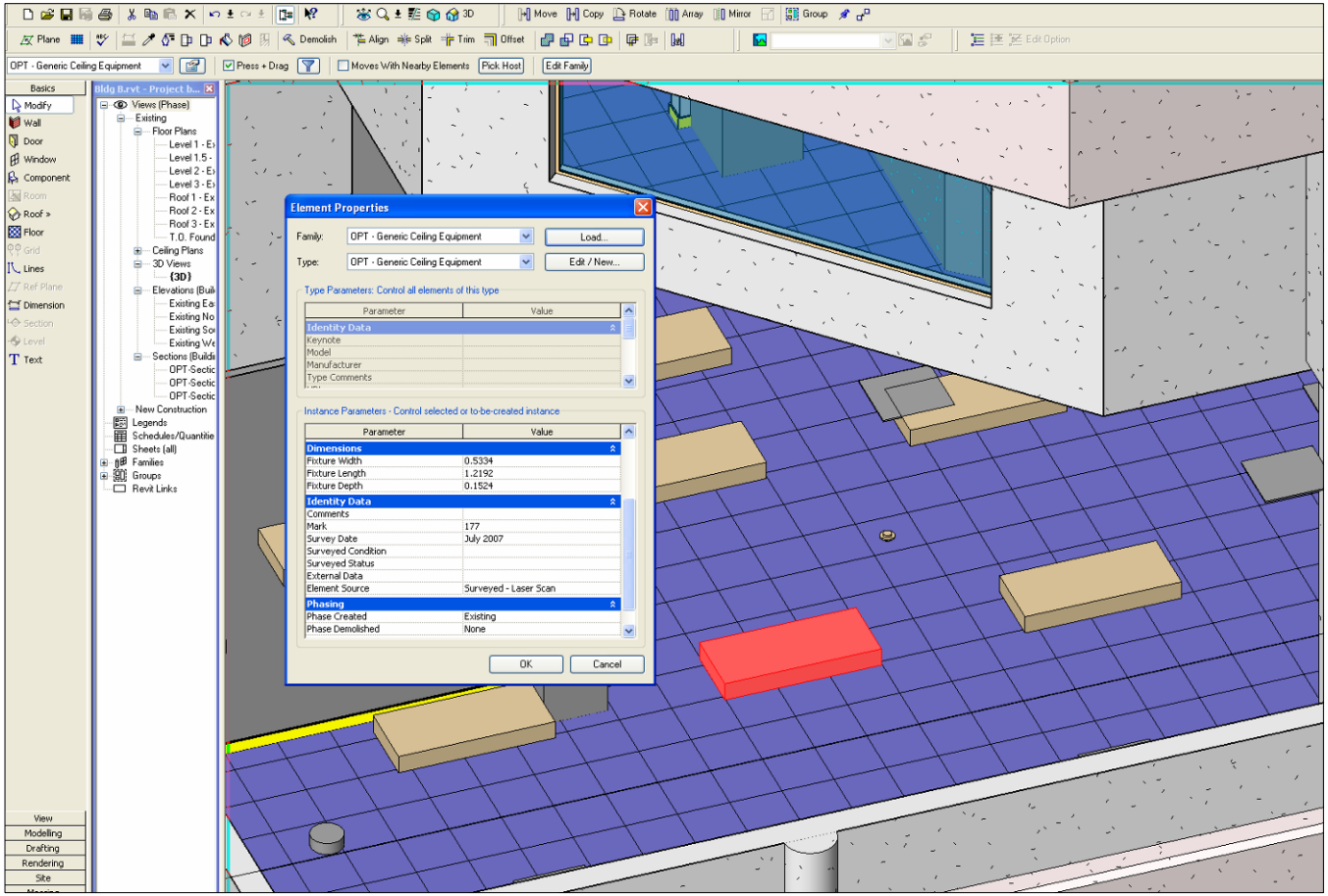
Laser Scanning

Associated object properties for graphic and non-graphic data included



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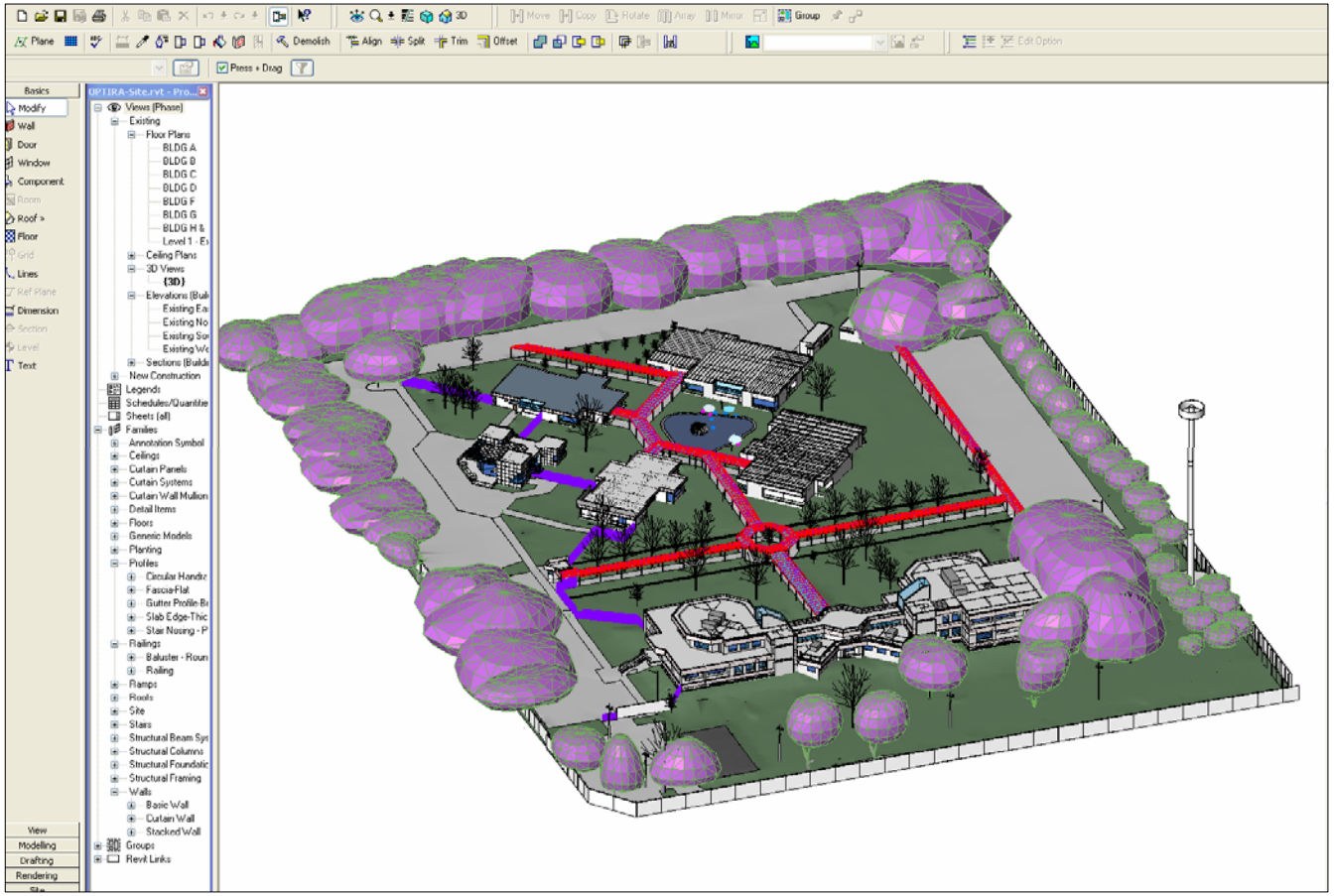
Laser Scanning

Final BIM site model consolidated



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COBIE

Technologies

- Building Information Modeling (BIM)
- Dprofiler
- Laser Scanning
- COBIE

Implementation

"Format for handover of O&M information. It organizes the collection, documentation and exchange of building data required at construction completion."

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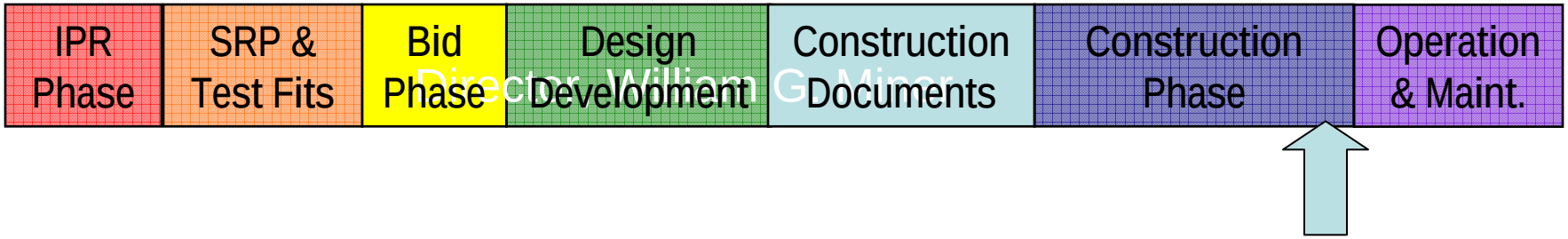
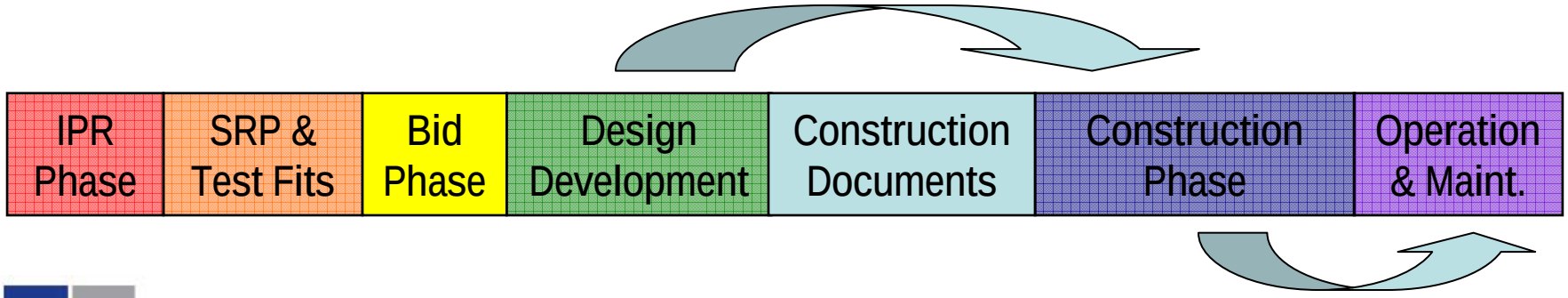
COBIE

Typical Project Handover Data Collection Model



COBIE Project Handover Data Collection Model



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COBIE

The COBIE data is captured in sequence in the corresponding spreadsheet within the Project file.

Contact Worksheet		**Submittal Worksheets**		**Job Plan Resource Worksheets**	
1	Contact	10	Schedule	21	Material
Design Worksheets		11	Document	22	Tool
2	Facility	12	Transmittal	23	Training
3	Floor	13	Approve	**Job Plan Task Worksheets**	
4	Space	**Installation Worksheets**		24	PM
5	System	14	Installation	25	Safety
6	Register	15	Manual	26	Trouble
7	Component	16	Warranty	27	Start-Up
8	Attribute	17	Spare	28	Shut-Down
9	Coordinate	**Commissioning Worksheets**		29	Emergency
		18	Instruction		
		19	Test		
		20	Certification		

COBIE

The Excel spreadsheet format is user-friendly and requires minimal expertise to use.

G10

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	SystemID	FacilityID	SystemFunction	SystemReferenceID	ExternalSystemName	ExternalNameID	SystemName	SystemDescription	CreatedBy	CreatedDate	CreatedTime	ReplacesID	Withdrawn	SystemCPick
2	1		50 33 10 HVAC				HVAC System		17	1-Oct-07	12:02		No	1,HVAC System
3	2		50 35 10 Electrical Power				Electrical Distribution		17	1-Oct-07	12:02		No	2,Electrical Distribution
4	3		50 32 12 Sanitary Waste and Vent				Sanitary Sewer		17	1-Oct-07	12:02		No	3,Sanitary Sewer
5	4		50 34 12 Fire / Smoke Protection				Fire Alarm		17	1-Oct-07	12:02		No	4,Fire Alarm
6	5		50 13 12 Membrane Roofing				Roofing		17	1-Oct-07	12:02		No	5,Roofing
7														

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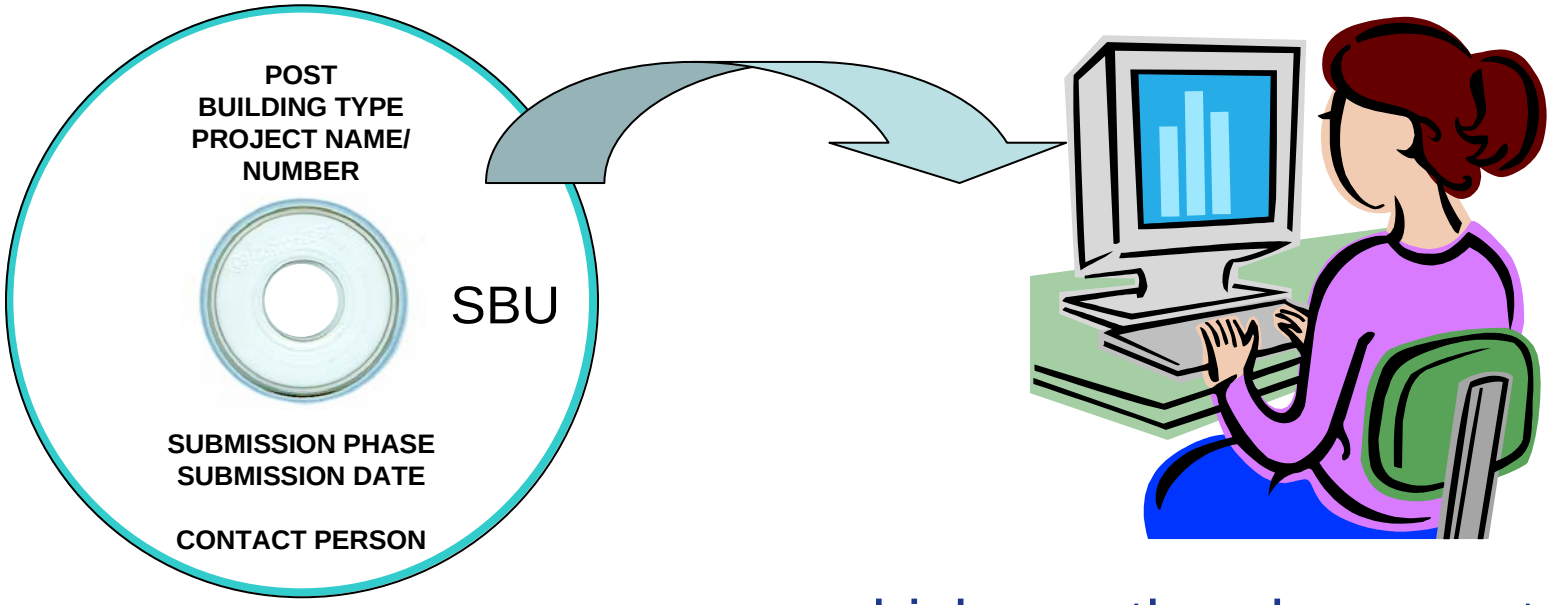
COBIE

Electronic COBIE data is submitted on disk(s) …



which can then be exported to facility management software.

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COBIE

Contractor Benefits:

- Organized structure to collect and manage data throughout the design and construction phases.
- Prevents the need for a “job crawl”.
- Ultimately saves time/cost.

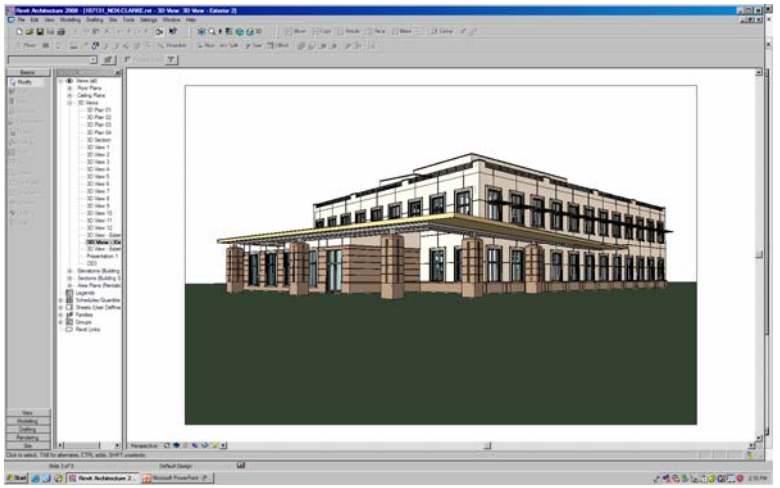
OBO Benefits:

- Will receive project data in a consistent and organized electronic format.
- Facilitates accessibility, and retrieval of O&M data.
- **Positions OBO to utilize BIM-compatible facilities management software**.

COBIE

Pilot Study – Kingston NOX

- Completed COBIE spreadsheets using as-builts.
- Provided feedback on COBIE.
- Finalizing summary report for OBO.
- Producing “clean” version of COBIE data for further research and development.



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Implementation

Technologies

- Building Information Modeling (BIM)
- Dprofiler
- Laser Scanning
- COBIE

Implementation

- Where we are now
- Challenges
- Path forward

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Implementation

Where we are now:

- Implementation directive, November 2006
- Completed Business partner survey to assess progress, capabilities, concerns
- BIM included in FY07 Capital Program
- Ongoing R&D and Implementation

Implementation

FY07 BIM Requirements:

- Required with DD, Final and As-Built submittals
  - BIM model
  - Walk-throughs and Renderings
  - Clash detection & QC Reports and feedback
  - COBIE spreadsheet / data
- Supplement the standard CAD deliverables

Implementation

FY07 BIM models to include architectural elements only:

- walls, floors, ceilings, roof
- columns
- doors
- windows
- fixtures
- casework

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Implementation

Challenges

- Development of industry-wide standards
- Development of OBO requirements based on needs
- Preparation (training, software, infrastructure)
- Integration of more engineering (ie. MEP) disciplines
- Finalization of IFC-compliant software

Implementation

Path Forward

- Continue R&D efforts
- Refine graphic BIM data requirements
- Develop non-graphic BIM data requirements
- Develop business processes that leverage BIM technologies
- Apply lessons learned and best business practices for FY08 requirements

Implementation

Ongoing Use Case Analysis

FY07	FY08	FY09
Arch. BIM Model COBIE	Struc. BIM Model	Full BIM Model
Cost Interface Analysis	SED BIM Standards ▪ Model Template ▪ Object Library ▪ RIP BIM Modules	Automated Code Check
Model Checking	Planning BIM Models	LEED/Energy Analysis
Model Viewers	Fac. Mgt. Pilot	4D & 5D Interface
Training		Blast/Struc. Analysis

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Summary

Technologies

- BIM: Design & Construction
- Dprofiler: Capital Planning
- Laser Scanning: Non-Capital Planning
- COBIE: Operations and Maintenance

Implementation