Digital Adventures
Bringing together GIS, COBie and BIM for Facilities Construction and Maintenance

Presented by
Carrie Sturts Dossick

COLLEGE OF BUILT ENVIRONMENTS
Construction Management
Overview

COBie I: Pilot

Integrating COBie and BIM with GIS

COBie II: Standards
University Owned Buildings

1895-1919: 20
1920-29: 149
1930-39: 174
1940-49: 223
1950-59: 257
1960-69: 311
1970-79: 373
1980-89: 433
1990-99: 491
2000-Present: 527

Total Sq. Ft.: 20+ million
The Goal

Provide better information to Facilities Services in a more useful format

Decrease time ‘hunting for information’ + increase in ‘wrench time’ = less time executing work orders

COBie, BIM, GIS and other digital adventures at the University of Washington
What is COBie?

Construction Operations Building information exchange

COBie is a standard for information exchange between software programs that will streamline the flow of information during the life of the project...

from design to construction to commissioning to operations.

This will eliminate duplicate effort and manual (re)entry of information that was already provided during previous phases of the project.

COAA + buildingSMART alliance

...are sponsoring several case studies across the U.S. to study how the handover process may be streamlined by using COBie.
The UW Research Team  
(Pilot 1: Demsey Hall)

- Carrie Sturts Dossick – faculty  
  –Assoc. Prof., Department of Construction Management

- Anne Anderson – student  
  –Ph.D. in the Built Environment

- Andrew Marsters – student  
  –M.S. in Construction Management, Dec 2011

- Gayane Aghazarian – student  
  –M.S. in Construction Management, Dec 2012

- Eman Ismaiel – student  
  –M.S. in Construction Management, March 2013
Cracking the egg...

**UW has a culture of innovation and technology**

- **Facilities staff:** already innovating and standardizing in CMMS (AiM)

- **BIM/CAD/GIS project:** focus on space inventory – broad potential for campus-wide data mapping

- **LEAN Initiative:** Transition from Construction to Operations

  - All very receptive to COBie

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CMMS - Computerized Maintenance Management System
GIS - Geographic Information System
COBie, BIM, GIS and other digital adventures at the University of Washington
The First COBie Pilot

Business Hall

$41.8 million project cost

65,000 sq. ft. classroom/admin building
Project Timeline

COBie, BIM, GIS and other digital adventures at the University of Washington

Hand-Off Date: Spring 2012
UW Model
## Data Required by UW

<table>
<thead>
<tr>
<th>Asset Group</th>
<th>Asset Description</th>
<th>Active</th>
<th>MANUFACTURER</th>
<th>SERIAL NUMBER</th>
<th>INSTALL DATE</th>
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<th>Bearings</th>
<th>SHAVES</th>
<th>TYPE</th>
<th>USE</th>
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<th>D-OUT</th>
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Defined Parameters in the Model

- Existing 3D models and subcontractor data
- Automated location for assets in the COBie dataset

Model + Assets = COBie
Data from Subs

COBie, BIM, GIS and other digital adventures at the University of Washington
Site Trips

Nameplate Verification

Site Location Verification
O&M Data

UW FSOB Business School – Phase 2
Balmer Hall

Operation & Maintenance Manual

Owner
University of Washington

Architect
LMN Architects

General Contractor
Sellen Construction

Mechanical Engineer
Netkin Mechanical Engineers

Job Number
710-2540

Prepared By:
MacDonald-Miller Facility Solutions

February 7, 2012
Building Information Transfer: Know your customer

Building Information Model (Design & Construction)

Building and Campus Information Management (Operations & Maintenance)

GIS
CMMS
Records
Repair Orders
Space Planning
Reports
Backflow Prevention Testing

Information is not neutral, often not trusted, and is connected to particular jurisdictions
**BIM/COBie requires big changes**

**COBie Catalyst**
Key Participant Meetings:

(Database managers from across campus)
Asset data only the first step

=> owners manuals, parts lists, systems models

**COBie/BIM** (Building Information Model)

Asset Data = Make, Model, Serial Number
Systems Models for Facilities
The BIM/CAD/GIS Project

1. COBie-BIM
2. Owner’s BIM
3. Export to CAD
4. Auto-Translate to GIS

COBie, BIM, GIS and other digital adventures at the University of Washington
Existing BIM/CAD/GIS System

3D GIS campus map
(showing extruded floor plates)

3D GIS campus map detail (showing extruded rooms)
BIM/CAD/GIS System and Potential

Existing 3D GIS system for Space Planning and Management

Prototype for Asset Management Capabilities
BIM/CAD/GIS Prototypes and Projects

3D GIS Thematic Maps

GIS Maps – Multiple Buildings, Color-Coded by Data

Revit Thematic Floor Plans

Data-Linked Maps
BIM Translation to GIS

Business Hall (Level 2)

HVAC

- HVAC Lateral
- HVAC Main

HVAC Equipoutput

HVAC Equipsource
Map Building Assets in GIS Floor Plan
AutoCAD

Microsoft Visio
AssetMapper

• Campus Engineering developed a web viewer for GIS data called AssetMapper. The viewer has both public facing and secured data, login has been integrated with uwnetids to allow for individual users to be granted unique permissions.

• Tools Used
  – AutoCAD Civil 3D
  – ArcGIS
  – JavaScript and Adobe Flex
  – Google Maps API
Critical Facilities

• Problem Statement: Currently information about critical facilities at the University of Washington has not been adequately inventoried. In the event of a failure, this information is essential to keep the critical facility in operation or minimize downtime.

• Tools Used
  – The Cloud
  – ArcGIS
  – Adobe Flex
  – SharePoint
  – Splash Pages
Critical Systems

University of Washington Critical Area Maps

Introduction: Improving Response

University of Washington Campus Engineering personnel have undertaken a pilot project in attempt to locate and better manage the critical areas on the Seattle Campus of the University of Washington. The Critical Areas covered in this project include: Animal Care Facilities, BSL-3 Labs, Data Centers and Server Rooms, Freezers and Cold Rooms, Laboratory Equipment, Lift Stations and Critical Sewers, Patient Areas and Rare Collections. The following document contains links to all of the GIS (Geographic Information Systems) maps produced during this project. To view any of the maps simply click on any of the following images and when prompted sign in as:

Overview

Critical Areas on campus include the following types of facilities: Animal Care, Laboratory Equipment, BSL – 3 Labs, Data Center and Server Rooms, Freezers and Cold Rooms, Laboratory Equipment, Lift Stations and Critical Sewers, Patient Areas, and Rare Collections. The map to the left provides an overview of all the buildings with critical systems and provides information on which critical systems are contained within each building.

Data Center and Server Rooms (Data Cent Srv)

Data Centers and Server Rooms have also been identified as Critical Areas on the University of Washington Seattle Campus, these sites can be found by clicking on the map to the left. Below are links to each of these Critical Areas:
Link between CMMS & BIM/CAD/GIS

AiM
Facilities Services
Operations & Maintenance
Getting it Right the Second Time

Fluke Hall
$30 million project cost
Major Laboratory Renovation
COBie Pilot II

Planning
Design
Construction
COBie Pilot Phase I
COBie Pilot Phase II
Occupancy & Operations

2012
2013
2014
2015
2016
Second COBie Pilot Goals

- Define BIM & COBie deliverable specification (193 Asset Groups)
- Measure benefit of BIM/COBie in operations
- Quantify investment in keeping data alive (who does it, how is it done)
- Define organizational resources: virtual model managers throughout operations?
Comments/Questions?

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