Alexandria BIMStorm™
Federal Friendly Zones™ Exercise

Renaissance Club
Washington, DC
December 10, 2008

Michael Chipley – Alexandria BRAC Coordinator
Kimon Onuma – BIM Architect Extraordinaire
How to make a BIMStorm (10 step plan)

1. Call Kimon
2. Call Deke
3. Make up a concept/exercise objective
4. Spend massive amount of time exchanging e-mails, phone calls, webinars
5. Explain to many, many folks what a BIMStorm is
6. Massage head from hitting table and walls
7. Encourage, cajole, plead, and other wise get the word out to participate
8. Dry run (Murphy’s Law)
9. Ready, set, go!
10. Watch in amazement as the exercise unfolds and creative, talented people do what they do best…

Optional 11th Step – Check into the Betty Ford Center for Recovering BIMoholics to detox
What is a Building Information Model?

National BIM Standard Definition of BIM

– A Building Information Model (BIM) is a digital representation of physical and functional characteristics of a facility. As such it serves as a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle from inception onward.

– A basic premise of BIM is collaboration by different stakeholders at different phases of the life cycle of a facility to insert, extract, update or modify information in the BIM process to support and reflect the roles of that stakeholder. The BIM is a shared digital representation founded on open standards for interoperability.
Why Should I BIM?

BIM can deliver…
• A facility sooner
• A lower cost higher quality facility
• A facility with few or no change orders
• A significant reduction in RFI’s
• A more energy efficient facility
• A more sustainable facility
• A more environmentally friendly facility

BIM is only the tool
• Build building electronically before you build it physically
• Collect information once by authoritative source
• Re-use information throughout the facility lifecycle
• Cut out non-value added effort (waste)

As of FY 08 GSA and DoD BRAC projects are to delivered in BIM

Courtesy of Deke Smith, Executive Director
BRAC Alexandria

Standard: NBIMSV1 P1

- Delivered Dec 27, 2007
- International Core
- National Specific
  - OmniClass
- Information Exchange Concepts
- Standard Development Process
- Information Assurance
- Capability Maturity Model
- References and Appendices
- Over 30 contributors

200,000+ Downloads

United States
NATIONAL BUILDING INFORMATION MODELING STANDARD
Version 1 - Part 1:
Overview, Principles, and Methodologies
Transforming the Building Supply Chain
Through Open and Interoperable Information Exchange

National Institute of BUILDING SCIENCES
Facilities Information Council
National BIM Standard

Courtesy of Deke Smith, Executive Director
USACE Challenge: Execute $69.6B of MILCON Requirements (FY06-13)

Projected Army FY06-13 = $48.5B

2008 SAME Joint Engineer Training Conference Minneapolis, MN
Army MILCON Transformation

Interoperability Demonstrations

- US Army Corps of Engineers co-sponsoring event with buildingSMART Alliance
- Three demonstrations:
  - Spatial Compliance Information Exchange (SCIE)
  - Coordination View Information Exchange (CVIE)
  - Construction Operations Information Exchange (COBIE)

*Information on this workshop can be obtained at http://buildingsmartalliance.org/ under the “News / Events” tab.*

2008 SAME Joint Engineer Training Conference  Minneapolis, MN
BIM-COBIE

**plan**
- room functions
- system functions

**design**
- spatial layout
- room numbers
- room function
- system info
- product sizing

**build**
- as-built layout
- product data
- serial number
- tag number
- warranty info
- spares/suppliers
- job plans
BRAC Alexandria

BIM-COBIE
H.R.3221

(Engrossed as Agreed to or Passed by House)

(7) HIGH-PERFORMANCE GREEN BUILDING- The term ‘high-performance green building’ means a building that, during its life-cycle, as compared with similar buildings (as measured by Commercial Buildings Energy Consumption Survey or Residential Energy Consumption Survey data from the Energy Information Agency)--

(A) reduces energy, water, and material resource use;
(B) improves indoor environmental quality, including reducing indoor pollution, improving thermal comfort, and improving lighting and acoustic environments that affect occupant health and productivity;
(C) reduces negative impacts on the environment throughout the life-cycle of the building, including air and water pollution and waste generation;
(D) increases the use of environmentally preferable products, including biobased, recycled content, and nontoxic products with lower life-cycle impacts;
(E) increases reuse and recycling opportunities;
(F) integrates systems in the building;
(G) reduces the environmental and energy impacts of transportation through building location and site design that support a full range of transportation choices for users of the building; and
(H) considers indoor and outdoor effects of the building on human health and the environment, including--

Objective is to reduce energy consumption and lead transformation of markets
Federal Security Standards

GSA and DoD developed separate security standards and apply them differently, both standards have tremendous impacts on public space, transit, communities, and best use of land.

They may have significant conflict with other design objectives.

Blast is a significant design challenge
Alexandria - Why a BIMStorm?

- Long term economic growth based on eco-friendly and sustainable development
- Alexandria rebalancing commercial and residential tax base
- Direct Alexandria BRAC loss actions impacts approximately 7% of workforce and leases in Alexandria (7,200 jobs, 1.4 million square feet)
- Alexandria needs 5-10 million SF of office space designed to federal facility requirements to attract other federal agencies
- Building Information Modeling is rapidly changing the traditional process of design and analysis
RFP released 6 June 2008, **Build to Suit Campus**
1. Meet the BRAC statutory deadline of Sep 15, 2011
2. 6,409 person at single site, minimum of 6,200 person
3. Satisfy UFC 4-020-02FA for threats and Level of Protection and use **CPTED**
4. Easy and clear authorized person access
5. **Establish a strong “campus-like” atmosphere by protecting and enhancing natural environment and common open spaces**
6. Incorporate sustainable design, **LEED Silver**
7. Flexible design for future changes
8. Will be done using **Building Information Modeling (BIM)**

**Mark Center selected as new WHS HQ site**
Alexandria Pre-BIMStorm

- Alexandria real estate opportunities not well known within federal government
- Alexandria was a “Flat World” – no 3D buildings and no presence on the web
- Community recovery strategy not defined
- City staff and community experience with PTO demonstrated new paradigm and possibilities to integrate federal agencies into an urban environment
- Federal government desire for transit oriented development, energy efficient buildings

First BIMStorm to be in a hotel and team environment, city staff and SMEs in real time
Federal Friendly Zones™ (FFZ’s)

Alexandria has many areas, neighborhoods and parcels that can meet these requirements, however, the process by which the federal government advertises, acquires and operates the commercial office lease space can conflict with many community objectives. The concept of the Federal Friendly Zones is to identify areas and sites that can support the federal requirements and become part of a larger integrated land use decision. Within each FFZ, there are three types of utilizations:

- Federal campus
- Single Federal Occupied Building
- Single building with federal agency as a tenant (dispersed)

Working with the local neighborhoods and federal agencies, a new approach can be developed to ensure the community grows and prospers to achieve mutually beneficial results (such as transit oriented development, Eco-City, enhanced water and air quality, etc.).

Another key objective of the Federal Friendly Zones is move from a Protection oriented process (using bollards, barriers, street closings, etc) that impact the streetscape and public space, to a Resiliency, Redundancy, and Recovery model that relies on enhanced police, fire, emergency management and community preparedness to respond to events (whether natural or man made).
Alexandria BIMStorm FFZ Objectives

- Educate stakeholders on new requirements and capabilities
- Demonstrate virtual planning, design collaboration, speed to market
- First BIMStorm to use real sites, real requirements, intensive GIS
- Create a Virtual Alexandria and web presence
- Highlight Alexandria as a place to Live, Work, Shop, Play
- Develop and capture Lessons Learned to refine FFZ concept
## Alexandria BIMStorm FFZ Scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Study Area</th>
<th>Block</th>
<th>Project Description</th>
<th>Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>2</td>
<td>DoD - Hoffman Block 2 - Class A 500,000 SF 10-15 story office building</td>
<td>New Construction</td>
<td>Office campus under development. This is for one of the blocks in the new campus.</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
<td>2</td>
<td>Multi or Single Building GSA - Hoffman Block 2 - Class A 500,000 SF 10-15 story office building</td>
<td>New Construction</td>
<td>Office campus under development. This is for one of the blocks in the new campus.</td>
</tr>
<tr>
<td>1</td>
<td>B</td>
<td>1</td>
<td>GSA - MRP Realty Landbay H Potomac Yard - Class A, 1 million SF campus with 2-4 buildings (Landbay H)</td>
<td>New Construction</td>
<td>Teams are to decide number and type of buildings.</td>
</tr>
<tr>
<td>1</td>
<td>C</td>
<td>1</td>
<td>DoD - Jones Lang LaSalle Victor Center - Class A, 1 million SF campus with 2-4 buildings</td>
<td>New Construction</td>
<td>Teams are to decide number and type of buildings.</td>
</tr>
<tr>
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<td>C</td>
<td>1</td>
<td>GSA - Jones Lang LaSalle Victor Center - Class A, 1 million SF campus with 2-4 buildings (Victory Center)</td>
<td>New Construction</td>
<td>Teams are to decide number and type of buildings.</td>
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<tr>
<td>2</td>
<td>A</td>
<td>3</td>
<td>Multi or Single Building DoD - Hoffman Block 3 - Class A 500,000 SF 10-15 story office building</td>
<td>New Construction</td>
<td>Teams are to decide number and type of buildings.</td>
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<tr>
<td>2</td>
<td>D</td>
<td>1</td>
<td>Multi or Single Building Commercial - Duke Mark - Class A 1 million SF office building</td>
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<td>D</td>
<td>1</td>
<td>Multi or Single Building DOD - Duke Mark Center - Class A 1 million SF office building</td>
<td>New Construction</td>
<td>Teams are to decide number and type of buildings.</td>
</tr>
</tbody>
</table>

- DoD campus/buildings
- GSA campus/buildings
- Class A Speculative Office
- Historic Properties
- Cultural Resources
- Transit
- Environment

Scenarios were developed to highlight type, name, scale and challenge teams integration of multiple skills/disciplines.
BRAC Alexandria

BIM 24 Hour Exercise Work Flow
BRAC Alexandria
Onuma Planning System
Define Space Attributes
Add Furniture and Equipment
Move into Room, Register and Name
The tools and technology were used to educate participants on federal requirements, to expand the presence of Alexandria internationally, and on the web.

Many federal agency players and observers.
Alexandria BIMStorm Scenario Start

Virtual Alexandria 3D World v1

Alexandria has robust GIS data sets

This BIMStorm was the first to use GIS in support of site selection, design, and analysis

Courtesy Onuma Inc.
Three teams design solution for one site; trade off between stand off distance, height, density

Jacobs-Turner Team created BIM and Construction Model CPTED and LEED analysis performed in parallel, went to 4D time phased model (first time)
Initial design and costs quickly refined and preliminary life cycle costing completed; the real estate industry is now valuing buildings on LCA.
The buildings are not joined with the GIS data – terrain is actually very hilly and steep and when the GIS and BIM are integrated, the perimeter protection plan and spaces can be tightly coupled.
Class A Speculative Office

Model height, FAR, shape and statistics change at the mouse click, real time “what if”; model can be placed on any parcel.

Note water, energy, Carbon Footprint, demographics are defined at space level and refined as design evolves – all automatic and completes the preliminary CPTED and LEED checklists.
Blast Buffers Around Buildings

Alexandria, VA
Hoffman Building Footprint and 82 Foot Security Buffer

Blast buffer zones and GSA Protection Zones can quickly form site constraints and enable the design team to explore mitigation options (floor plan, spaces, selective envelope hardening, road realignment, evacuation rally points).

Courtesy Onuma Inc.
Alexandria Historic Properties, Metro

GMU
- Gadsby Tavern
- Torpedo Factory
- Washington Masonic Temple

Models to be posted

UC
- City Hall
- Contraband and Freedmen Cemetery

Preliminary analysis but no models, yet..

Potential for CPTED analysis to tie disconnected trails, parking, roads and sidewalks together, eliminate vandalism/theft
Public space, art, and events can be integrated into a FFZ, down to the furniture level

Courtesy BIM Education Co Op
**Fire Station Study**
Station by Finith Jernigan Design Atlantic

**Code Mapping**

**Code Templates**

**BIMstorm LAX**
Identified 250 NFPA 2001 Sections for Any Building

**BIMstorm New Orleans**
Mapped Sections to OCCS and Uniformat. Began to define requirements

### Name, Rank, Facility Number

<table>
<thead>
<tr>
<th>Code Number</th>
<th>Code Name</th>
<th>Project Name</th>
<th>Lot/Block Number</th>
<th>Unit Number</th>
<th>Category</th>
<th>Room Number</th>
<th>Project Year</th>
<th>Plan Set</th>
<th>Code Standard</th>
<th>Memo Description</th>
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</tr>
</tbody>
</table>

**Fire Station**

**Plan**

**Courtesy WDG Architects Debra MacPherson**
Code Mapping

Current - Focus on the Front End
MF2004 Div 00 and 01, OCCS 36, UF Z

Courtesy WDG Architects Debra MacPherson
Alexandria GIS Fire Station Analysis

Demonstrated response times and potential sites for new stations, road radius, ingress/egress points, type of size of equipment (ladder trucks, etc) generated as building is set on the parcel.
Alexandria GIS Flood Analysis

Used the FEMA HAZUS flood analysis overlaid with city GIS and digital elevation model data to create a topographical model, identify areas for redundant utilities, recovery staging areas

Building water and waste water, use of Green Roofs rain can be used as inputs to water shed model

Courtesy ESRI and Onuma Inc
Teams and SMEs, Lessons Learned

Over 200 players/observers
- Design Teams
- City Staff
- SME’s

Lessons Learned
- Industry challenges
- Government challenges
- Organizations and Associations challenges
- IT challenges

BIM tools are revolutionizing virtual collaboration, parallel design, speed to market, waste reduction, total cost

Major cultural shift, challenging to implement, older versus younger adoption of technology, major changes in business processes required
BRAC133 WHS Next Steps

• City, Duke and Army in final negotiations, design intent
• Property becomes an Annex of Ft Belvoir
• Approximately 1.8M sq ft campus
• Common base building with 2 towers, approx 17 stories
• 2 employee parking structures
• 1 Transit Center
• 1 Remote Receiving Facility
• Upgrades to roads, transit service – possible DAR project
• Community public meeting hosted by Duke and Army

• Break ground Jan 09
• WHS move by Sep 2011
BRAC Alexandria

BRAC133 WHS Transit Center
Final Environmental Assessment
Implementation of 2005 Base Realignment and Closure Recommendation 133
(Washington Headquarters Services)
Fort Belvoir, Virginia

Table ES-1
Summary of potential environmental and socioeconomic consequences

<table>
<thead>
<tr>
<th>Resource Area</th>
<th>GSA Site</th>
<th>Victory Center</th>
<th>Mark Center</th>
<th>No Action Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Use</td>
<td>Long-term negligible to minor adverse and benefits; not significant</td>
<td>No effects</td>
<td>No effects</td>
<td>No effects</td>
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<td>Transportation</td>
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<td>Long-term minor adverse; not significant</td>
<td>Long-term minor adverse; not significant</td>
<td>No effects</td>
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<tr>
<td>Air Quality</td>
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<td>Short- and long-term minor adverse; not significant</td>
<td>Short- and long-term minor adverse; not significant</td>
<td>No effects</td>
</tr>
<tr>
<td>Noise</td>
<td>Short-term minor adverse; long-term negligible adverse; not significant</td>
<td>Short-term minor adverse; long-term negligible adverse; not significant</td>
<td>Short-term minor adverse; long-term negligible adverse; not significant</td>
<td>No effects</td>
</tr>
</tbody>
</table>

Geology and Data
Soils
No effects
Short-term minor adverse
No effects
No effects
Short-term minor adverse
No effects
Short-term minor adverse

Water Resources
Surface Water and Groundwater
Short-term minor adverse and long-term minor beneficial
Short-term minor adverse and long-term minor beneficial
Short-term minor adverse and long-term minor beneficial
Short-term minor adverse and long-term minor beneficial

Biological Resources
Vegetation
No effects
No effects
Long-term minor adverse; not significant
No effects
No effects

Economic Development
Housing
Short-term minor adverse
Short-term minor adverse
Short-term minor adverse
Short-term minor adverse
Short-term minor adverse

July 2008
BRAC Alexandria

BRAC133 WHS Mark Center Site
New road alignments, interchanges, bus routes, shuttles, possible HOT Lanes and BRT stop
Contact Information

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