Moderator: Leo Fernandez, BIM Manager, Pond & Company

Speakers:
- Scott Wick, AIA, LEED AP, PMP, Chief Architect, HQ USACE
- David Gutierrez, AIA, Architect, Capital Improvements, NAVFAC HQ
- Gene Mesick, RA, Chief, Technical Services Division, AFCEC
Building Information Management

US Army Corp of Engineers
Chief Architect
Scott Wick, AIA, LEED AP, PMP
(202) 761-7419  scott.c.wick@usace.army.mil
Agenda

• Why USACE is using BIM

• Current Focus
  • Information
  • USACE Policy & Guidance
  • Requirements

• Path Forward
  • Administrative/Technical
  • Near Term Goals
  • Long Term Goals
Why USACE is using BIM

• Building Information MANAGEMENT
• BIM Supports USACE Strategic Organizational Goals
  • Regionalization
  • Capable workforce
• BIM Effectively Supports MILCON
  • BIM benefits in design and construction
  • Goal to accrue CW and O&M benefits
BIM Covers the Entire Project Life-Cycle

- multi-disciplinary 3D design
- engineering analysis
- facilities management
- cross discipline coordination, collision detection
- construction documents
- fabrication
- construction sequence visualization
- construction

2014 Joint Engineer Training Conference & Expo • May 20-23 • Orlando, Fla.
USACE BIM Requirements

• Formerly known as “Attachment F”
  • **Standard contract language** for required (and optional) BIM uses during design, construction, and development of as-built documentation
  • Project Execution Plan (PxP)
  • Minimum Modeling Matrix (M3)
• Will be included as industry Best Practice in upcoming NBIMS-US v3.
USACE Policy and Guidance

• Standardizes CAD, BIM, and GIS Deliverables for Military Design and Construction Projects
  ECB 2012-22 (2012)

• USACE Roadmap for Life-Cycle Building Information Modeling (BIM)
  ERDC SR-12-2 (2012)

• Mandates the use of Building Information Modeling (BIM) on all USACE Projects
  ECB 2013-18 (2013)
Current Focus – Information!

- Designer Data
- Legal Data
- Geospatial Data
- Financial Data
- Specifier Data
- Owner / Occupier Data
- Sustainers Data
- Environmental Data

BIM
Path Forward

• Administrative
  • Embrace developing BIM standards
  • Incorporate BIM (and reuse of data) into USACE business processes
  • Inform and train workforce (culture change)
Path Forward

• Technical
  • Facilities Management/O&M
    • Military Programs – ensure that BIM data can be exported into our customer sustainment management systems (e.g. Maximo or GFEBS)
    • Civil Works – address O&M’s owner-operator needs
  • Cost Estimation
  • Integrate BIM with site information, GIS, and other data repositories
Near-term Goals

• Develop BIM Contract Language for Design-Bid-Build

• Map data requirements between Design and customer Facility Life Cycle Management (FLCM) systems
  • COBie implementation
Long-term Goals

• Wide-scale implementation of BIM/VDC and COBie along with other “ie” standards
• Life-Cycle Data Management (LCDM) vision
  • Transparent, workflow-based access to data
    • Accessible from BIM, GIS, O&M applications, etc.
  • Centralized Geospatial file repository
Phased Building
Information Management (BIM) and Modeling
Implementation Plan

David J. Gutierrez, AIA
May, 2014
Phased BIM Implementation Plan

Applicability:
To all Navy projects (DB & A/E DBB) that meet the following requirements:

1) New construction greater than or equal to $750,000

2) Major renovation greater than or equal to 50% of the Plant Replacement Value and greater than or equal to $2.5M
Phased BIM Implementation Plan

Phase I Deliverables (FY14):

Facility Electronic Operation and Maintenance Support Information (eOMSI) Specification Section 01 78 24.00 20

1) eOMSI Manuals
   a) Product and Drawing Information
   b) Facility Information
   c) Primary Systems

2) eOMSI Facility Data Workbook

eOMSI Facility Data Workbook – Contains required eOMSI facility data file, which is a contract deliverable populated by the Contractor and provided to the Government for automated upload into MAXIMO
Phase II Parametric Modeling Criteria (FY15):

- BIM Modeling Requirements for Designer of Record - Standardized open 3D file format to include Level of Detail, Minimum Modeling Matrix (M3), Model Submittals, etc.

- BIM Project Execution Plan - Document completed by the Designer of Record (DOR) that identifies BIM objectives, goals, authoring applications, etc.
Phased BIM Implementation Plan

BIM Definition:
• To develop a comprehensive strategy for collecting, managing, and sharing required data and information to accurately support facility life cycle from planning to disposal

BIM Goals:
• Standardize data processes and data format for facility life cycle sustainment
• Data entered once, used repeatedly, consistently and kept current
Phased BIM Implementation Plan

BIM is:

- Data Deliverables for facility life cycle sustainment
  - O&M data: cut sheets, warranty, certificates, test reports, etc. on equipment and building systems
- CADD drawings: Floor Plans, Utility Schematic Diagrams, Enlarged Connection and Cutoff Plans
- Operation, diagnostic techniques, and repair procedures for MEP, fire protection systems, etc.
- Facility Data Files to upload directly into Public Works MAXIMO
Phased BIM Implementation Plan

Facility Data Files:
- Standardized facility data template to support Public Works (PW) MAXIMO & Infrastructure Condition Assessment Program (ICAP) for life cycle sustainment
- UNIFORMAT I data template deliverable
- Open 3D file format

BIM is Not:
- A specific software solution e.g. REVIT, Bentley, etc.
- A modeling solution
Phased BIM Implementation Plan

Current State:
- Design and construction data is not shared, maintained, or updated across the enterprise to accurately support facility life cycle sustainment

Current State Impacts:
- Inefficiencies (manual inputs, repeat data entry, etc.)
- Reduced productivity
- Poor management and coordination
- Wasted resources
- Frustrated personnel
Phased BIM Implementation Plan

BIM Actions Completed:
- Document BL facility data requirements
- Document data storage capacity & requirements
- Execute in-house BIM Pilot Projects
- Document challenges (hardware, software, & network)

BIM will Impact:
- Facility Electronic Operation and Maintenance Support Information (eOMSI) guide specification and associated deliverables, uploaded to WBDG - Spring 2014
- Business management processes, roles, etc.,
- Improved Business Line (BL) coordination
Phased BIM Implementation Plan

BIM Actions To Complete:

• Update Design Build Request for Proposal (RFP) and Design Bid-Build Statement of Architectural and Engineering Services (SAES) implementing BIM

• Coordinate with Defense Health Agency (DHA) regarding BIM requirements in UFC 4-510-01 DESIGN: MEDICAL MILITARY FACILITIES

• Coordinate with USMC to develop draft facility data workbook and templates

• Whole Building Design Guide NAVFAC BIM Page
Phased BIM Implementation Plan

In-House Parametric Modeling:

• Working with REVIT software for in-house Design Bid Build projects

• Current Navy IT network (NMCI) presents software, & network challenges due to sporadic bandwidth and limited capacity

• Until Navy Next Generation Enterprise Network (NGEN) comes on-line in FY15, the capability for in-house parametric modeling is unknown

• NAVISWORKS is a viewer that in-house design teams will use to conduct class detection and perform various quality assurance reviews of parametric models submitted by A/E(s)
Phased BIM Implementation Plan

BACKUP INFORMATION
Phased BIM Implementation Plan

Top Level Life Cycle Process Map

- Create end to end process map
- Establish current data exchange points to include:
  - Applications
  - Hand offs
  - Data entry
  - Storage
### Phased BIM Implementation Plan

**PWBL Mandatory Data Items**

<table>
<thead>
<tr>
<th>REQUIRED ASSET FIELDS</th>
<th>Position</th>
<th>Name</th>
<th>DOR/KRT/GVT</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. AssetNum</td>
<td>1</td>
<td>Asset identification used by the KTR to uniquely identify assets or equipment (e.g. FAN001, AHU003)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Description</td>
<td>2</td>
<td>Primary Asset Name (100 Character Limit) To be completed by KTR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Long Description</td>
<td>3</td>
<td>Additional Relevant Information (1000 Character Limit) To be completed by KTR</td>
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<td></td>
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<tr>
<td>4. Master System</td>
<td>4</td>
<td>Reference values from Model &amp; Facility Data Matrix tab (MASTERSYSTEM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. System</td>
<td>5</td>
<td>Reference values from Model &amp; Facility Data Matrix tab (SYSTEM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Sub-System</td>
<td>6</td>
<td>Reference values from Model &amp; Facility Data Matrix tab (SUBSYSTEM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Building Number</td>
<td>7</td>
<td>Current Building # in Maximo for renovation work. Will be provided by GVT for new construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Asset Quantity</td>
<td>8</td>
<td>To be completed by KTR (Quantity in correct unit of measure as defined in UOM field of the Model &amp; Facility Data Matrix)</td>
<td></td>
<td></td>
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<tr>
<td>9. Replacement Cost</td>
<td>9</td>
<td>Contract install cost (material and labor) from schedule of values, bid proposal, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Contract Number</td>
<td>10</td>
<td>Refer to Contracting Officer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Task/Delivery Order Number</td>
<td>11</td>
<td>Refer to Contracting Officer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Warranty Expiration Date</td>
<td>12</td>
<td>MM/DD/YYYY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Installation Date</td>
<td>13</td>
<td>MM/DD/YYYY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. CLASSIFICATIONID</td>
<td>14</td>
<td>Reference values from Model &amp; Facility Data Matrix tab (SUBITEM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Room Number</td>
<td>15</td>
<td>Insert Room Number for installed equipment/asset.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Manufacturer</td>
<td>16</td>
<td>To be completed by KTR</td>
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<tr>
<td>17. Model</td>
<td>17</td>
<td>To be completed by KTR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Serial #</td>
<td>18</td>
<td>To be completed by KTR</td>
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</tr>
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</table>
Phased BIM Implementation Plan

A10 – D50 Typical Master Systems for Navy MCON, Major Renovation, or Facility Systems Replacement

<table>
<thead>
<tr>
<th>Description</th>
<th>Listname</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>A10 - FOUNDATIONS</td>
<td>MASTERSYSTEM</td>
<td>SF</td>
</tr>
<tr>
<td>A20 - BASEMENT CONSTRUCTION</td>
<td>MASTERSYSTEM</td>
<td>SF</td>
</tr>
<tr>
<td>B10 - SUPERSTRUCTURE</td>
<td>MASTERSYSTEM</td>
<td>SF</td>
</tr>
<tr>
<td>B20 - EXTERIOR ENCLOSURE</td>
<td>MASTERSYSTEM</td>
<td>SF</td>
</tr>
<tr>
<td>B30 - ROOFING</td>
<td>MASTERSYSTEM</td>
<td>SF</td>
</tr>
<tr>
<td>C10 - INTERIOR CONSTRUCTION</td>
<td>MASTERSYSTEM</td>
<td>SF</td>
</tr>
<tr>
<td>C20 - STAIRS</td>
<td>MASTERSYSTEM</td>
<td>RISER</td>
</tr>
<tr>
<td>C30 - INTERIOR FINISHES</td>
<td>MASTERSYSTEM</td>
<td>SF</td>
</tr>
<tr>
<td>D10 - CONVEYING</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>D20 - PLUMBING</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>D30 - HVAC</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>D40 - FIRE PROTECTION</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>D50 - ELECTRICAL</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
</tbody>
</table>
# Phased BIM Implementation Plan

## J10 – Q10 Typical Master Systems for Utilities Project

<table>
<thead>
<tr>
<th>Description</th>
<th>Listname</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>J10 - Electric Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>K10 - Potable Water Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>K20 - Non-Potable Water Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>K30 - Fire Protection Water Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>K40 - Salt Water Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>L10 - Steam Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>L20 - High Temp Hot Water Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>L30 - Domestic Hot Water Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>L40 - Chilled Water Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>M10 - Sanitary Sewer Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>M20 - Industrial Wastewater Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>M30 - Oily Wastewater Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>M40 - Storm Water Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>N10 - Natural Gas Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>N20 - Propane Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>P10 - Compressed Air Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
<tr>
<td>Q10 - Multiple Commodity Utilities</td>
<td>MASTERSYSTEM</td>
<td>EA</td>
</tr>
</tbody>
</table>
Advantages of Building Information Modeling (BIM):

- **Efficiency** – All drawings are coordinated from the same database.

- **Intelligent Modeling** – Better understanding of building performance in different environments through simulations.

- **Integrating Systems** – All disciplines in model achieve a higher level of coordination. Data & graphics are comprehensively integrated to ensure designs are aligned w/programmatic requirements.

**Barracks Renovation Project**

Norfolk
Building Information Management

Mr. Gene Mesick
Chief, Technical Services
AFCEC/CN
USAF BIM Current State

- MILCON Program Centralization at AFCEC
- MILCON Cost Optimization
- Air Force Design Standards Program
- Standardize design & construction processes
MILCON Program Centralization

- BIM-based designs for all vertical construction
- 110 BIM as-builts delivered to BCEs to-date
- Utilizing standard designs for select facilities
- Revit software BPA available to BCEs
MILCON Cost Optimization

- Reduce construction unit costs
  - Reduce 25% from 2011 baseline by 2019

- Standardize products & processes
  - Focus on right quality of work when planning projs
  - Emphasize true value engineering in our projects
  - Design facilities to minimize life-cycle costs

- Utilize asset management principles
  - Drive down life-cycle costs
  - Reduce need to construct new facilities
Recent USAF BIM Projects

Lackland Dorm
Used BIM Prototype for site design, scope, cost, programming

Tyndall Fitness Center
Used BIM data for specs, visualizations, energy analysis

HQ CENTCOM
Demonstrated BIM efficiencies over CAD, visualizations
Recent USAF BIM Projects

- BIM used for construction scheduling, site utilization of construction equipment, clash avoidance
- Also provided visualization / walk-thru during design

Space analysis for materials handling

Maintainers can locate hidden equipment
AF Design Standards Program

- **Corporate Facility Standards**
  - Defines design quality standards (cost/schedule/quality)
  - Sets standard as appropriate for specific mission: “just right”
  - One-stop resource for all facilities related requirements

- **Standard Designs**
  - Communicates AF spatial criteria for a specific facility type
  - Most created in BIM to jumpstart design
  - Facilitates incorporation of lessons learned

- **Standard RFPs**
  - Standardizes performance-based requirements
  - Saves RFP development time
  - Reflects Air Force design-build process

Coordinated for several major facility types

Integrity - Service - Excellence
AF Design Standards Program

AIR FORCE CORPORATE FACILITIES STANDARDS
(Includes UFCs, AFIs, ETLs)

Standard Design

Standard RFP

A-E / Design Team Judgment

Facility Project Design & Construct

Installation Compatibility Standards

Utilize Revit BIM

Integrity - Service - Excellence
Dynamic Prototypes: Airmen Dormitories

Choose a unit type module

Replicate, assemble, and arrange modules to fit the site

Import the Basic Module into project file

Apply walls & roof

Integrate on the site
## AF Standard Facilities Designs

<table>
<thead>
<tr>
<th>Completed &amp; Posted on WBDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enlisted (Permanent Party) Dormitory</td>
</tr>
<tr>
<td>Security Forces Operations Facility</td>
</tr>
<tr>
<td>Fitness Center</td>
</tr>
<tr>
<td>Visiting Quarters</td>
</tr>
<tr>
<td>Child Development Center (not BIM)</td>
</tr>
<tr>
<td>Military Working Dog Kennel</td>
</tr>
<tr>
<td>Thule Dorm</td>
</tr>
<tr>
<td>Consolidated Comm Facility (Requirements Doc)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In-Progress (ECD: Jun 2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Station (Headquarters &amp; Satellite) (95%)</td>
</tr>
<tr>
<td>Air Traffic Control Tower/RAPCON (95%)</td>
</tr>
<tr>
<td>CE Squadron Complex (95%)</td>
</tr>
<tr>
<td>LRS - Logistics Readiness Squadron Supply Warehouse, (95%)</td>
</tr>
<tr>
<td>UAS Squadron Operations Facility (95%)</td>
</tr>
<tr>
<td>UAS Maintenance Hangar/Shops (95%)</td>
</tr>
<tr>
<td>Fighter Maintenance Hangar/Shops (95%)</td>
</tr>
<tr>
<td>Fighter Engine Maintenance Facility (95%)</td>
</tr>
<tr>
<td>Security Forces Level I Confinement (90%)</td>
</tr>
<tr>
<td>Indoor Small Arms Range (95%)</td>
</tr>
<tr>
<td>Entry Control Facilities/Installation Access Control Points (90%)</td>
</tr>
</tbody>
</table>

6 Being Updated w/ Lessons Learned

- KC-46A Squad Ops
- KC-46A Hangars (MX, Fuel, Corrosion)
- KC-46A Flight Simulator
- KC-46A Fuselage Trainer
USAF BIM Future Direction

**Vision**
Explore & Integrate BIM to *maximize value and lifecycle building performance*

**Goals**
- Achieve improved efficiency
- Implement BIM as primary DM/CM IT platform & process
- Engage/Integrate with asset management stakeholders
- Utilize as the primary data source for facility advocacy, asset management & SRM
- Employ BIM in all phases of asset management
USAF BIM “Flight Plan”

- Leverage & build on info throughout facility life-cycle
- Provide standard framework to collect & share info as it is generated on a continuous basis

GOAL: Continuous Information Development

National Institute of Building Sciences (NIBS)
USAF BIM Future Direction

- Finalize BIM Flight Plan
- Establish BIM – BUILDER – TriRiga interface for asset accountability & management
- Incorporate into NexGen IT spiral development
- Develop BIM training program
Discussion

Tyndall Fitness Center

HQ CENTCOM

Integrity - Service - Excellence