

**Building Information Model (BIM)
National BIM Standard
Facilities Information Council (FIC)**

August 29, 2005
NIBS - Washington, DC

Agenda Items Discussed:

Goal - Present goal, position paper and draft scope for discussion. Approximately 80 were in attendance from the federal government, U.S. military, academia, and private industry.

1. Discussions / Presentations:

- a. CURT AEC Productivity Initiative – Steven Smith, GSA
- b. GSA BIM development team – Steve Hagan
- c. USCG BIM development team – Dave Hammond
- d. IAI – Information Framework – Francois Grobler
- e. BIM Construct – Dianne Davis & Kimon Onuma
- f. FIATECH Roadmap – Ric Jackson

2. Identification of Responsibilities

- a. Identify roles in the development of the National BIM Standard
- b. Establish a Consensus Committee
- c. Finalize scope of first version of the National BIM Standard

3. Set date for next meeting

- a. Identify specific action items and assignments
- b. Identify other parties that should participate
- c. Discuss agenda items for next meeting

Location:

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Meeting minutes attached (prepared by Glenn Hunt, STV Inc. <http://www.stvinc.com>).

NIBS FMOC MEETING MINUTES

August 29 2005

Prepared by Glenn Hunt, STV Inc.

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Meeting Minutes
Meeting Number One
August 29, 2005

Location – American Institute of Architects, Board Room
1735 New York Avenue, NW
Washington, DC 20006

National Building Information Model (BIM) Standard

Goal: Issue the first version of a United States National Building Information Model (BIM) Standard by the end of calendar year 2006.

Purpose of Meeting: Explore the approach to accomplish the stated goal, discuss the establishment of a consensus committee, and discuss the scope of the proposed standard.

Welcome and Introduction – Deke Smith / Norman Strong / Dave Harris

Mr. Smith commented that the purpose and goal of this meeting is not intended to be for technology problem solving only, but also for business process problem solving. The issue/challenge is to pull all the available assets together to attain this stated goal:
Issue the first version of a U.S. National BIM Standard by the end of calendar year 2006.

Further, the purpose of the meeting is additionally to explore the approach to accomplish the stated goal, discuss the establishment of a consensus committee and discuss the scope of the proposed standard. A key element is grasping an understanding of just what the BIM is.

Question: How do “we” create and issue a standard that can be used by all?

Norman Strong, FAIA, Vice President, American Institute of Architects (AIA) welcomed the group.

Dave Harris, FAIA, President National Institute of Building Sciences (NIBS) commented that the intent of the meeting was not just to create a “tool,” but to ensure its successful implementation. Full life-cycle efforts are anticipated to be incorporated. Mr. Harris drew on the need for the support of all present... Government, DOD, technology, private industry, etc.

Discussion

1. CURT AEC Productivity Initiative – Steven Smith, GSA
(Construction Users Round Table <http://www.curt.org/>)

Mr. Smith addressed how poorly coordinated AE drawings are and the resultant difficulties that occur in the field. Impacts by inefficiencies, mistakes and delays account

for \$200 billion of \$ 650 billion, with a very negative impact on life-cycle. Owners must drive this change by leading in creating collaborative + (incentives). Owners must be the integrating influence in the building process. Collaboration is one major problem that needs to be addressed. All members (designers, contractors, suppliers, manufacturers, facility managers) have different risk sharing. Collaboration is characterized by open, timely and reliable information sharing. Collaborative teams can openly share information and use appropriate technology, and collaboration tools must be used to permit boundary crossing. Project information and data flow: real-time status management, coordination and control was discussed, as was SVirtual BIM support endorsed industry standards; interoperability; single environment and database; more. The owner-interest is real and here.

CURT/GSA: Cost effectiveness and aggressive leadership is needed to facilitate significant improvement in the industry.

Opportunity of owners: Better value through improved delivery ties; better quality; (the product) better meets the needs of occupants; safer workplaces; more.

CURT/GSA Actions to Date: CURT Executive Committee approved the work plan for 2005 for A/E productivity committee (DEC 04); more.

“Optimize Project: - This can be accomplished by full collaboration (contracts need to promote, not impede collaboration); highly integrated and productive project teams; open information sharing; more. A plan is underway to develop a pilot program and research effort to test the benefits. This will coalesce into the optimum process.

Audience Discussion:

- In a complex process, lots of information is available, which makes it difficult to “tell” how to apply it. Response: Apply what exists (known) rather than develop new.
- In open information sharing with proprietary issues there is a barrier to sharing the information. Comment: If incorporating proprietary info, it is currently/historically dealt with early in process.
- Clear definition of what information/limits of the information may help to limit liability and ownership issues.

2. GSA BIM Development Team – Steve Hagan, GSA

<http://www.gsa.gov/Portal/gsa/ep/home.do?tabId=0>

Mr. Hagan offered that, “Perhaps look at the framework first versus the standard.” In the GSA project portfolio, there are over 500 business partners in design/construction, with over 200 projects in place. The Public Building Service (PBS) guide was referenced. GSA has had nine pilot projects to date. A spatial study led to major savings in project planning and HVAC ductwork design and distribution on a project in New York City. The 3-D-based technology permits additional benefits to include additional analyses. Typically, a project runs over an 8 to 10-yr timeframe. Question: Who will benefit the most from the information? Over the course of the project, it will change, moving from designer to constructor to facility owner (over 25-30 yrs) life-cycle. Scope, schedule, budget, quality, criteria are all standard needs. IFC-based final concept submissions can

be in conjunction with 3-D. There is a need to dramatically increase (information) effort in the concept design phase... upfront definition. There is a need to move from 2-D to 3-D to incorporate integrated and structured data. The BIM must have “objects” related to drawings and specification disconnects as associated in Unifomat and Masterspec. The linkage must be there and it must be automated. Question: How should this be implemented? Final Concept BIM: basics; scope; schedule (4-D model); budget; documents; customer housing plan; 3-D interactivity; more. The new Olympic stadium facility in Beijing, China could not have been accomplished without 3-D and BIM.

Audience Discussion:

- Will the model include the process? Response: GSA has two processes in place.
- It is important that data is available in the process, that all (involved in the process) provide that data, that the information is transferable, and is in fact transferred.

3. USCG BIM Development Team – Dave Hammond, USCG

<http://www.uscg.mil/USCG.shtm>

USCG BIM Strategy: “*Think* (strike out) **Ready to...** BUY Globally and Act Locally.”

Mr. Hammond commented that the Coast Guard can’t wait any longer for the private sector to move forward. He presented 3-D cad and GIS parallel model using Charleston (model) as an example. He addressed scenario-based business cases. New Information Technology (IT) enables process change, which moves the business case decision phase closer to the front end of the effort.

Process Alignment: Link and align daily tactical activities to agency-wide strategic outcomes.

Organizational performance: Expect to measure both vertical and horizontal performance across the entire organization (internally and externally).

The move is to a centrally-planned logistics system, having distributed execution. Vertical performance is between facility activities and organizational outcomes. Horizontal performance is between operations and facility support at multiple levels within the organization over the life-cycle. Integrated decisions require IT-enabled interoperable data and applications. The USCG owns the data, no questions! The USCG is using global competition. BIM applications must support IAI-IFC/IFGs, NCS, Unifomat II; e.g., the Coast Guard expects all of its applications to be interoperable and support (all) disciplines (more). Moving to a portfolio-base, the business process is linked to strategic outcomes. The traditional structure for professional and trade disciplines and traditional stove-piped software has been broken down. Currently the USCG has 33M sq ft (or 100% of inventory) modeled to CG BIM Level 1. The USCG is focused on GraphiSoft and ESRI products <http://www.esri.com>. We can only (succeed by using) an open architecture and an interoperable software environment.

Audience Discussion:

- Behavior/decisions changes, observation: bulk of money is in construction.
Comment: 80-85% cost is in long term use. This is where USCG is trying to move some of this cost to the front end.

4. IAI – Information Framework – Francois Grobler, US Army, CERL

<http://www.cecer.army.mil/td/tips/index.cfm>

CERL – [Construction Engineering Research Laboratory](#)

Mr. Grobler offered ideas towards the BIM standard becoming reality. He discussed that the technology is available; albeit, it is not perfect; nor is it complete, but it is at a place that it can be implemented. In the process, point-to-point does not work. Life-cycle interoperability: BIM with data in one repository (e.g., a virtual place on the internet... for its {information} availability) over the life-cycle. The BIM would be at the core of individual (facilities) models. This is currently how it is being accomplished overseas.

How do we make this happen? Generic Data Model vs BIM (working definition by FIC, 19 April): “Stored information needs to be appropriated such that it is readily available along/throughout the lifecycle. BIM (can) integrate all the relevant aspects of the (shared information) into a coherent organization of data that computer applications can access, modify and/or add to, if authorized to do so.”

Interaction needs to happen between design development and construction (documents) for actively (shared) support of the IFC BIM. There will be models that will be private (proprietary, e.g., government cost estimates) and those that will be shared. Questions that for consideration: What information is being exchanged in the process, and when is it/should it be exchanged? Exchange requirements depend on the context/purpose of the communication processes... conveyance would be through the software application. The framework of information for construction (interacting parts) and where the BIM fits into it, was discussed. The IFC model is the core (definition) of BIM. An overview of the (North American) OMNI Class dictionary status and the need for its application/implementation was presented. Libraries are currently being accomplished for products definitions. (IFC-Industry Foundation Classes <http://www.aecbytes.com/feature/IFCmodel.htm/>)

For more efficient implementation, an information framework is needed: Product data in computable format – Whole Building Design Guide (WBDG), Singapore- IFL; Reference processes IFC (FIATECH?); Exchange requirements - NIBS; Industry “stuff” (e.g., contracts, legal issues, training).

Our Task: Decide between vertical or horizontal slices, i.e. processes or maturity approach; identify and prioritize phases and processes to include in NBS v 1.0; Association/collaboration with international; NBS development methodology including: NBS architecture (what will it look like?); what will it include/when; who will do it/ what (much to be done – immediately- on business process issues)? In the next meeting finalize the methodology (Mr. Grobler offered a white paper development based on the IAI international approach).

5. BIM Construct – Dianne Davis & Kimon Onuma,
<http://BIMConstruct.org>

Ms. D. Davis commented that over one million projects have been designed and constructed using BIM technology. An electronic and standards-based BIM is a visual decision tool and a task automation tool.

Mr. K. Onuma provided an overview of BIM Construct. USCG BIM effort: Standards were developed and tested (for pre-site inspection, site inspection, post-site inspection). BIM is not only 3-D, and it is not only about construction documents. What matters most is the value and use (application) of the data. To be able to access the information and not re-generate the data is important... whether about a door knob or an HVAC system. The import is to maximize the utilization of the data. BIM levels, from a simple mass/block through to a complete knowledge-base (repository) were discussed. Data needs to be moved in/out and between/among software to support the BIM. The USCG has cut its acquisition process from ten months to one month. There is a time savings in the early planning stages. All 8,000 USCG facilities are in BIM, but at varying levels.

Audience Discussion:

Question: Why hasn't the architectural community initiated this? Instead, it is being driven by the client/owner. Response: The value needs to be defined; and it comes down to costs.

Audience Comments:

- The USCG BIM will be different than for (any) other applications.
- The standard has to be flexible enough to be used by many, similar to the internet development.
- The many forms in which data can be acquired must be BIM-conducive. Further, data should also be able to be "machine" manipulated. OSCAR defines/identifies data elements (a generic process model, working toward DID, with everyone exchanging similar types of data). (OSCRE – Open Standards Consortium for Real Estate <http://www.oscre.org>)

6. FIATECH Roadmap – Ric Jackson, FIATECH

(FIATECH – "...the only non-profit consortium focused on fast-track development and deployment of technologies to substantially improve how capital projects and facilities are designed, engineered, built and maintained." <http://www.fiatech.org>)

Mr. Jackson provided a summary of the prior presentations. He suggested that a date be established to identify just when the standard is needed; also establish the associated cost. Owners do not want to be "held captive" regarding their data.

Three myths:

- (1) Owners must lead.
- (2) Owners must identify requirements and help solve the problem, but don't have exclusivity over vision of the future nor means to achieve it.

- (3) Technology “developers” want to support this effort but need to do it and stay in business.

In presenting his top ten reasons for not changing, Mr. Jackson included: “Change is risky,” “Don’t understand it,” “Cost to implement,” and “Legal” (lawyers). To change, on the other hand: only one valid reason: “To stay in business.”

He used the semiconductor industry as an example of identifying a problem within the industry, which then pooled its resources, then investigated and went through its processes and reorganized. In FIATECH, owners, contractors, technology providers, etc. have come together to support the capital projects technology road-mapping initiative. This is not just a FIATECH-driven goal, but industry-wide, and it is international. An early ‘90s national initiative in construction was discussed. If (the government/industry) is serious about making this happen, then a common commitment about the problem and doing it must be made. Question (or challenge): “Can it be done in 18 months?” Both the Process Information Model and the BIM overlap.

7. Introduction of attendees.

8. NBIMS V1 Proposed Goals & Objectives

Mr. Deke Smith provided a slide for Overall NBIMS V1 proposed goals & objectives:

Goal 1: Identify the overall scope of BIM

Objective 1.1 – develop a capability maturity model

Objective 1.2 – complete the overall BIM scope matrix

Objective 1.3 – Identify overlaps and gaps in the efforts to date

Goal 2: Identify Scope of NBIMS 1.0

Objective 2.1– Establish schedule for delivery of version 1.0

Objective 2.2 – Identify the scope of follow-on versions

Objective 2.3 – Develop marketing/presentations to articulate the product

Goal 3: Identify the players.

Objective 3.1 – Assign responsible partners for each business area

Objective 3.2 – Identify communities of interest for each business area

Objective 3.3 – Identify potential resource sponsors

9. BIM Focus (Working Lunch) - Deke Smith

Mr. Smith presented BIM focus slides for discussion with the audience providing response and suggestions as follows:

- a. Business Functions – Participants. Expanded on the specific participants.

- b. Complete Facility Life-cycle Focus – One recommendation: work through OMNI class (31) in support. Much discussion on definitions/terminology, i.e. lexicon and international framework for dictionaries.
- c. The Interoperability Problem. Shows the loss of information over the course of a project.
- d. BIM-based Information Transformation. As-is condition/short term goal/long term goal. How to bring the industry into this newer methodology.
- e. Capability Maturity Model – Draft proposal. Identifies Levels 1 thru 10, and includes life-cycle, business process, time/response, graphic, interoperability, spatial, and delivery.
- f. BIM Supports 4D Versioning. As-required through As-maintained.
- g. GIS – Spatial Data Theme Integration. Brings GIS into architectural world. There is a need to understand climate, prevailing winds, etc. (google earth was referenced <http://earth.google.com>). This is a portal environment, not just one piece of software.
- h. Links Executive Order (EO) 12906/A-16 & EO 13327. Geospatial information and building footprints/need for life cycle information.
- i. Federal Basis for IFC-BIM approach. Coordinated National Spatial Data Infrastructure, with cadastral and building data are included. Promote efficient and economical use of national real property assets and consider life cycle cost estimations and enhancement of agency productivity through an improved working environment.
- j. NIST Study Identifies \$15.8 Billion lost – mostly at the expense of the owner.
- k. Funding. There is a shared development funding requirement. The problem must be defined in order to solve it... just throwing money at the problem alone will not solve. It must be developed among the contributors to the standard to recover costs of production. There is a need to avoid costs associated with lack of interoperability, i.e., “Develop data once and use it many times throughout the life-cycle, instead of collecting it many times and only using it once.”

10. National Institute of Building Sciences – Sandy Shaw, NIBS
(<http://www.nibs.org/>)

Mr. Shaw discussed the FIC Consensus Process:

- a. Active and reviewer members
- b. Active members attend project committee meetings.
- c. Member categories were identified.

Mr. D. Jordani discussed the need to review the process, both business and technical. Comment: In the OGC geospatial consortium “world,” collect once - use many, works. They have a process in place for test bed/procurement in its business. FIATECH is in tools and solutions but not in specification/standards development. It should start with the business process... test beds have led to “policy prototyping.”

11. LBNL – Vladimir Bazjanac, LBNL

Mr. Bazjanac commented on GSA region 9, San Francisco, CA. Basics in BIM... information associated with a building. Data must reside in the software. The IFC data model was applied in the region. Achicad 9 has an advance IC design that works.

Energy performance is important. Architects and HVAC engineers defined the BIM and allowed contractor to access the data. The SMIE tool allows the operator to enter data and synchronize the database of GSA buildings. Presented a slide that shows the process it uses (for consideration). There is no need to add any classes to the IFC classes. Issue is, “Can the software function to support the needs of the owner?” Interoperability is not just CAD, but all data/information that is created along the way. Interfaces must be created by (software providers) AutoDesk, Bentley, etc. to do this.

12. Identify Responsibilities. Mr. Jordani opened discussions on setting up working groups. The audience offered the following suggestions:

Executive committee

Task groups

Funding

Identifying roles in the development of the National BIM Standard

Establishment of a Consensus Committee

Training

General audience discussions/comments followed regarding BIM development and implementation:

- Is a national BIM standard really needed?
- Perhaps rather than standardize BIM, standardize the data model.
- Focus on getting feedback from the marketplace.
- Possibly use S. Hagan’s “stair-step” approach that transitions the use of the data through the lifecycle.
- How does the standard get to industry? It should not be perceived as a threat to the construction industry.
- Producing, documenting, balloting must be accomplished in order to develop/finalize scope of first version of the National BIM Standard.
- NSF 596 was referenced.
- Consider what the deliverables are then identify the role/component of the product (building).
- The model could be a logical file structure (relational or object-based).
- The IFC model is the “richest” (most comprehensive) data model in existence and it is in the public domain, which allows internal mapping and interoperability. It is more accepted in Europe than currently in US. This cannot be done with proprietary software.
- What is conceptual definition/profile?
- There is no financial backing to support this effort. Consider lobby (using this group) to put together a letter to present to (Congress?). USCG identified a “threat” from outside the US, i.e., in going overseas to compete contracting for its needs.
- There is a need to align various consortia together to support this.

- Suggest that owners put requirements on designers/contractors through submittals. This could be Version 1.0 as a starting point. Also, identify the minimum IFC data.
- Per M.K. Miles, USCOE, the U.S. Army has an immediate and major concern. It will be spending \$30 billion in design and construction over the next five years, with the focus on design/build (DB) class of buildings (e.g. all dining rooms/all barracks). Savings will be long term in the 30-35 yr life of operating and maintaining (O&M) the building. (They want in its) Requests for Proposals, a statement similar to, "Firms without BIM expertise need not respond." D-B approach is expected to offer the greatest savings. Primary interest is saving money through the BIM application/database and O&M. The Army is looking for, and needs, a BIM "structure" to start with, i.e. Level 1, Level 2, etc. Other issues include roofing, energy savings, O&M (e.g. HVAC filters). The primary items list identifies about 20 or so items (concerns).
- The mission life-cycle is less than the facility life-cycle. This means that the rehabilitation of a facility will be necessary, more often. Therefore, as-built and O&M data are (mandatory) for this (effort) to happen inexpensively and in a timely manner.
- NASA/ARMY are collaborating on OMSI and have an interest in the BIM Connect. The starting point may be the creation of the existing spaces / documenting the footprint and all associated assets.
- The research effort needs to expand beyond DOD.
- The USCG offered that it has a background that can support the Army in its efforts.

Suggested Working Groups:

- Research Existing Resources
- Cost Estimating/Controls (Preliminary)
- Test Beds (via OGC)
- View Definitions (use cases)
- View Interfaces
- Communications/Marketing
- Performance-based BIM
- ROI Implementations (Industry-led)
- FRPC Test Bed (Exec Order-13327)
- Security Integration (GIS/CAD)
- Existing Submittal Requirements (UFGS)
- Research/Analysis
- Legal and Legislative
- Unique IDs
- Risk/Benefit Assessment
- Requirements/Timeline
- Define Impacts

13. Wrap-up – Deke Smith

An Executive Committee set up was discussed. Attendees were directed to contact Mr. Deke Smith and indicate their interest. The next meeting date is expected to be in about a month, tentatively Sep 26, 2005.

General List of Acronyms

A/E/C – Architect/Engineer/Construction
AEC3 – “...brings together the capabilities of three innovative organizations specializing in developing and applying information technologies in the AEC/FM industry.”
<http://www.aec3.com>
BIM – Building Information Model <http://www.aecbytes.com/feature/IFCmodel.htm/>
BLIS – Building Lifecycle Interoperable Software <http://www.blis-project.org/>
CERL – [Construction Engineering Research Laboratory](#)
CURT – Construction Users Round Table <http://www.curt.org/>
ERDC-CERL – Engineer Research & Development Center-
<http://www.cecer.army.mil/td/tips/index.cfm>
ESRI – GIS and mapping software <http://www.esri.com>
FIATECH – “...the only non-profit consortium focused on fast-track development and deployment of technologies to substantially improve how capital projects and facilities are designed, engineered, built and maintained.” <http://www.fiatech.org>
FIC – Facilities Information Council of NIBS www.nibs.org
FFC – Federal Facilities Council <http://www7.nationalacademies.org/ffc>
GML – Geographic Mark-up Language
IAI – International Alliance for Interoperability <http://www.iai-na.org>
IFC – Industry Foundation Classes <http://www.aecbytes.com/feature/IFCmodel.htm/>
ISG – Implementer Support Group - IAI
ISO – International Organization for Standardization <http://www.iso.org>
M/E/P – Mechanical/Electrical/Plumbing
MIMOSA – [MIMOSA-Machinery Information Management Open Systems Alliance](#)
NCS – National CAD Standard <http://www.nationalcadstandard.org>
NIBS – National Institute of Building Sciences <http://www.nibs.org/>
NIST – National Institute of Standards and Technology <http://www.nist.gov/>
OGC – Open Geospatial Consortium
O&M – Operation and Maintenance
OPS – Office of Pipeline Safety <http://ops.dot.gov/>
OSCRE – Open Standards Consortium for Real Estate <http://www.oscre.org>
SED – Streams Editor <http://www.gnu.org/software/sed/sed.html>
SOA – Service Oriented Architecture
SPF – Sender Policy Framework
STEP – **ST**andard for the **E**xchange of **P**roduct model data
<http://www.aecbytes.com/feature/IFCmodel.htm>
UML – Unified Modeling Language
USCS – United States Coast Guard <http://www.rdc.uscg.gov>
USGS – United States Geological Survey <http://www.usgs.gov>
XML – e**X**tensible **M**ark-up **L**anguage <http://www.xml.org>