Joint NIBS/bSa – TRB Workshop

Opening Comments

Dana K. “Deke” Smith, FAIA
Executive Director, buildingSMART alliance
Member of buildingSMART International Executive Committee
National Institute of Building Sciences
Keeping You Informed
Organization and Programs

**Industry Advocacy & Outreach**
- Consultative Council
- Council on Finance, Insurance and Real Estate (CFIRE)
- National Council of Governments on Building Codes and Standards (NCGBCS)

**Facility Performance & Sustainability**
- Building Enclosure Technology and Environment Council (BETEC)
- High Performance Building Council (HPBC)
- National Mechanical Insulation Committee
- Facility Maintenance and Operation Committee (FMOC)

**Security & Disaster Preparedness**
- Building Seismic Safety Council (BSSC)
- Multihazard Mitigation Council (MMC)
- Multihazard Risk Assessment/HAZUS

**Information Resources & Technology**
- Whole Building Design Guide
- National Clearinghouse for Educational Facilities
- National CAD Standard
- National BIM Standard-U.S.
- buildingSMART alliance
- buildingSMART International
Relationships

• building **SMART** alliance is United States Chapter of building **SMART** International

• building **SMART** International (BSI) has an International Council and Executive Committee

• BSI is organized into “rooms”
  – **Process Room** – Global BIM Guide Wiki
  – **Product Room** – Data Dictionary
  – **Infrastructure Room** – International efforts
  – **Technical Room** – IFC4 Implementation
Infrastructure Room – Munich 2013

Presentations from:
- Netherlands
- France
- Sweden
- Korea
- United States – Stuart Chen – University of Buffalo
Infrastructure Room

Road Map 2016: Projects to go forward

IN1: LandXML
IN2: IFC Bridge
IN3: Use Cases definition
IN4: Urban & landscape planning
IN5: DataDictionary
IN6: Alignments
IN7: Infra construction
IN8: Environmental assessment
IN9: Geotechnical
IN10: Spatial view infrastructure network
IN11: Safety & Strength Analysis for Constructions
IN12: Delivery of As-Built Data for Asset Management
Agenda

• Delivering Projects In A Digital World
  Danny Kahler, PE
  KAHLER ENGINEERING GROUP

• Digital Delivery – An Information Rich Product
  Deke Smith, FAIA
  NATIONAL INSTITUTE OF BUILDING SCIENCES

• Bringing Together GIS Mapping with COBie and BIM Standards for Facilities Construction and Maintenance
  Carrie Sturts-Dossick, PhD, PE
  UNIVERSITY OF WASHINGTON

• A Civilized Process for Civil Information Modeling (CIM)
  Connor Christian
  KIEWIT CORPORATION

• From Building Information Modeling (BIM) to Bridge Information Modeling (BrIM): Plus, Minus, Delta
  Stuart Chen, PhD, PE
  UNIVERSITY AT BUFFALO, STATE UNIV OF NY
Agenda

• Federal Highway Administration on the Development of Open Bridge Information Modeling
  Brian Kozy PhD, PE
  FEDERAL HIGHWAY ADMINISTRATION

• Information Classification Using Construction Classification System (OmniClass)
  Greg Ceton
  CSI

• Project Delivery Performance: Lessons Learned from Vertical Construction
  Behzad Esmaeili, Ph.D.
  UNIVERSITY OF NEBRASKA-LINCOLN

• Practice Issues in Getting Digital Information Across the Design/Construction Interface
  Jennifer Whyte, PhD
  UNIVERSITY OF READING, UK

• Establishing Practice Guidelines for Using Building Information Modeling (BIM) Information in Construction
  Joseph W Betit, PLS
  BECHTEL CONSTRUCTION OPERATIONS

• Advanced Work Packaging
  Ted Blackmon
  CONSTRUCT-X

• Closing Discussion and comments
  Danny Kahler, PE
  Deke Smith, FAIA
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Digital Delivery
An Information Rich Product

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Alliance Sponsors

These are the Change Agents in the Facilities Industry.

Why Isn’t your group recognized here?

COBie Education Sponsor
Agenda

• building **SMART** alliance
  – Goals and Strategic Plan

• Challenges
  – Metrics
  – Culture Change
  – Education

• Digital Delivery
  – National CAD Standard

• Information Architecture
  – Connecting all the dots
Strategic Goals of buildingSMART alliance

1. **Improve Construction Productivity**
   - Enable PPP and/or design build approach
   - Enable Lean Construction techniques
   - Enable off-site production

2. **Reduce Overall Cost**
   - Enable life cycle costing
   - Enable appropriate Value Engineering
   - Enable automated Quantity Take Off

3. **Improve Quality**
   - Improve worker skills through education and certification
   - Improve accuracy through fabrication from models
   - Eliminate or greatly reduce change orders

4. **Deliver Facilities Sooner**
   - Enable real time scheduling, procurement and RFID tracking
   - Improve owners return on investment by early occupancy
   - Enable just in time delivery and improved Product Lifecycle Modeling (PLM)
2007 Strategic Plan for the buildingSMART alliance

• **Build Alliance**
  – Need all stakeholders involved

• **Build Architecture**
  – Relationships in IT format

• **Development Projects**
  – Working toward developing building ballots

• **Facilitate National Standards**
  – NCS© & NBIMS-US™

• **Education (Future)**

• **Certification and Accreditation (Future)**

• **What should the 2014 version include?**
We Must Profoundly Change

• We need to know where we are and set goals of where we want to be.
  – We need metrics

• Doing more of the same and expecting different results is not a healthy outlook.
  – We must profoundly change the way we do business
    • We must enter data one time for entire project
    • We must share information across the life cycle
Metrics – We are not yet improving

Construction

All Other Industries
This Year – Introduction to Metrics

• **Metrics Data Base Resource**
  - Keep it very **simple**
  - bSa as a **neutral** and central point to collect
  - We need it to be **sustainable** – there must be a value proposition – A report we sell for $5,000
  - Participation will get you **discounts** to $0

• **bSa Reports on Metrics**
  - Look at **level of use**
  - **Cost** – Estimated vs. Actual - LCC?
  - Schedule – Estimated – Actual – **Value per day**
  - Customer **perceived quality** – just ask a system similar to Amazon
My Concerns – Our Challenge

We continue to work in silos
My Concerns – Our Challenge

BIM must be seen as the enabler

- Designing more sustainable facilities
- Building more resilience facilities and communities
- Reducing the carbon footprint
- Conserving water
- Building more safely
- Providing visualization of final product
- Addressing climate change
- Reducing energy use
- Incorporating daylighting
- Reducing co-mingled waste – increasing re-cycling
- Entering data one time and re-purposing
- Delivering information rich facilities to the owner
- Supporting commissioning
- Supporting prefabrication
- Improving product lifecycle management (PLM)
- Supporting facility operations, management and maintenance
- Supporting code checking
My Concerns– Our Challenge

We are not getting to the owner

Pro Forma Level Impact
My Concerns– Our Challenge

Architect is not take advantage of opportunity

Building – Refining – Transforming – Excelling

Graphic Courtesy of University of Wisconsin
My Concerns – Our Challenge

Technology is not relevant to senior management

- Parliamentary level support in UK – Saving 20% of construction budget **builds 60 more secondary schools** – 2015 Goal
- Construction industry is 31% less efficient than manufacturing identified in 2004 (Now equals $3T)
- NIST Study identifying $15.8B waste due to lack of interoperability (Now equals $150B)
- **This is not just BIM or CIM – this is applying comprehensive information technology to the facilities industry** – **WHEN will this be a crisis?**
The Problem – The Reality

Clearly most people are comfortable with the way we have always done it!

New projects generated with old thinking does not create change

Doing more of the same and expecting different results is not really an option
30 Stories – 15 Days

- Survives 9.0 magnitude earthquake
- 4 panel insulated windows
- Smart heat conservation system
- Automatic solar and sun shades
- Air is 20 times as pure as outside
- Air quality monitored in each room
- LED lighting
Benefit to Owner

• Broad Construction Hotel Project
  – 330 rooms delivered in 15 days
    • Assuming factory in production mode and not one off production
  – Normal delivery 570 days (19 months from contract to occupancy)
    – 570 - 15 = 555 x $100 / per room = $55,500 per room x 330 = $18,315,000!
      – Also, consider the cost of money for 15 days vs. 19-24 months.

• Our success will be based on our ability to capture the hearts and pocketbooks of owners

If you have not seen the video the Google – 30 stories 15 days China
Goal: Shift $ from Op Ex to Cap Ex

Societal Impact / Cost
Long term and significant

Operational Cost
over the life of the project annually

Construction Cost
Life cycle based

Design Cost
Value engineered and life cycle based decisions

Should not expect significant reduction in cost

Reduced operating costs directly benefits society by providing more product.

Societal Benefit
Return on Investment

A small improvement in design has significant impact to operations and society

Contribution from Mark Bew - Size indicates relative value – not to scale
My Concerns– Our Challenges

1. **Information Sharing** – Break down silos
2. See **BIM as an enabler** – not the enemy
3. Get the message to the **owner**
4. Prepare **architect to lead**
5. Become **relevant** to change
Education – Where We Stand

- **Academic Interoperability Coalition**
- Yesterday held 8th annual Education event

**Status**

- We lack common job titles
  - Hence no common outcomes
  - Cannot legitimately credential
- We lack common KSA’s
  - Multiple uncoordinated certificates become meaningless to employers
- Accrediting organizations not yet on board
  - Unaccredited programs being offered
- Hard to find instructors
- Still doing more training than education
Education - Ten Core Principles

- **Coordinate** and plan with all parties before you start
- Ensure all parties have **life cycle view** – involve them early and often
- Build the model then **build to the model**
- **Detailed data** can be **summarized** (The reverse is not possible)
- **Enter data one time** then improve and refine over life
- Build **data sustainment** into business process – keep data alive
- Use **information assurance** and **metadata** to build trust – know data sources and users
- **Contract for data** - good contracts make good projects
- Ensure data is **externally accessible yet protected**
- Use **international standards** and cloud storage to ensure long term accessibility
Why Open Standards

• It is all about **sustaining the data**

• Proprietary products come and go
  – Not a problem if only worried about initial project

• International standards have the **best longevity**

• Storing at a data center “in the cloud” ensures **data refresh**

• Store data and geometry

• Implement cyber security / **information assurance strategies**
NBIMS-US Impact

• **Version 2 has had a significant effect**
  - **COBie** use worldwide is significant
  - **IFC** is now being used
    - This got it out of the lab environment
    - Software vendors have embraced it
    - It will only improve over time

• **Version 3 will have an even greater effect**
  - It is far more **comprehensive**
  - More people will understand the value of **open standards**
• Working on version 6
  – 370 ballots submitted
  – 250 made it vote
  – 5 days left of voting – appears all will be approved and then published by mid year

• Open CAD Standard focus
  – Standard symbols and layers
  – Standard practice – organization and sections
  – Plotting standards

• Defines 2D output for digital output including from BIM and CIM
Digital Project Delivery

• Far more than just now providing a PDF of 2D drawings!

• Goal is to provide information rich deliverable
  – Information from design and construction
  – Information from manufacturers
  – Information for commissioning
  – Information for the facility manager
  – Delivering green and keeping it green
  – Providing Facilities Reserve Study
CAD
Automating an Existing Process
Affected Only Design

BIM
Information For Facility & Infrastructure
New Business Processes
Digital Project Delivery

• FIATECH Project – Auto Codes

• Three steps

  1. Electronic Delivery – Convincing 600 code officials to accept electronic deliverables

  2. Many states have legislation requiring wet signatures, must change to accept electronic signatures

  3. Delivery of models allows for automating rule sets to do 100% check of some items in building codes.
Importance of Standards & Guidelines

• Mandatory if we are to **share information** across the lifecycle

• Mandatory along with **metadata** to build trust

• Don’t want every office to **re-invent wheel**

• Reference Standards and Information Exchanges can be standards. Best practices cannot – until they can be accepted as **standard practice**
Disney Concert Hall, designed by Frank Gehry. Photos courtesy of Dennis R. Shelden, Ph.D., Chief Technology Officer, Gehry Technologies.
In order to build trust you need to know an authoritative source of information. For security you must also know who is using data and for what purpose.
DoD Business Enterprise Architecture

- Program Information
- Acquire Defense Decision Memorandum
- Assign Human Resources
- Manage Travel
- Manage Human Resources
- Entitlement Pay
- Manage Financial Assets and Liabilities
- Manage Defense Acquisition System
- Conduct Program Management
- Conduct Periodic and Ad hoc Reporting
- Execute Sourcing Strategy
- Manage Sales and Procurement
- Manage General Ledger
- Deliver Property and Forces
- Asset Record
- Manage Sales and Procurement
- DoD Fund Balance
- Perform Funds Allocation, Control, Collection, and Disbursement
- Perform Asset Accountability
- Manage Defence Acquisition System
- DoD Fund Balance
In Closing

• National Institute of Building Sciences a good organizational focal point
• building SMART is a good international focal point
• Need more resources – great people involved – need dollars for research, testing, validation, demonstration, coordination, and collaboration
• Need metrics to set baseline, setting goals, and measuring progress
• Need continued open standards development
• Need a focus on education at all levels
• Need an overall high level information architecture to connect all the dots
Thank You

If I can be of further service please contact me:

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