TPF-5(372)
BIM for Bridges and Structures
Introductions

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• Transportation BIM Program Manager
• Project Technical Lead
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Introductions

Julie Rivera, PE, SE

- HDR Project Manager
- 15 years industry experience
- Bridge analysis & design
- 3D modeling experience
- Coordination/management role & bridge designer advisory role
- Julie.Rivera@hdrinc.com
AGENDA

1. Vision
2. General project overview
3. Key project activities
VISION
AASHTO BRIDGE VISION

Model-Based Approach

Fabrication
Asset Management
Construction
Design
AASHTO BRIDGE VISION

Designer → Standard Deliverable → AASHTO → Contractor

Fabricator

Owner

Public
RJ12    Connor to update public graphic
Rivera, Julie, 8/5/2019
AASHTO BRIDGE VISION

Entire Project

Superstructure

Substructure
AASHTO BRIDGE VISION
Focus of pooled fund project

Model-Based Approach

Fabrication

Asset Management

Construction

Design
PROJECT VISION

Develop a National Standard for open exchange of modeled bridge and structure data to be used for design to construction and fabrication, with the ultimate goal of updating and using the data throughout the life of the structure.

Transportation Pooled Fund - TPF-5(372)
ACHIEVING THE PROJECT VISION
PROJECT VISION

AASHTO Bridge Vision

National Standard for data exchange
GENERAL PROJECT OVERVIEW
TRANSPORTATION POOLED FUND – TPF-5(372)

17 STATES PARTICIPATING

01 California DOT
02 Delaware DOT
03 Illinois DOT
04 Iowa DOT
05 Kansas DOT
06 Michigan DOT
07 Mississippi DOT
08 North Carolina DOT
09 New Jersey
10 New York State DOT
11 Ohio DOT
12 Pennsylvania DOT
13 Texas DOT
14 Utah DOT
15 Wisconsin DOT
16 Florida DOT
17 Vermont VTRANS
   + FHWA
   + Roger Grant (NIBS)
KEY PROJECT ACTIVITIES
PROJECT ACTIVITIES

1. Investigation & Exploration
   - Existing initiatives
   - Terminology

2. IFC Development
   - Development of standard
     *Model View Definitions*

3. Industry Outreach
   - Designers
   - Contractors
   - Fabricators
   - Software vendors & developers

4. Collaboration & Implementation

5. Economic Analysis: ROI
INVESTIGATION & EXPLORATION
INVESTIGATION & EXPLORATION

Build On Previous Efforts

buildingSMART 〈 NIEM 〉

U.S. Department of Transportation
Federal Highway Administration

ci

American Concrete Institute
Always advancing

AASHTO
The Voice of Transportation

National BIM Standard—United States®

National Institute of BUILDING SCIENCES™
Innovative Solutions for the Built Environment

UF | UNIVERSITY OF FLORIDA

PCI

BIM FOR BRIDGES AND STRUCTURES
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BIMFORUM
IFC DEVELOPMENT
BRIDGE LIFECYCLE PROCESS MAP

• What is it?
• Where did it come from?
• What are we doing with it?
• How will it be used?
IFC DEVELOPMENT

Industry Foundation Classes (IFC)

buildingSMART International

ISO 16739

BIM FOR BRIDGES AND STRUCTURES TPF-5(372)

BIMFORUM19
IFC DEVELOPMENT

Industry Foundation Classes (IFC)

**Geometry**
Solid: An extrusion of a 300mm x 300mm rectangular profile

**Attributes/Properties**
Column D-2, RGB140-142-140, Cast Concrete, 150lbs/ft$^3$, 5400psi

**Semantics**
Column

**Relationships**
Internal bearing, 2nd story, bearing on footing below and supporting slab above, structural system, has reinforcing
ICF DEVELOPMENT

Model View Definition (MVD)

Entire IFC Schema

MVDs

Source: Mark Baldwin (Mensch & Maschine)
IFC DEPLOYMENT
IFC DEPLOYMENT
IFC DEPLOYMENT

Trimble

AUTODESK

Bentley

NEMETSCHEK GROUP

AASHTOWare

AASHTO

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BIMFORUM 19
IFC DEPLOYMENT

Design to Construction (Bid)

Design to Fabrication
IFC DEVELOPMENT

More Than Just Buildings...

Alignment

Bridges

Tunnelling

Roads

Railway

Ports & Harbors

Site & Landscape

BIM FOR BRIDGES AND STRUCTURES

BIM FORUM 19

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IFC DEVELOPMENT
Bridges are Just the Beginning...

Superstructure

Substructure
PROJECT TASKS

- Review & update Bridge Lifecycle Process Map
- Review and test current FHWA Design to Construction MVD
- Gap Analysis of Design to Fabrication MVD for IFC 4.2
- Develop Information Delivery Manual (IDM) for Design to Fabrication – identify data exchanges
INDUSTRY OUTREACH
ROADMAP UPDATE

**PHASE 1: Program**
- Identify the data to be exchanged

**PHASE 2: Develop**
- Develop data exchange formats and schemas

**PHASE 3: Implement**
- Implement formats and certify software

**PHASE 4: Deploy**
- Deploy certified software in bridge projects

**Year 1**
- Create IDM

**Year 2**
- Create MVD

**Year 3**
- Test Software

**Year 4**
- Collaboration forum, ROI study, workshops

**Year 5**
- Software vendor coordination/certification

INDUSTRY INVOLVEMENT
INDUSTRY INVOLVEMENT

- Bridge Engineers
- Fabricators
- Consultants
- Contractors
- Developers
- Software Vendors
- Communicators
GOVERNANCE

Manages MVDs

AASHTO

Manages Schema

buildingSMART®

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BIMFORUM'19
SOFTWARE VENDOR COLLABORATION

OBJECTIVE:
Incorporation of MVDs into commercial off-the-shelf software

Software vendor inclusion is paramount
Certification process through BSI
Training & effective communication
COLLABORATION & IMPLEMENTATION
INDUSTRY INVOLVEMENT

Stakeholder Collaboration Forum

- Discussion threads
- Educational tools
- Videos
- Case studies
- Quick polling
- Stakeholder input
ECONOMIC ANALYSIS
ECONOMIC ANALYSIS

- Training
- Implementation costs
- Operations and maintenance

+ Improved productivity
+ Faster project delivery
+ Reduced asset management costs
+ Reduced safety risks
+ Lower construction costs
JOIN THE TEAM

- DOTs can join the Pooled Fund TPF-5(372)
  - Contact: Ahmad.Abu-Hawash@iowadot.us

- Software developers can participate in the advisory committee
  - Contact: John.Reese@hdrinc.com

- Designers, Fabricators, and Contractors can participate by providing input on data exchange requirements
  - Contact: Connor.Christian@hdrinc.com
QUESTIONS

For more information contact:

- Julie.Rivera@hdrinc.com
- Connor.Christian@hdrinc.com
- John.Reese@hdrinc.com