Standardized Format for Bridge and Structure Information Models

Project Status

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This investigation was sponsored by TRB under the NCHRP Program. Data reported are work in progress. The contents of this presentation has not been reviewed by the project panel or NCHRP, nor do they constitute a standard, specification, or regulation.
Synthesize current practices and propose recommendations for future development of a standardized modeling format

Tasks to Date:
• Task 1: Conduct literature Review
• Task 2: Synthesize Common Modelling Formats
• Task 3: Hold a 2-Day Workshop

On-going Tasks:
• Task 4: Propose Recommendations for Future Research
• Task 5: Present Research Findings to T-19
• Task 6: Submit a Final Report
Task 1 – Literature Review

Task 1: Conduct a literature review of relevant standards and current practices utilized by State DOTs and international agencies.

Literature review included:

- Bridge/transportation efforts
- Building efforts
- Current practices and software application
- BIM/BrIM Roadmaps
Task 2 – Format Synthesis

Task 2: Synthesize the common modelling formats including developed, proposed, or used by similar infrastructure industries.

4-step synthesis:

- Step 1: Overview of common modeling formats and schemas
- Step 2: Selection of formats and schemas
- Step 3: Detailed evaluation of selected formats and schemas
- Step 4: Gap analysis of three schemas
Task 2 – Stewardship Models

- Model 1: administrated by the AASHTOWare
- Model 2: administrated by a non-profit industry consortium
- Model 3: administrated by a coordination of FHWA, AASHTO and other organizations
- Model 4: administrated using a multi-year contract
- Model 5: administrated using a hybrid model
Task 2 – Stewardship Model 1: AASHTOWare

Establish a task force under the AASHTOWare Structure:

• The task force is under supervision of AASHTO
• Several technical working groups
• A working group for promotion
Task 2 – Stewardship Model 2: Industry Consortium

Structure:

• Board of directors
• Specification program
• Interoperability program
• Public outreach and community adoption program
Task 2 – Stewardship Model 3: Coordination of FHWA, AASHTO and other organizations

Structure:

- An executive director and a board of directors
- Member agencies
- Consultants
- Volunteers
Task 2 – Stewardship Model 4: Multiyear Contract

FHWA or AASHTO-funded competitively awarded multiyear contract with:

1. University research center,
2. Nonprofit organization, or
3. Consulting firm
Task 2 – Stewardship Model 5: Hybrid Stewardship Model

- Advisory Board
  - AASHTO staff support
    - AASHTO Committees
    - Schema Interest Groups
    - State DOTs
    - Consultants and Software Developers
      - Academia
      - Volunteers
Task 3 – Workshop

Task 3:

- Hold a two-day workshop to gather information and discuss recommendations
- The workshop was held on May 10th and 11th with 39 participants
Task 3 – Workshop Attendees

- **Software vendors**: 15
- **State DOTs, FHWA, and NCHRP**: 12
- **Consulting firms**: 6
- **Fabricators/contractors**: 4
- **Organizations and academia**: 2

The pie chart represents the distribution of workshop attendees across different categories.
Task 3 – Workshop Presentations

8 presentations in the workshop

- 2 - Bridge owner/designer (state DOTs)
- 1 - Fabricator
- 1 - NSBA task group
- 2 - Update of FHWA BrIM project
- 2 - Schema synthesis and development
Task 3 – Workshop Discussion and Polling Sessions

- Break-out session for 3 groups:
  - Stewardship of common modeling format
  - Design/fabrication/construction
  - Data format development/implementation

- Two polling sessions
Task 3 – Summary of Workshop Polling Sessions

Which format should be chosen as the dominant data schema?

1. IFC
2. OpenBrIM
Task 3 – Summary of Workshop Polling Sessions

What is the best time frame to select the dominant data schema, e.g. IFC, OpenBrIM?

1. 3 months
2. 6 months
3. 1 year
4. Other
5. Not sure
Task 3 – Summary of Workshop Polling Sessions

Who should make the selection? (Rank the following – select one or more)

1. AASHTO T-19
2. AASHTO SCOBS
3. FHWA
4. Software vendors
5. Software user groups
6. Other

[Bar chart showing the percentage of votes for each option]
Task 3 – Summary of Workshop Polling Sessions

Which is the preferred stewardship model for developing the standardized data format?

1. Model 1: by AASHTOWare
2. Model 2: by an independent non-profit industry consortium
3. Model 3: by a coordination of FHWA, AASHTO and other organizations
4. Model 4: using a multi-year contract
5. Model 5: using a hybrid model
6. Other
7. Not sure
Task 3 – Summary of Workshop Polling Sessions

Who should own/maintain the common modeling format?

1. FHWA
2. AASHTO
3. Formats should emerge organically
4. Other
Task 3 – Summary of Workshop Polling Sessions

What are the possible funding sources for the standardized data format?

1. FHWA
2. AASHTO
3. State DOTs
4. Pooled Fund
5. Consulting firms/contractors
6. Other
Task 3 – Summary of Workshop Polling Sessions

Can the AASHTOWare software be leveraged to promote the standardized data format? If so, how?

1. Implement the data format in AASHTOWare as a pilot study
2. Promote the data format with AASHTOWare newsletter
3. Do nothing
Summary of Task 4

Work conducted for task 4

• Identify potential challenges
• Provide a strategic plan for format adoption
• Propose recommendations for future work
Task 4 – Challenges to BrIM Adoption

Challenges in 5 categories

• Technical challenges
• Process-related challenges
• Mindset-related challenges
• Legal challenges
• Return-on-investment challenges
Task 4 – 4-Phase Cyclic Strategic Plan

- Identify data to be exchanged
- Develop common modeling formats
- Implement formats and certify software
- Deploy certified software in bridge projects
## Task 4 – 4-Phase Cyclic Strategic Plan

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<th>Phase 1 Program</th>
<th>Phase 2 Develop</th>
<th>Phase 3 Implement</th>
<th>Phase 4 Deploy</th>
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<td>Investment tasks</td>
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Task 4 – Strategic Plan: Phase 1

Technical Tasks (3 months to 1 year)

- Work groups formation
- Define data exchange requirements
  - What data need to be exchanged
  - When the data exchanges happen
  - Among whom the data exchanges occur
Task 4 – Strategic Plan: Phase 1

Process-related Tasks (3 months to 1 year)

• Define vision, mission statements, and implementation objectives
• Define functional needs and business requirements
• Define BrIM use cases and level of detail
Task 4 – Strategic Plan: Phase 2

Technical Tasks (3 months to 3 years)

- Determine the dominant data exchange schema
- Generate common modeling format
- Test and publish the format
Task 4 – Strategic Plan: Phase 3

Technical Tasks (1 year to 3 years)

• Implement the format on bridge software
• Certify the software that implements the format
• Configure system to support the software
• Create an inter-disciplinary data environment
Task 4 – Strategic Plan: Phase 3

Process-related Tasks (1 year to 3 years)

• Create guides for model version control, data exchange, etc.
• Make standards for BrIM object libraries
• Define procedures for testing data exchanges
Task 4 – Strategic Plan: Phase 4

Process-related Tasks (1 year to 3+ years)

- Define guidelines for wide use of BrIM in bridge projects
- Update bridge development policies
- Foster collaboration locally and internationally
Task 4 – Strategic Plan: Phase 4

Mindset-related Tasks (1 year to 3+ years)

• Develop suitable pilot projects to test-drive
• Promote success stories, best practices, and lessons learned
• Provide training programs for BrIM
Task 4 – Strategic Plan: Phase 4

Legal Tasks (1 year to 3+ years)

• Review and re-define contract agreement, legal clauses, and data liability
• Draft BrIM specific contractual provisions
• Conduct a risk evaluation for deploying BrIM
Task 4 – Strategic Plan: Phase 4

Investment Tasks (1 year to 3+ years)

• Obtain funding to deploy software/hardware, configure IT systems, conduct training, etc.

• Conduct ROI analysis to measure benefits of using BrIM
Thank you
Questions?

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