

# NCHRP

20-07/Task 377


## Standardized Format for Bridge and Structure Information Models

### Project Status

Mark Mlynarski

Hanjin Hu

06/27/2016



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.

# Project Overview

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

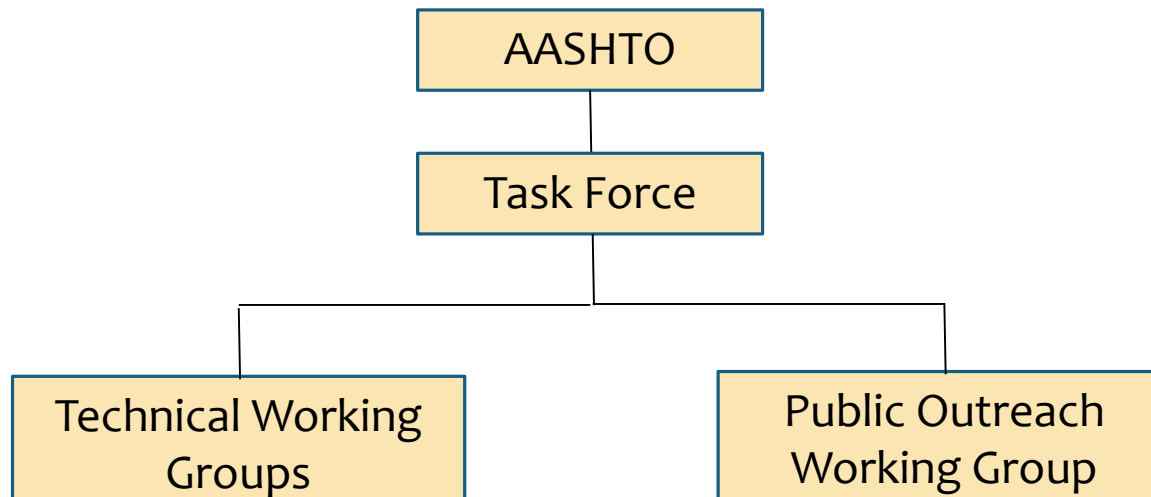
# Task 2 – Stewardship Model 1: AASHTOWare



Establish a task force under the AASHTOWare

Structure:

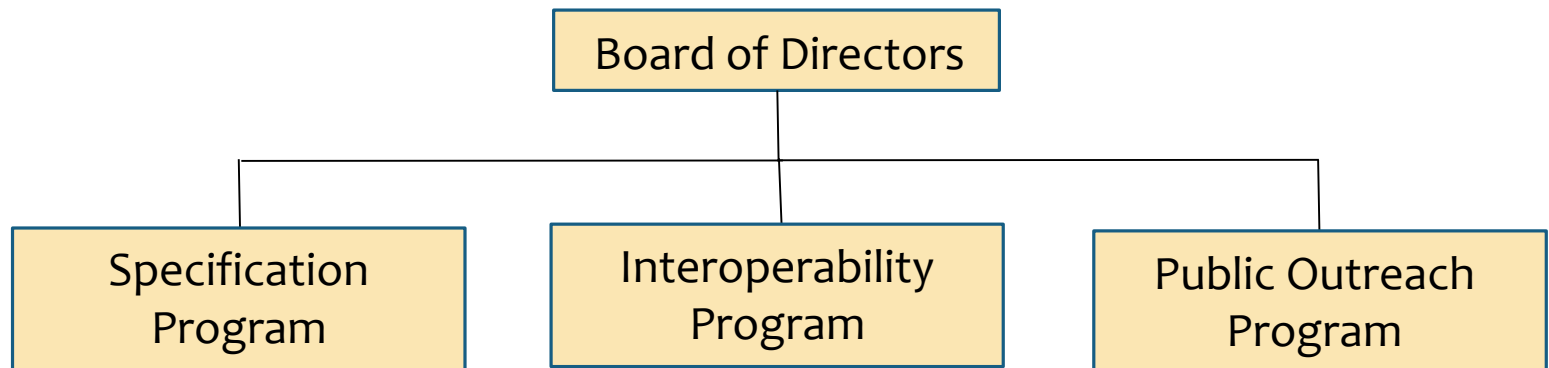
- The task force is under supervision of AASHTO
- Several technical working groups
- A working group for promotion



# Task 2 – Stewardship Model 2: Industry Consortium

## Structure:

- Board of directors
- Specification program
- Interoperability program
- Public outreach and community adoption program

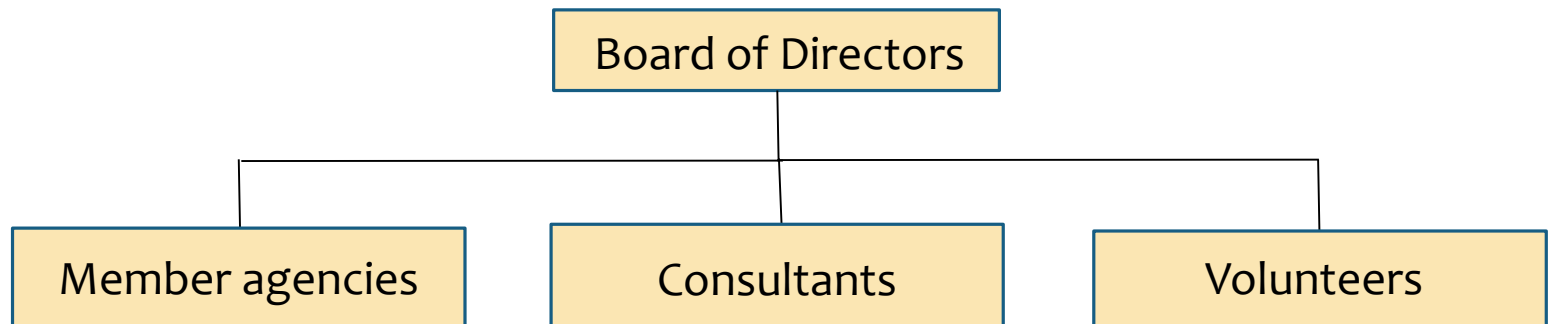




# Task 2 – Stewardship Model 3: Coordination of FHWA, AASHTO and other organizations

## Structure:

- An executive director and a board of directors
- Member agencies
- Consultants
- Volunteers



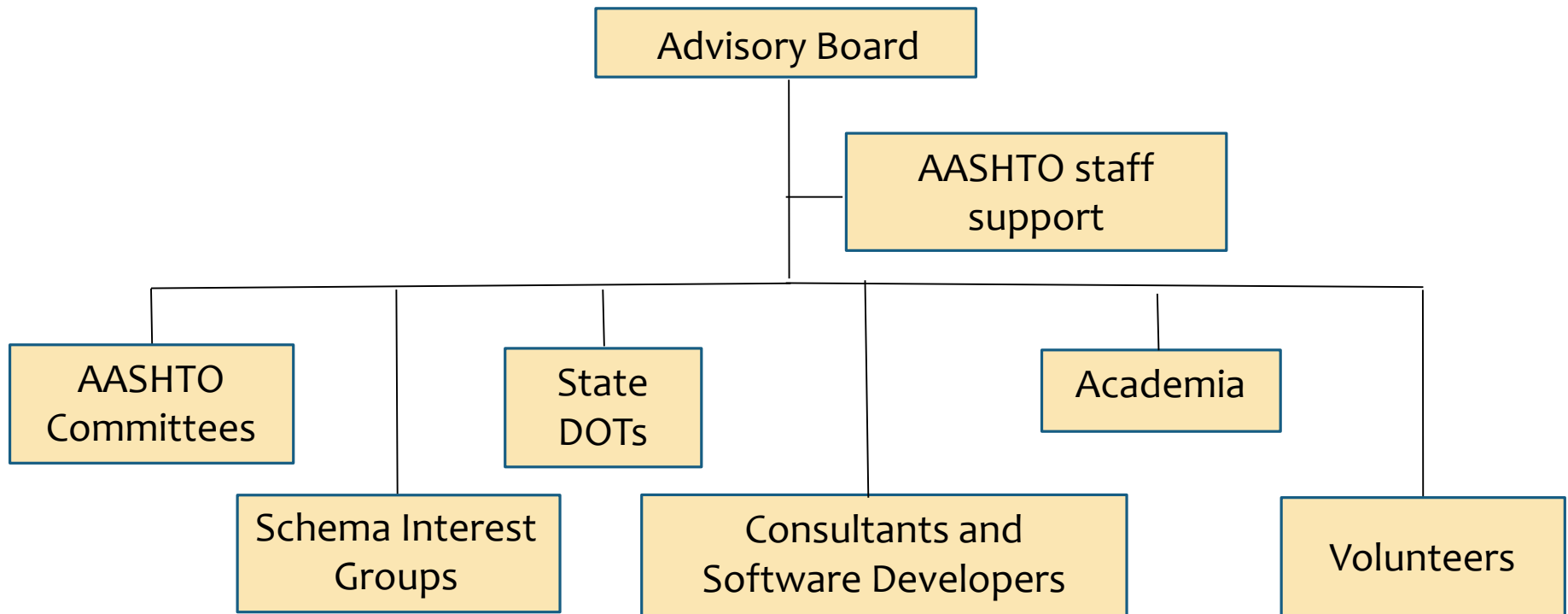
# Task 2 – Stewardship Model 4: Multiyear Contract

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

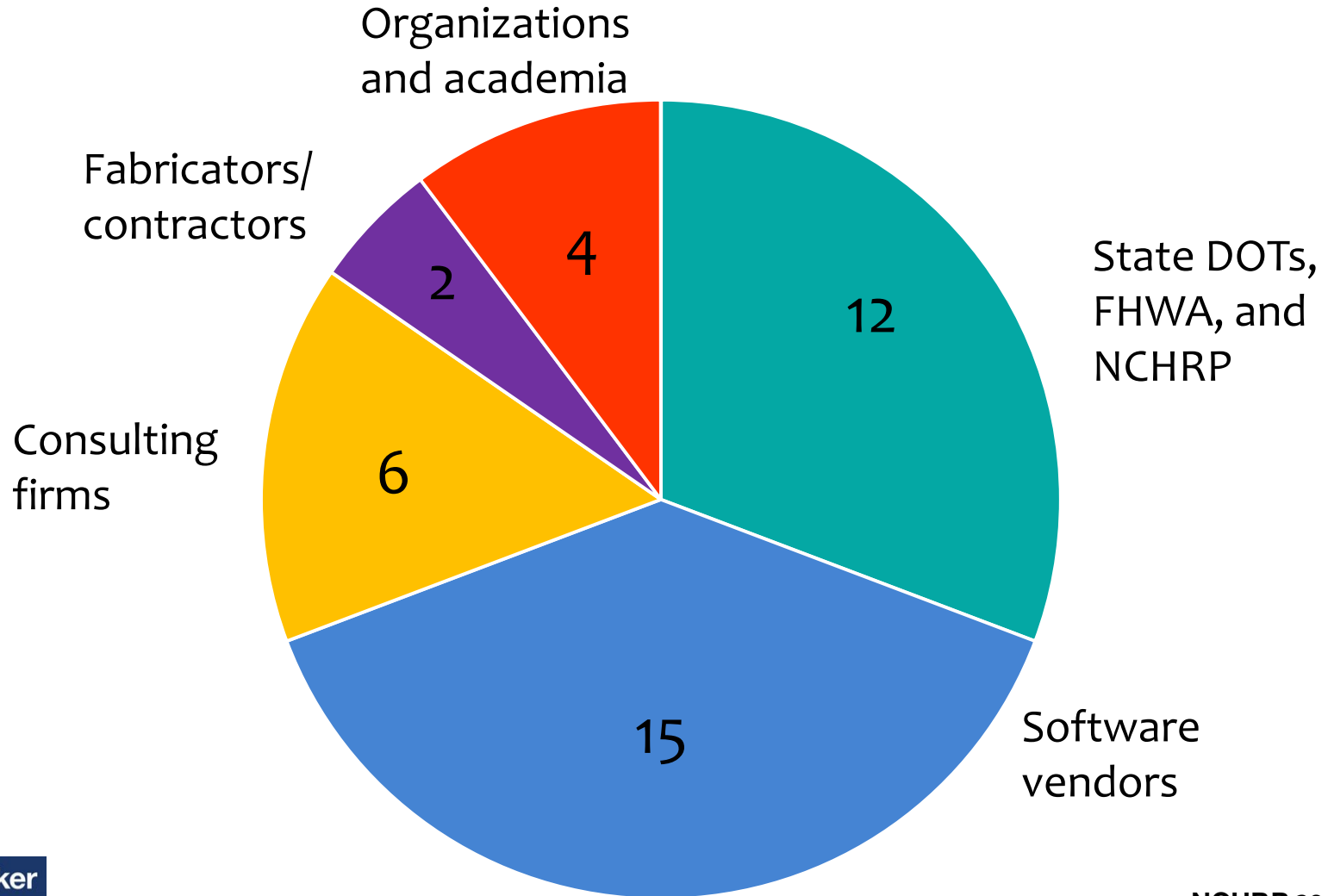


# Task 3 – Workshop

## Task 3:

- Hold a two-day workshop to gather information and discuss recommendations
- The workshop was held on May 10<sup>th</sup> and 11<sup>th</sup> with 39 participants

# Task 3 – Workshop Attendees



# 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

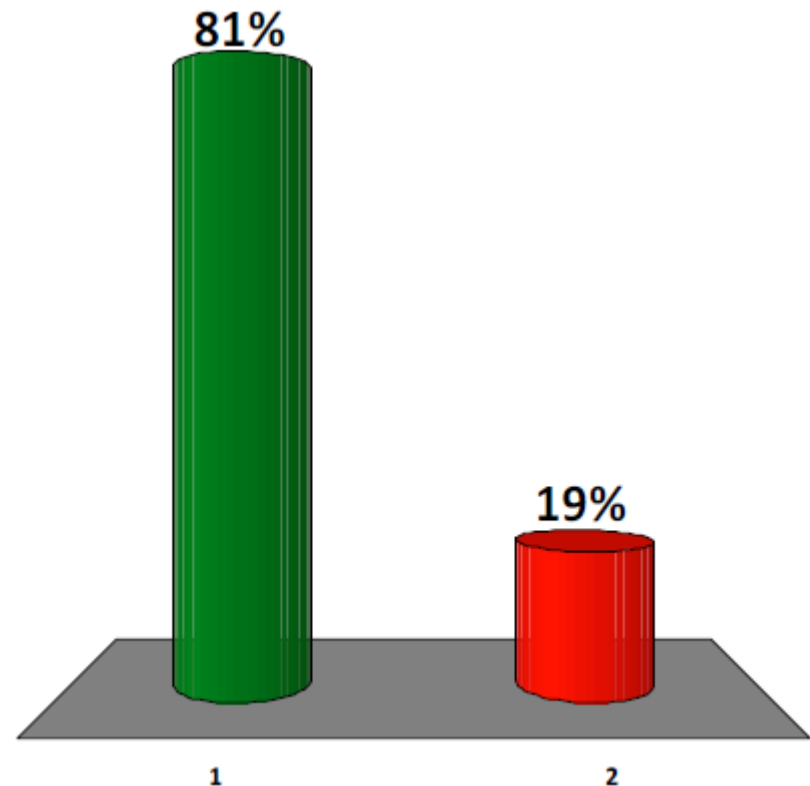
# Task 3 – Workshop Discussion and Polling Sessions

- 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

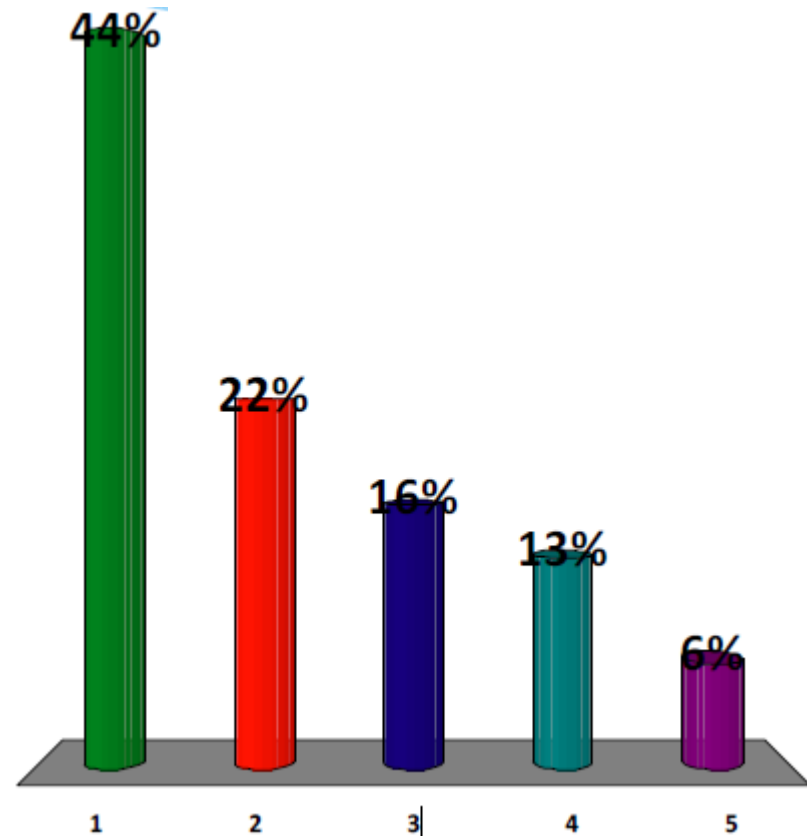




# Task 3 – Summary of Workshop Polling Sessions

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

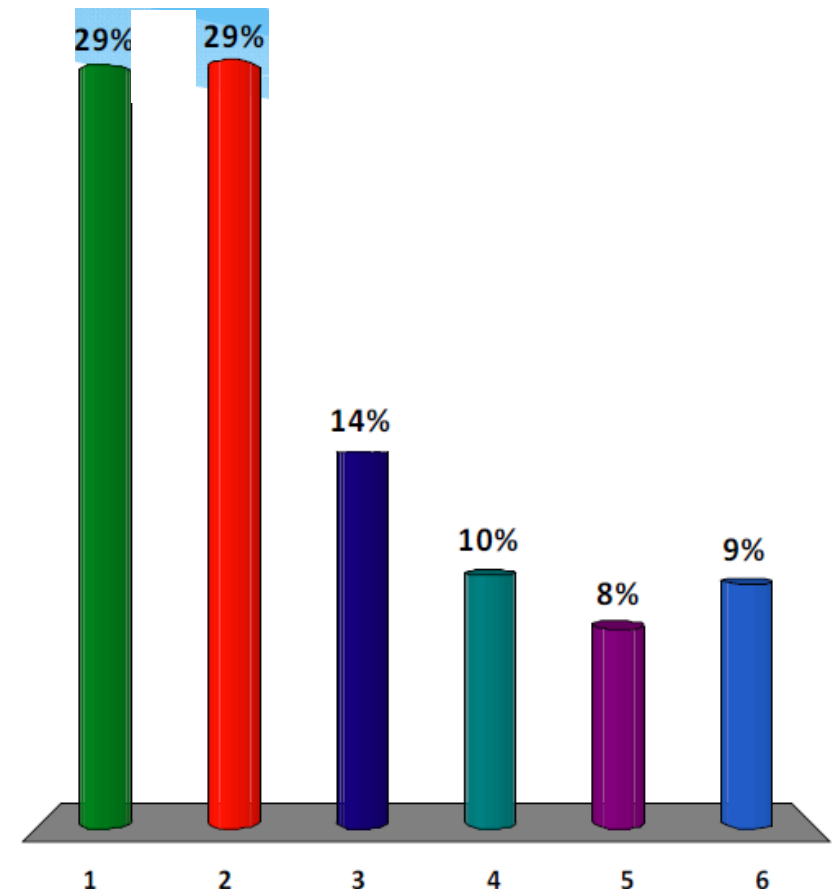
1. 3 months
2. 6 months
3. 1 year
4. Other
5. Not sure



# Task 3 – Summary of Workshop Polling Sessions

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

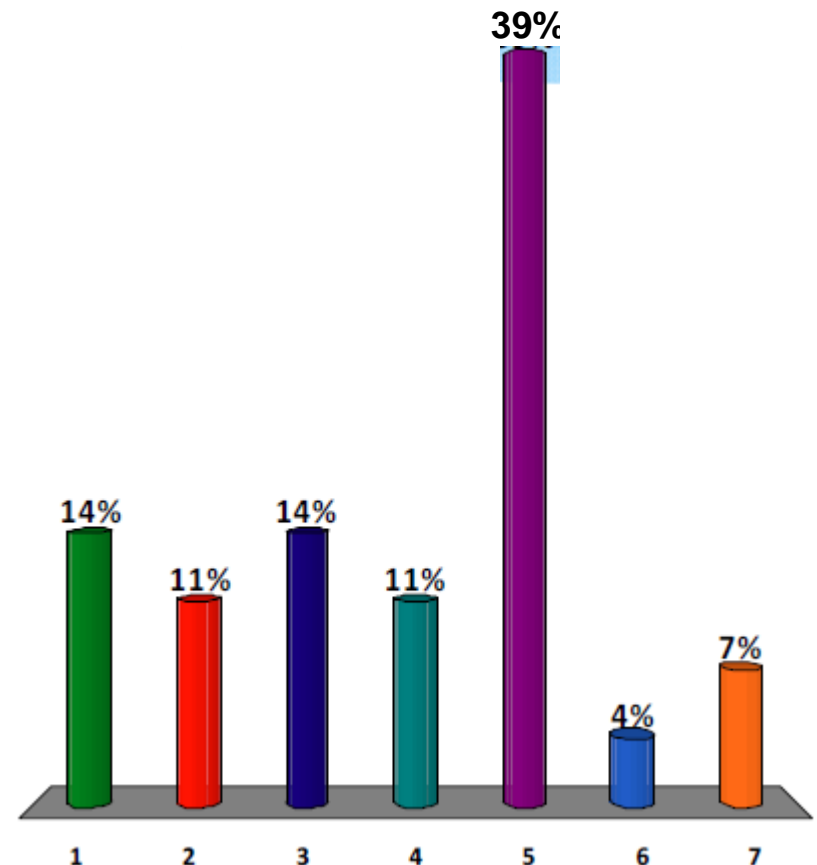
1. AASHTO T-19
2. AASHTO SCOBS
3. FHWA
4. Software vendors
5. Software user groups
6. Other



# Task 3 – Summary of Workshop Polling Sessions

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

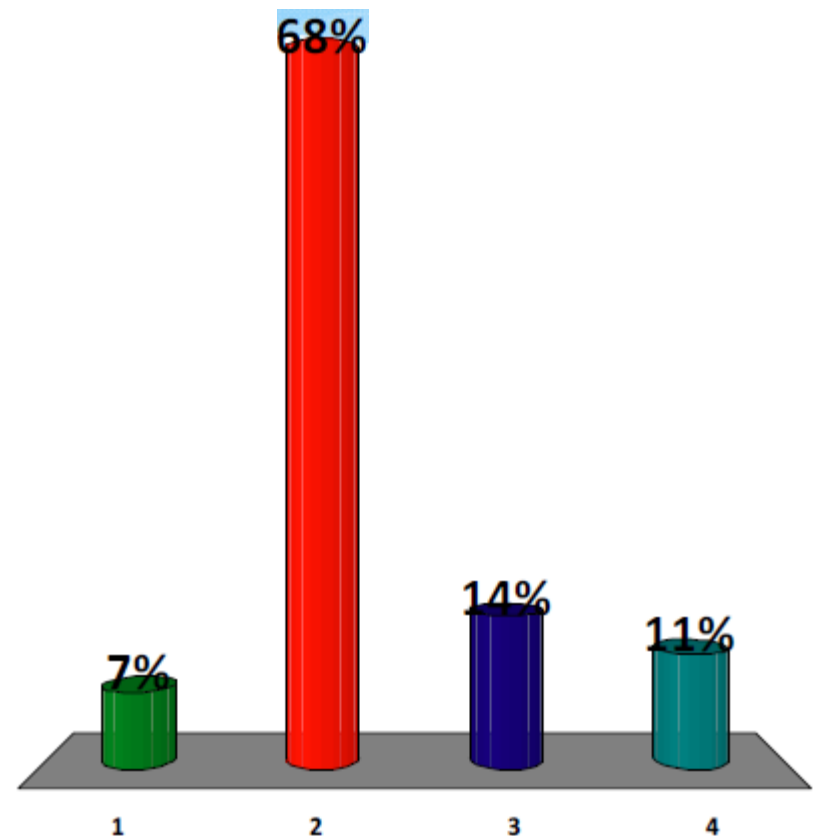
1. Model 1: by AASHTOWare
2. Model 2: by an independent non-profit industry consortium
3. Model 3: by a coordination of FHWA, AASHTO and other organizations
4. Model 4: using a multi-year contract
5. Model 5: using a hybrid model
6. Other
7. Not sure



# Task 3 – Summary of Workshop Polling Sessions

Who should own/maintain the common modeling format?

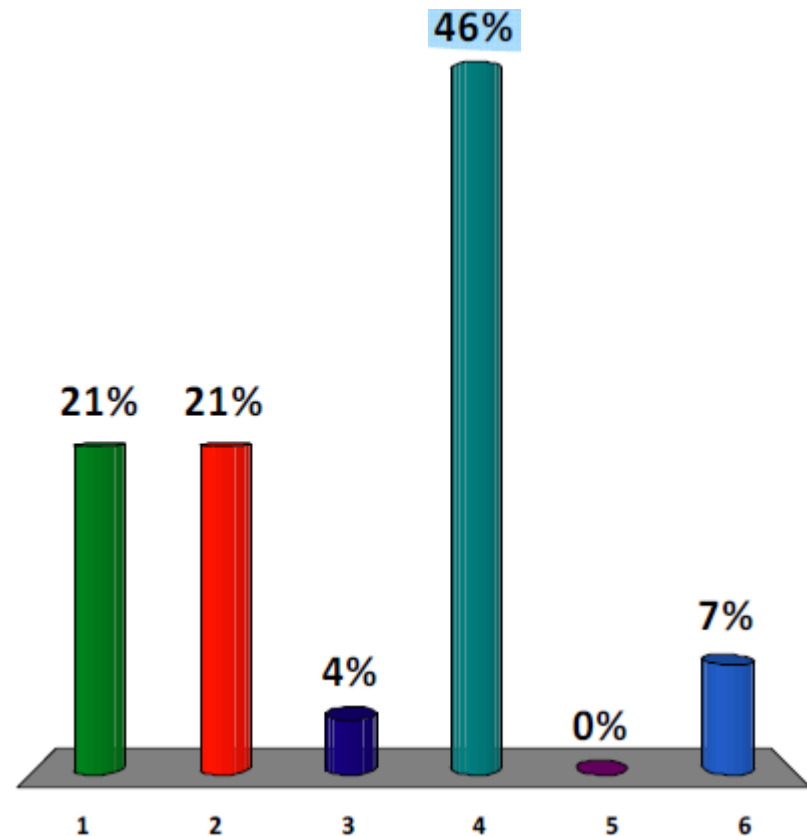
1. FHWA
2. AASHTO
3. Formats should emerge organically
4. Other



# Task 3 – Summary of Workshop Polling Sessions

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

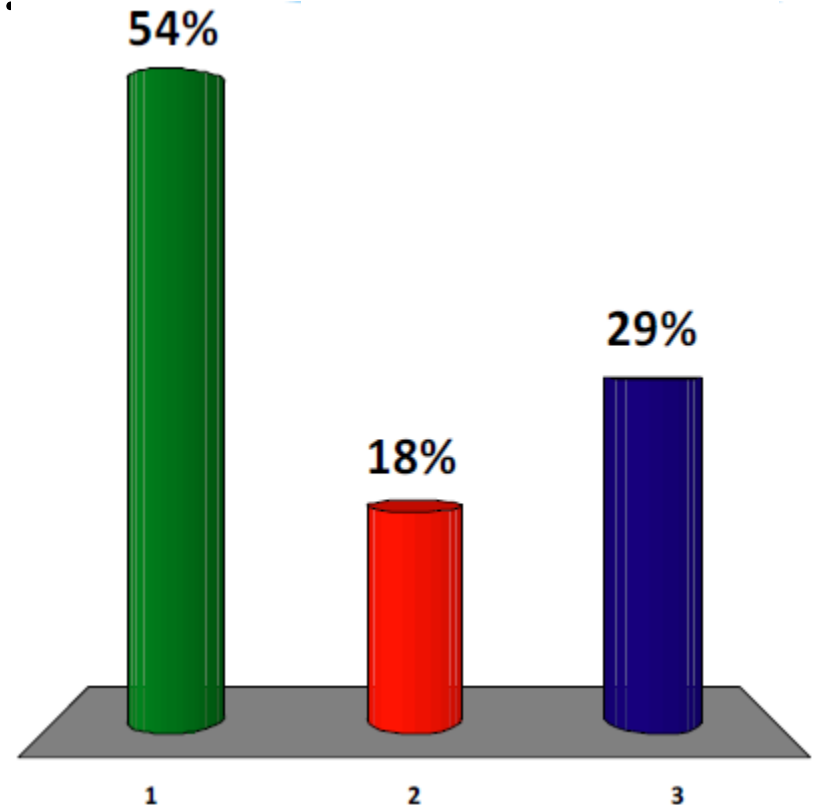
1. FHWA
2. AASHTO
3. State DOTs
4. Pooled Fund
5. Consulting firms/contractors
6. Other



# 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

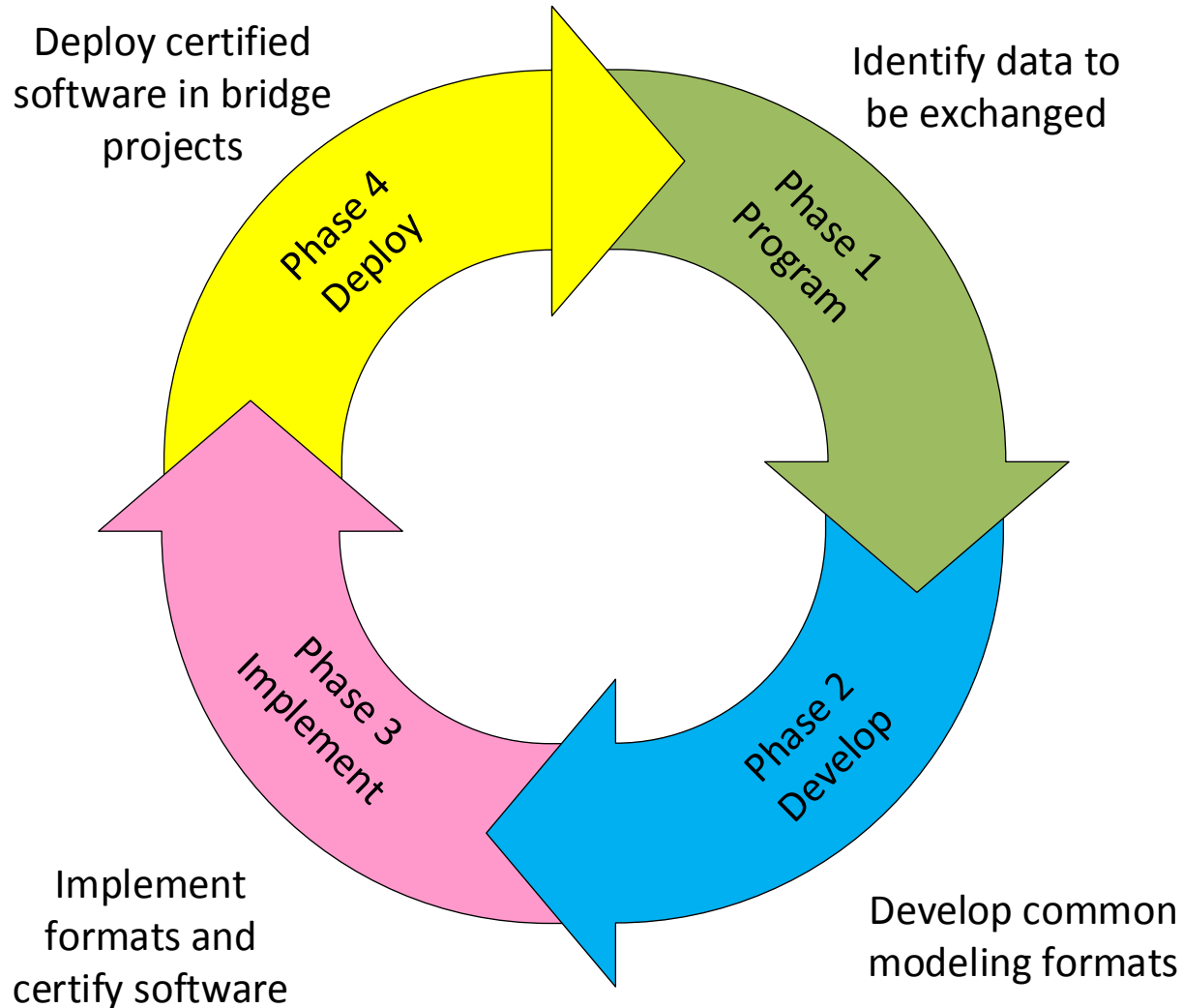
# Task 4 – Challenges to BrIM Adoption

Challenges in 5 categories

- Technical challenges
- Process-related challenges
- Mindset-related challenges
- Legal challenges
- Return-on-investment challenges

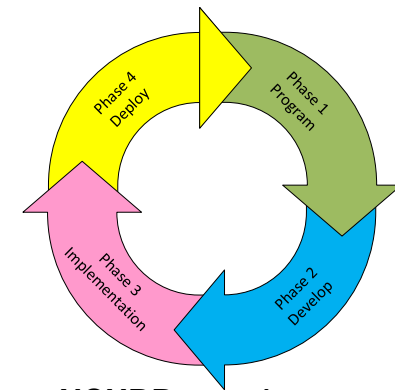


# Task 4 – 4-Phase Cyclic Strategic Plan



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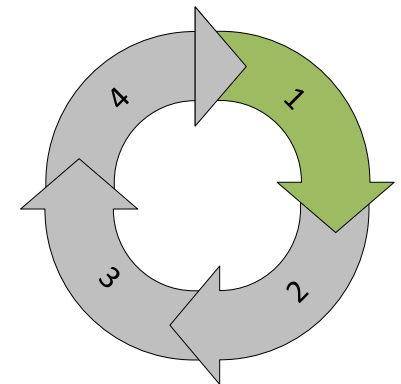
Future work	Phase 1 Program	Phase 2 Develop	Phase 3 Implement	Phase 4 Deploy
Technical tasks	√	√	√	
Process-related tasks	√		√	√
Mindset-related tasks				√
Legal tasks				√
Investment tasks				√



# Task 4 – Strategic Plan: Phase 1

## Technical Tasks (3 months to 1 year)

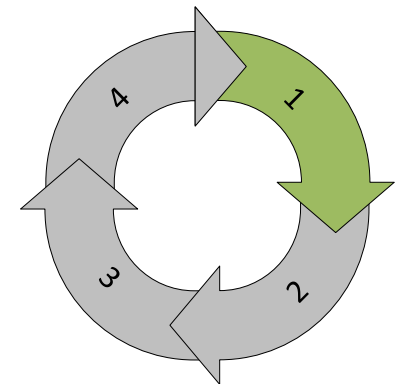
- Work groups formation
- Define data exchange requirements
  - ◆ What data need to be exchanged
  - ◆ When the data exchanges happen
  - ◆ Among whom the data exchanges occur



# Task 4 – Strategic Plan: Phase 1

## Process-related Tasks (3 months to 1 year)

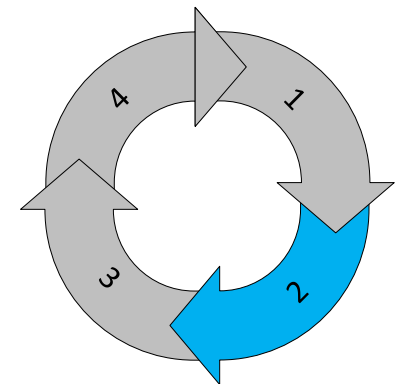
- Define vision, mission statements, and implementation objectives
- Define functional needs and business requirements
- Define BrIM use cases and level of detail



# Task 4 – Strategic Plan: Phase 2

## Technical Tasks (3 months to 3 years)

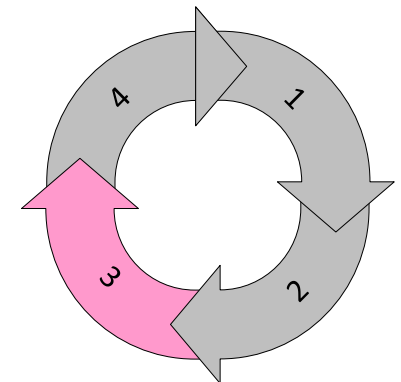
- Determine the dominant data exchange schema
- Generate common modeling format
- Test and publish the format



# Task 4 – Strategic Plan: Phase 3

## Technical Tasks (1 year to 3 years)

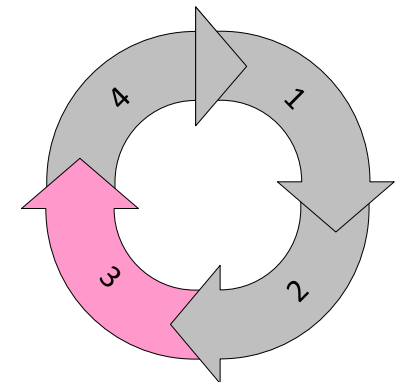
- Implement the format on bridge software
- Certify the software that implements the format
- Configure system to support the software
- Create an inter-disciplinary data environment



# Task 4 – Strategic Plan: Phase 3

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

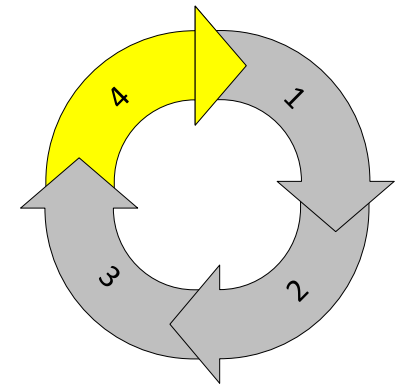
- Create guides for model version control, data exchange, etc.
- Make standards for BrIM object libraries
- Define procedures for testing data exchanges



# 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

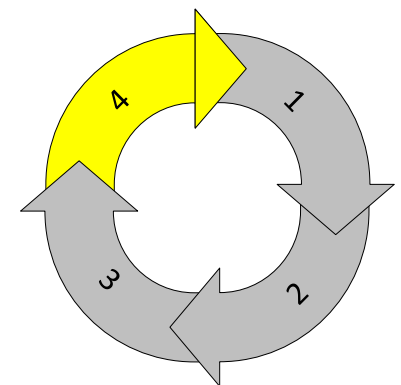




# Task 4 – Strategic Plan: Phase 4

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

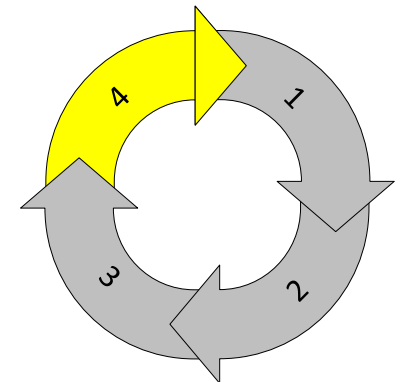
- Develop suitable pilot projects to test-drive
- Promote success stories, best practices, and lessons learned
- Provide training programs for BrIM



# Task 4 – Strategic Plan: Phase 4

## Legal Tasks (1 year to 3+ years)

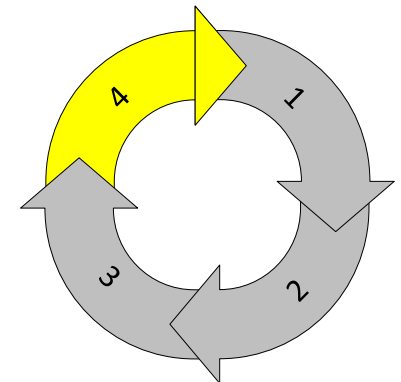
- Review and re-define contract agreement, legal clauses, and data liability
- Draft BrIM specific contractual provisions
- Conduct a risk evaluation for deploying BrIM




# 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?

Contacts:

Mark Mlynarski, 412-269-7933, [Mmlynarski@mbakerintl.com](mailto:Mmlynarski@mbakerintl.com)

Hanjin Hu, 412-269-7946, [hanjin.hu@mbakerintl.com](mailto:hanjin.hu@mbakerintl.com)