

U.S. National BIM Program: Implementation Plan

The Foundation for Digital Transformation of Capital Facilities and Infrastructure

Foreword

The mission of the National Institute of Building Sciences (NIBS) is to bring industry stakeholders together, and build consensus on challenging topics to advance the construction industry. One critical issue within the construction industry is the low level of digitalization, which prevents it from transforming lifecycle work processes to be more efficient, less expensive, more resilient, and safer to build and maintain. The U.S. National BIM Program will focus on achieving this critical digital transformation of the industry. It will be successful through collaboration between the public and private sectors, across industry sectors (e.g., buildings and infrastructure), and across the diversity of project stakeholders (owners, designers, constructors, suppliers, vendors, and other involved parties).

The U.S. construction industry has been a leader in implementing Building Information Modeling to support activities in delivering projects, and NIBS has supported this effort by developing BIM standards and guidelines at the U.S. national level. However, this effort has not accrued comparable benefits to asset owners to transform their building programs and operations. At the same time, many international initiatives focus on BIM standardization to support digital transformation throughout the entire life cycle of designing, constructing, and operating the built environment. It is important to recognize that while the U.S. construction industry has tremendous capabilities related to digital technology it has not consistently taken a leading role in setting the digital standards and practices needed to transform the delivery and operational approaches for built assets.

This planning document outlines a strategy to rapidly expand standardization efforts, including expanded roles in partnerships with organizations worldwide. The focus is on developing practice-oriented standards that can be adopted into contracts to support information management processes. There needs to be a focus on providing information to owners to enable significantly improved operations and maintenance of built assets. The project team members need to be supported with efficient approaches to plan, design, and construct built assets. This will require next-generation standards, education and training solutions, and a legal framework that supports the efficient adoption of information management standards.

Throughout the development of this plan, a valuable partnership was leveraged with the Centre for Digital Built Britain, a leader in national transformation programs adopting standards-based BIM, along with many other volunteers including the National BIM Program (NBP) Steering Committee members. Leading subject matter experts have also been leveraged in BIM adoption in infrastructure and buildings who have shaped this national strategy. NIBS is excited and grateful to the team of volunteers who devoted their time and expertise throughout the development of this strategy, and looks forward to significantly growing the efforts. Your support is needed to do so.

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Chair, U.S. NBP Steering Committee
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Executive Summary

The foundation of the U.S. economy and society relies upon having a high-quality and resilient built environment, including the infrastructure people use and buildings that support their daily activities. Information is the lifeblood that supports the delivery and operations of built assets. Unfortunately, the consistent creation and use of information throughout the built asset industry has traditionally relied upon paper or unstructured digital documentation. This is clearly starting to change based upon the increased adoption in the U.S. of Building Information Modeling computer applications to support the overall design and construction of built assets. But, the transition to full adoption is slow, and the construction industry is widely known as an industry that lacks digital maturity. In fact, McKinsey Global rated the construction industry as next to last in the level of digitalization out of 22 industries evaluated.

Action is needed by increasing efforts on the efficient, consistent digitalization of information and significantly improving the processes used to capture, create, store, use, and maintain this information. This can be achieved by adopting structured, open Building Information Management practices. While the U.S. has been one of the clear global leaders in the development and implementation of BIM for focused use cases during project delivery, e.g., aspects of design and construction, the U.S. has more recently lagged other countries in the definition and adoption of standards to ensure the efficient delivery and operations of projects leveraging structured asset information.

The industry must transition to digital delivery and operations of buildings and infrastructure. The foundation for this digital transformation lies in managing digital information throughout the life cycle of assets. Unfortunately, there is currently a significant ‘information deficit’ within the industry, with minimal structured digital information about the built environment. This information deficit is causing an increasingly significant financial burden on the industry. Some recent estimates show that poor digitalization levels cost the global construction industry as much as \$1.85 trillion in 2020 alone (FMI 2021). These losses are attributed in part to poor decision-making and ineffective stakeholder communication. It is more difficult to innovate because digitalization is a prerequisite for adopting many technologies. It is much more challenging to optimize operations of assets because data is not available to support

optimization. Ultimately, it will not allow us to achieve our vision of a 'digital twin(s)' of the built environment that allows for real-time monitoring of assets, improved performance modeling for predictive energy, social and sustainability performance, and reduced overall lifecycle costs through efficient delivery and operation.

To achieve a new level of industrial efficiency, the industry must be digitally transformed. This plan outlines a collaborative approach led by NIBS to develop a U.S. National BIM Program (the Program) to accelerate this transformation.



Program Vision

To accelerate the digital transformation of the built asset industry to achieve optimal economic, environmental, and functional performance of U.S. built environment.



Program Mission

To transform lifecycle information management practices by creating and advancing the consistent adoption of next-generation information management standards and practices to significantly improve the built environment delivery and operations processes.

The Program will be structured around six overlapping Workstreams to organize efforts to address critical industry initiative areas:

- 1) Owner Leadership
- 2) Project Team Implementation
- 3) Standards and Guidance
- 4) Stakeholder Engagement
- 5) Education and Training
- 6) Legal and Insurance.

The next step is to commence the U.S. National BIM Program by initiating the Program organizational structure within NIBS, identifying Program Partners, and securing the resources to meet the mission successfully (e.g., time, talent, and funding). During the initial phase, the focus will be on creating a consistent, coordinated message to attract core stakeholder organizations and gain support throughout the industry while developing foundational BIM standards. A targeted portfolio of high-value sponsored development projects will be pursued across six Workstreams using both volunteer, staff, and sponsored participants during this phase. These initial projects will form the foundation for continued efforts to transition the construction industry through digital transformation.

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1 Why is a U.S. National BIM Program Needed?

The U.S. Construction Industry is a significant contributor to the U.S. economy, employing over 7 million people to create or renovate nearly \$1.4 trillion in buildings, infrastructure, and other built assets each year. But the construction industry has yet to enjoy the productivity improvements of the digital age, averaging only 1% productivity growth in the past 20 years¹. The industry has been noticeably very slow to leverage digital delivery and operations. Building Information Management (BIM) provides the foundation for this transformation. Leading owners, designers, and builders throughout the United States have been global innovators in BIM adoption. Still, the lack of a consistent digital delivery framework and the supporting infrastructure for funding and implementation, have limited advancement to the next stages of BIM and digital transformation.

Historically, the U.S. has been a leader in initiating digital innovation in construction with some very significant examples of virtual design and construction. But the U.S. lags in the definition of a common, industry-wide approach to consistently create and deliver structured asset data and information to Owners of buildings, roads, bridges, and other infrastructure projects. There are clearly leaders in the industry, yet workflows and tools across the industry lack common standard workflows, organizational approaches, and data formats for open data exchanges. Other countries throughout the world, including European and Asian nations, have invested significant resources into the development of common standards, implementation resources, and training to support BIM adoption and use based upon BIM standards. There is a need and opportunity for the U.S. to leverage and build upon open information management standards to support higher levels of information development and use.

The development, adoption, and implementation of common BIM standards within the U.S. will:

- **Increase the clarity** of data and information exchanged along the project value chain by creating a common language.

¹ "Reinventing construction through a productivity revolution", McKinsey Global Institute, February 2017.

- **Enhance cooperation** between owners, designers, and builders by connecting processes.
- **Drive efficiency of delivery** by eliminating ambiguity and repetitious information generation and coordination.
- **Accelerate the effectiveness of the supply chain** by reducing friction and confusion in communicating clear requirements.
- **Empower informed decision-making** by providing valuable information when it is needed by the key decision-makers.
- **Integrate buildings and infrastructure** for seamless management of the built environment to benefit [safety](#), [security](#), [resilience](#), and [sustainability](#).
- **Enable innovation** through the existence of high-quality, structured data regarding the built environment.

This document outlines a strategy for creating a U.S. National Building Information Management Program to develop and deploy implementation resources, advanced digital standards, and the social and legal foundation to support adoption in the U.S., aligned with and learning from the lessons of global approaches.

1.1 What is Building Information Management (BIM)?

The term BIM is frequently used throughout the construction industry with various meanings. Some reference BIM as a Building Information Model, which is an intelligent digital model of a facility or asset (a BIM product). Others define it as a process, Building Information Modeling, used to create the information-rich model. A more comprehensive view of BIM encompasses the overall information management process for the planning, design, construction, and operation of assets (both buildings and infrastructure) in the construction industry. In fact, all three of these definitions were embedded into the U.S. National BIM Standard (NBIMS-US). Throughout this document, BIM will specifically be referred to as ***Building Information Management***, focused on the overall digital information management workflows and data sharing to support the entire asset lifecycle process, from project delivery (planning, designing, and constructing an asset) to the asset management during the operations of a facility or infrastructure. Specifically, Building Information Management has been defined in the U.S. National BIM Standard, Version 3 (NBIMS-US) as:

“... the organization and control of the business process by utilizing the information in the digital prototype to affect the sharing of information over the entire life cycle of an asset.”

BIM is a collaborative process that relies upon structured, digital data. It is also a process that requires detailed planning by both the owner (to define what they need) and the project team (to create, use and transfer valuable digital data to the owner). It is a process that can only be achieved at a high level by leveraging standard workflows and data structures to enable efficiency and data quality.

1.2 The Value of BIM throughout the Life Cycle of an Asset

The use of BIM in the construction industry can provide many benefits, both in the initial delivery of the constructed assets and in the management and operations of assets. There are a number of studies that demonstrate the value of BIM adoption for the initial delivery of an asset, with various estimates of the value of BIM adoption and the return on investment (ROI). There are fewer studies that demonstrate the lifecycle value of developing a digital twin approach to operating and maintaining facilities and assets, e.g., buildings, roads, bridges, and other infrastructure. Due to the existing limitations in the level of digital transformation of the industry, the full potential benefits have not yet been seen of effective building information management throughout the entire asset life cycle. Several forward-looking studies have projected the potential impacts of a broad digital transformation of the industry. With digital transformation, Boston Consulting Group (2016) estimates construction cost savings of 10 to 25% for vertical construction and even higher rates of 15 to 25% for infrastructure projects.

One additional critical challenge the construction industry must address is a rapid decline in the U.S. construction labor force. McKinsey Global Institute (2020) projects that by 2031, 41% of the construction workforce will retire, and so there is a need to shift construction methods to more industrialized approaches leveraging digital information to enable effective delivery of quality assets with a smaller workforce. McKinsey (2017) also estimates that the industry could increase overall productivity by 50 to 60% through design-to-manufacturing processes supported by digital information.

There are already initial estimates of the impact that digital transformation can produce in the construction industry from countries that have adopted a broad BIM strategy. The U.K. estimates that it has seen an overall reduction in public construction costs of 15 to 20% through the adoption of a BIM mandate on all public projects (U.K. Government Construction Strategy 2011). Other targeted case studies have shown significant benefits from open BIM adoption on projects, including reduced costs, improved quality, and reductions in overall delivery schedule.

These savings in initial project cost and delivery speed can be small compared to the potential significant value gained in the overall asset quality, which is more difficult to measure quantitatively. Ultimately, if an owner can manage and maintain their asset data throughout the entire life cycle, they can yield significant benefits during the operational phase of a project.

The information deficit needs to be addressed throughout the entire life cycle of projects by leveraging BIM to develop interactive, digital twins of built assets. A digital twin is defined as ‘a digital replica of a real-world physical entity’ (El Saddik 2018). To truly leverage digital asset information, that information should be used to create an operational digital twin that contains facility asset information along with integrated real time sensor data and predictive capabilities.

2 Achieving the Vision through the U.S. National BIM Program

The National Institute of Building Sciences (NIBS) initiated the U.S. National BIM Program (NBP or Program). The Program concept has evolved over the past several years through conversations and collaborations with leading organizations and communities, involving both the public and private sectors, spanning a diverse cross-section of asset/project types. This effort has recently accelerated through collaborations with the U.K. Department of Business, Energy and Industrial Strategy (BEIS) and the Centre for Digital Built Britain (CDBB), combined with significant increases in interest from the owner community throughout the U.S., including both building and infrastructure owners.

The **vision** of the U.S. National BIM Program is **to accelerate the digital transformation of the built asset industry** to achieve optimal economic, environmental, and functional performance of the U.S. built environment.

The **mission** of the Program is **to transform the lifecycle information management practices** by creating and advancing the consistent adoption of next-generation information management standards and practices to significantly improve the built environment delivery and operations processes.

The Program will be guided by the following **Core Values**:



Inclusive: Involve a broad range of key stakeholders



Aligned: Limit rework through coordination with key stakeholders



Open: Require open digital standards



Practice Oriented: Focus on ability to implement, now and in the future



Collaborative: Share experience and expertise



Reliable: Standards provide the foundation for commitments and contracts

To achieve this mission, the following **Program Goals** will be accomplished:

Next Generation Standards

Develop next generation process and information BIM standards to a level of implementation that can be validated for contractual compliance along with deployment guidance and resources

Support Owner Adoption

Support the development, collection, management, use and sharing of information models for asset owners

Improve Project Delivery

Enable all key stakeholders to significantly improve the project delivery process and facility performance by adopting BIM

Build Communities

Build a community that represents all key stakeholders to develop, promote, and adopt leading practices for BIM implementation in collaboration with partner organizations

Create Legal Framework

Create the legal and insurance framework(s) to support adoption including a focus toward using the model content for project commitments and contracts

Educate and Train

Create education, training, and certification programs in collaboration with partner organizations to support the evolving workforce demands

To achieve the full lifecycle value of adopting BIM, it requires the collaboration of all team members during both the delivery and operations and maintenance of a project. This requires that team members speak in a common language that is consistently organized and openly available (a common BIM framework) and that team members have education and training.

Countries within the European Union adopted a common Strategic Framework for Public Sector BIM Programs (REF EU BIM Handbook) which leveraged four core areas (see Figure 1 from Matthews (2016)), including:

- 1) Grow industry capacity
- 2) Foundation of public leadership
- 3) Communicate vision and foster communities
- 4) Build a common, collaborative framework.

This BIM framework provides insight into the critical areas for improvement to advance the role of BIM industry-wide within a country. These areas provide a strong foundation for the creation

of a comprehensive program focused on all aspects of adoption, from people, processes, and technology.



Figure 1: Strategic Framework for Public Sector BIM Programmes (Matthews 2016)

A core foundation of the Program development is to comprehensively address the impediments to the next level of BIM adoption within the industry. The Program includes initiatives aimed at the core elements of **People – Process – Information – Technology**:

- 1) **People**: Evolving the roles and responsibilities of team members and providing the education and training to meet the changing demands;
- 2) **Process**: Establishing standardized workflows that enable information management efficiency with a focus on the use of open data standards;
- 3) **Information**: Defining open data standards to support ease of use across processes and delivery to owners; and
- 4) **Technology**: Creating common information exchanges that enable technology providers to develop new and innovative technologies.

3 Developing the U.S. National BIM Program

In 2021, NIBS convened a series of meetings and workshops, along with stakeholder interviews to define the initial focus of the Program. A Steering Committee, composed of 14 prominent leaders representing major client and service provider organizations, focused on digital transformation of the industry, was created. This Committee met frequently to guide and review the development of this Program plan. In addition to the Steering Committee, a core team of volunteers and staff led the authoring of content for this planning document. This included the core authoring team along with members of six Workstreams.

To advance the U.S. adoption of BIM, the Program established focused Workstreams to identify and implement initiatives related to the Program. The six Workstreams include: Owner Leadership, Project Delivery Implementation, Standards and Guidelines, Stakeholder Engagement, Education and Training, and Legal and Insurance.

These Workstreams align with, and can be mapped to, the strategic framework of BIM programs as shown in Figure 2, with the foundation of leadership originating through the public/private NBP initiative.

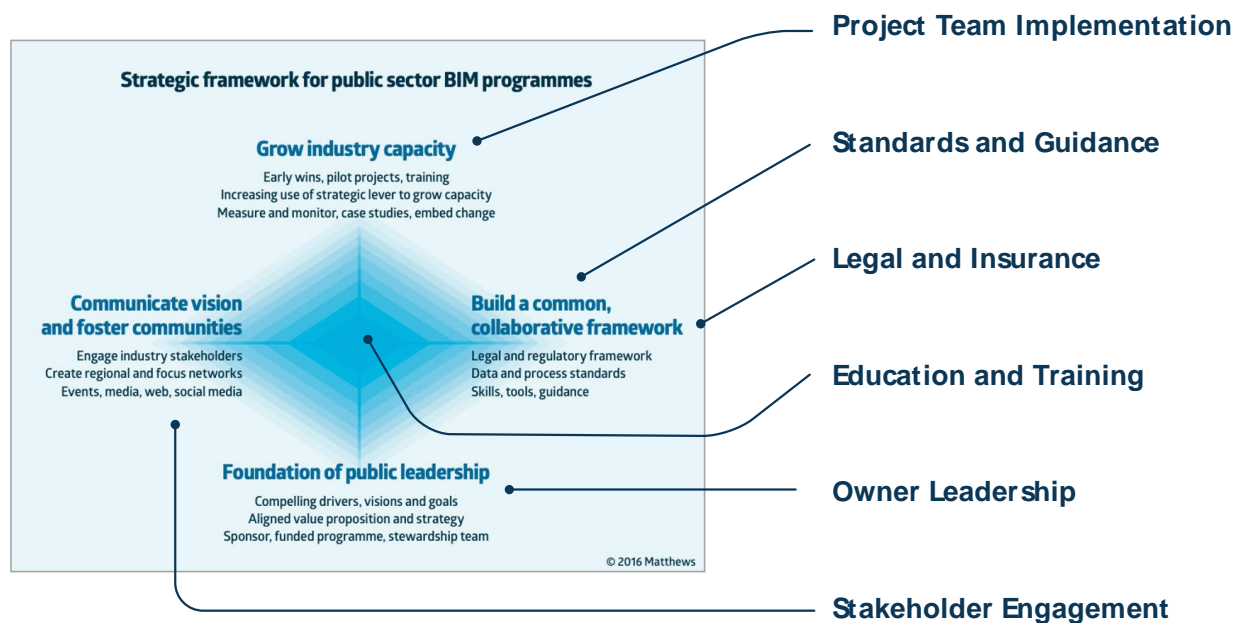


Figure 2: U.S. NBP Workstreams mapped to Strategic Framework for public sector BIM Programmes

4 Workstream Plans

A U.S. National BIM Program Roadmap has been developed through the identification of needs and focused initiatives within targeted areas organized by the Workstream area. For each Workstream, an initial panel of experts was convened to identify the most important initiatives for the U.S. market within the focus area. These Workstream teams explored the definition of the scope needed for their area; defined the fundamental problems focused on what is holding them back; and then identified the highest value initiatives to advance the digital transformation of the industry. This chapter identifies the Workstream scope, problem statements, and initiatives for each of the six Workstreams, along with the general sequence and timeframe for addressing each initiative. The Workstream plans will evolve through an annual planning cycle as progress is made toward the Program goals.

4.1 Owner Leadership Workstream

4.1.1 Scope

The Owner Leadership Workstream will focus on defining the specific needs and engagement activities to support the expansion of owner adoption and implementation of BIM, with a focus on setting consistent BIM requirements and obtaining quality information from project delivery to support the operations and maintenance of assets. This Workstream will include approaches for public and private sectors and address building and infrastructure owners. It also includes fostering innovation through supporting investments in research and development (R&D) and supporting project teams that agree to work together to explore innovations in project delivery.

4.1.2 Problem Statement

Owners need to overcome a series of challenges to adopt BIM throughout the project life cycle successfully. First, they need to implement a collaborative process that engages all project stakeholders with the appropriate organizational structure and training. They also need to develop standard work procedures that enable efficient and secure sharing of data across new and existing software applications. Finally, they must gain the support needed throughout the organization to enact the required changes.

4.1.3 Proposed Solutions

The Owner Leadership Workstream will focus on initiatives to support owner adoption using the People, Process, Technology, and Data framework to overcome these challenges. Core Workstream initiatives are shown in Figure 3.

People

To embed BIM throughout an owner organization, there is a need to gain executive leadership support for digital transformation within the organization at every level. This requires leadership to commit to a vision for digital transformation and persist in pushing for that vision. Maintaining commitment to transformation benefits from clear case study evidence of BIM impacts on projects, along with approaches to benchmark the status of BIM adoption within the organization. The Program will provide common benchmarking

and a common business case documentation structure, focusing on the early stages of the project, with the intention to document the impact of expanding BIM use within an organization. A clear roadmap to support expanded BIM uses will be developed to support the change management required for BIM adoption. Also, a clear definition of roles and responsibilities of BIM professionals within each organization, along with a career pathway, need to be defined.

Process

Owners need clear and consistent procedures for implementing BIM. Owners must participate in the standards and guidelines initiative to identify opportunities to standardize approaches across all participants. In addition to project delivery workflows, owners will also investigate approaches for leveraging the model as the contract document, along with addressing the challenges for gaining permits and approvals from modeled content.

Technology

Many owners have legacy information systems that will require significant effort to connect with and/or transition to a more interoperable, data-centric approach. The Owner Workstream will need to focus on approaches for an owner to progress through various stages of maturity related to information systems in order to achieve their overall goals, allowing for value to be derived across the process and not just at some end state.

Data

A core part of gaining success from BIM is to have clearly defined information delivery requirements. These should be associated with common BIM Uses (as defined by Penn State University and in the U.S. National BIM Standard) recognizing the common elements of BIM within all organizations. BIM Uses offer a way for Owners to plan and implement BIM incrementally, gaining value along the way while envisioning where they want to be in the future. The Owner Workstream will work with the Standards and Guidelines Workstream to identify and define the best approaches for developing, cataloging, and issuing common data requirements for various asset/facility types.

Year 1

- Case Study Spotlights for Industry Innovators
- Develop Owner Community for Knowledge Sharing
- Develop Information Management Maturity Model
- Case Studies of Operational Implementation

Years 2 and 3

- Compelling Business Case
- Develop Mentoring Program
- Guidance Document for Owner Adoption
- Analyze Maturity of Owner Organizations

Years 4 and 5

- Model-based Approaches to Permitting
- Roles and Responsibilities Definition
- Continued Analysis of Maturity Progression

Beyond Year 5

- Continued Owner Community

Legend

- Major Milestone
- Additional Significant Activities

Figure 3: Owner Leadership Initiatives by Plan Phase

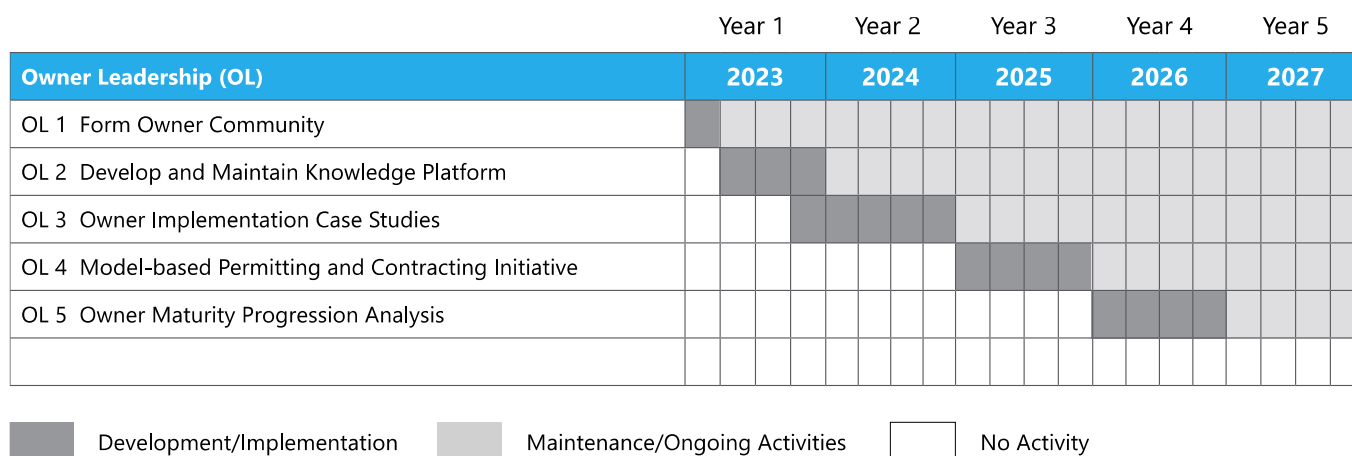


Figure 4: Timeline for Owner Leadership Workstream Initiatives

4.2 Project Team Implementation Workstream

4.2.1 Scope

Identify the needs and resources to support designers, constructors, suppliers, consultants, and technology vendors who will implement BIM to deliver projects and support owner adoption.

4.2.2 Problem Statement

Inconsistency in how BIM is applied to project delivery limits the benefits to all stakeholders. From a project implementation standpoint, the ability to work with each other and build trust requires a level of confidence that everyone is working towards the same goal to provide value to the owner.

4.2.3 Proposed Solutions

To address these challenges, advancing the implementation of BIM project execution through 5 key initiatives is prioritized in the order proposed below:

Document Value Potential with Clear Metrics:

Establish a project lifecycle path for BIM-enabled project delivery including value potential and metrics.

Moving away from a traditional project break-down of cost by phase, which is based on number of sheets issued, is still a challenge. *Stakeholders in project implementation view value potential very differently.* When value comes in the way of efficiency for the project team as a whole, it may increase the effort required of one or more stakeholders in the process. Additionally, the case for value potential that revolves solely around compensation does not always resonate equally. Showing which aspects of implementing BIM practices and for whom they have value potential would be helpful to early-stage project planning conversations. This is when decisions can be made to invest in one approach over another and to ensure that stakeholders are compensated accordingly. This can also enable the project team to find new ways of collaborating using digital processes across the project life cycle and beyond to the project owner.

Correlate Objectives with BIM Uses and Methods:

Package/define objectives and means to achieve specific BIM Uses.

To promote consistency and clarity and develop digital ways of working, provide a clear correlation between the BIM Uses, outcomes, and guidelines for standard implementation. This exercise would closely relate to the BIM Uses effort underway as a part of the NBIMS-US V4 work group.

Demonstrate Process:

Demonstrate a BIM-enabled process to highlight value/applicability throughout the project life cycle.

Identify a means to facilitate or promote sharing of demonstration projects and reference implementations to help illustrate successful and consistent outcomes from complete and consistent implementation. Where have stakeholders realized the benefit? Was it aligned with what they expected from early planning? What open standards were used and what data was exchanged and was it received and usable by the owner?

Demonstrating the process is aimed at building trust in future workflows and processes. Yet, the trust needed is really reinforced by the ability to validate what has been shared between the stakeholders and ultimately with the owner.

Identify Global BIM Enabled Delivery Practices:

Establish a repository of best global BIM deliverable practices.

Recognizing that BIM has taken hold in many places and in many ways throughout the globe, there are potential lessons learned by sharing those stories. The U.S. marketplace has been leveraging BIM in varying degrees over the past two decades. A proper survey would be helpful to understand how things might be done better and learn from what has been done both at home and abroad. What may be working well, not-so-well, and what it might mean in translation to the U.S. marketplace.

Recognize Successes:

Recognize projects that successfully leverage open standards and innovative/best practices.

To encourage and support open standards, it is important to motivate practitioners as well as technology providers to improve the way in which open standards are supported and projects successfully delivered. This effort can leverage recognition programs of other organizations and can be good press for both the participants and the National BIM Program/BIM Council.

Figure 5: Project Team Implementation Initiatives by Plan Phase

Year 1

- Document Value Potential with Clear Metrics
- Plan BIM Uses & Methods Study

Years 2 and 3

- Correlate Objectives with BIM Uses & Methods
- Demonstration of BIM Process in Case Studies
- Project Team Survey to Define Outcomes

Years 4 and 5

- Global BIM Enabled Delivery Practices Report
- Award Program for BIM Projects

Beyond Year 5

- Award Program for BIM Successes

Legend

- Major Milestone
- Additional Significant Activities

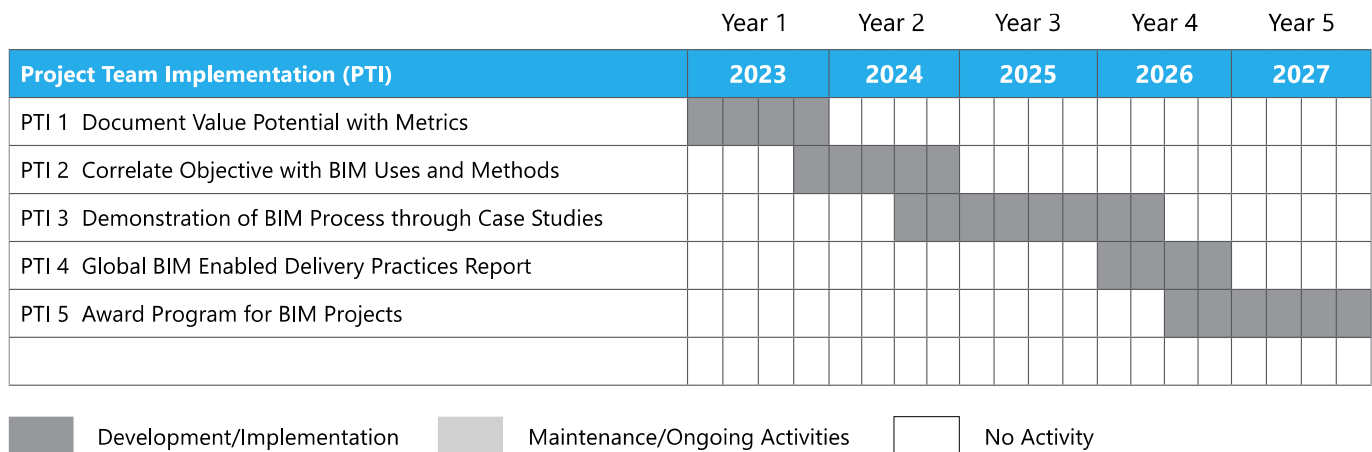


Figure 6: Timeline for Project Team Implementation Workstream Initiatives

4.3 Standards and Guidance Workstream

4.3.1 Scope

Adapt and extend national and international BIM standards and guidance resources to support the consistent, open, and verifiable integration of BIM throughout the project life cycle.

4.3.2 Problem Statement

Many owners of buildings and infrastructure do not have clear, detailed BIM requirements that are consistently applied to the delivery and operations process. For owners who have high quality requirements, they are not aligned with any industry standard approach to support efficient delivery. Having common standards would enable the industry to leverage the data to support greater levels of integration between design and manufacturing, along with increasing the opportunities to implement innovative design and construction solutions.

4.3.3 Proposed Solutions

A national BIM roadmap for standards and guidelines will be developed with the clear identification of core initiatives, organizations to develop and review content, and the formatting and publishing of the content. This roadmap will be developed through a collective effort during a U.S. BIM Standards Summit with participation from the [NBIMS-U.S. Planning Committee](#) and other BIM standards organizations, with anticipated participation from [AASHTO](#), [buildingSMART USA](#), [BIM Forum](#), [Digital Twin Consortium](#), [Open Geospatial Consortium \(OGC\)](#), [AIA/AGC](#), [Construction Specifications Institute \(CSI\)](#), large owners and delivery partners, and leading academics.

This Workstream will coordinate across the existing and future standards and guidelines including the following solutions:

- a) Continue to develop and expand [NBIMS-US](#) as needed.
- b) Work with ISO on reviewing and participating in [ISO/TC 59/SC13](#), the Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM).
- c) Integrate [ISO 19650](#) into the U.S.
- d) Coordinate with other organizations to ensure comprehensive standards for BIM adoption, and others as identified in the proposed workplan and Figure 7.

A description of envisioned activities in these categories is included in the following sections.

Develop and Expand NBIMS-US

At this time, the National BIM Standard Project Committee within NIBS is completing version 4 of the U.S. National BIM Standard (NBIMS-US), which is expected to be released in 2022. This new version of NBIMS-US will be structured into various modules focused on different content areas. In particular, NBIMS-US Version 4 will be composed of:

- 1) **Introduction with a Common Framework:** The introduction and framework will define the overall structure of NBIMS-US and describe how the standard, guidelines, and template content can be used for BIM adoption.

- 2) **Core BIM Requirements:** A set of common requirements that can be used by Owners to more easily specify the required BIM implementation on a project.
- 3) **BIM Execution Planning (BEP):** A standard defining the elements and information that is either required or optional for the development of a BEP on a project at various phases. The BEP will define
- 4) **BIM Use Definitions:** A standard approach to document a BIM use on a project along with definitions for the most commonly adopted BIM uses.
- 5) **Construction to Operations Building Information Exchange (COBie):** A standard information exchange for building operational data along with guidelines for implementation.

There are a significant number of opportunities to expand NBIMS-US with additional valuable content. This includes: the detailed definition of requirements for common BIM uses across the various domains of infrastructure and buildings; the expansion of requirements for information requirements to the owner and other project data sharing; and the definition of new standards to support operational digital twins.

ISO TC 59/SC13 Participation

ISO TC 59/SC 13 is focused on the organization and digitization of information about buildings and civil engineering works, including Building Information Modeling (BIM). This ISO subcommittee is focused on both international information exchanges and BIM process standards. It is critical that the U.S. has a diverse group of BIM experts actively participating on this subcommittee. ASHRAE is the U.S. Standards Body that is the representative for ISO TC 59/SC 13. This workstream will have formal representation on the ASHRAE Technology Advisory Group and will ensure that the U.S. is actively engaged in the international standards discussions.

Integrate ISO 19650 into the United States Market

ISO 19650 (Organization and Digitization of Information about Buildings and Civil Engineering Works, Including Building Information Modeling (BIM) - Information

Management Using Building Information Modeling) is an international process standard that defines the common project and owner organization tasks that need to occur to successfully implement BIM. It is not specific to a particular project type or owner category. The process provided within the ISO 19650 Standard provides a high-level framework to support U.S. BIM adoption, and is leveraged by U.S. National BIM Standard activities. The U.S. needs to formally adopt ISO 19650 to provide consistency with the international community and value to facility owners.

Coordinate with Other Organizations Involved in BIM Standards Development and Adoption

It is critical for the Program to help coordinate between the many U.S. organizations that are actively engaged in developing and adopting BIM standards and guidelines. Several core organizations that will be prioritized include:

- A. ASHRAE who is the ISO TC 59/SC 13 representative for the U.S. along with a close partner with NIBS on the development of the SPC 224 Standard focused on BIM implementation by owners.
- B. BuildingSMART USA who is the U.S. chapter of BuildingSMART International (BSI). BSI is focused on the development of information exchange standards using open exchanges. They are the originator of the Industry Foundation Classes (IFC) data schema and standard information exchange definitions.
- C. Contract Document template authors such as the American Institute of Architects and the ConsensusDocs organizations to ensure consistent specification of the standards and requirements.
- D. Other standards organizations who are developing BIM and related digital standard solutions such as AASHTO, BIM Forum, product manufacturers, CSI, and OGC to name a few.

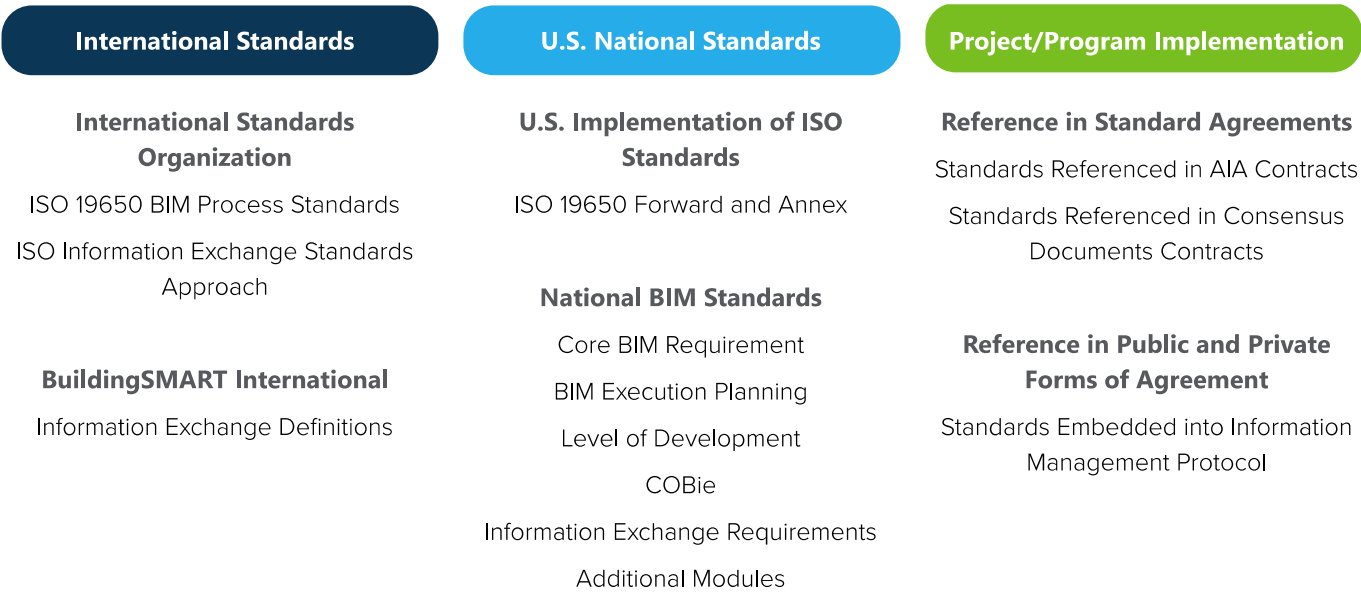


Figure 7: U.S. BIM Standards, Guidelines, and Contracts Framework

The primary projects that are envisioned for this Workstream are shown in Figure 8. These projects and their priorities will be refined through the Standards Summit meeting.

Year 1

- Complete/Publish NBIMS-US Ver 4
- U.S. BIM Standards Roadmapping Summit
- Update U.S. TAG to ISO TC 59/SC 13 in Collaboration with ASHRAE

Years 2 and 3

- Develop/Publish NBIMS-US Ver 5
- Draft/Publish US ISO 19650 Part 1&2 in Collaboration with ASHRAE
- Support Omniclass® Enhancements in collaboration with CSI

Years 4 and 5

- Develop/Publish NBIMS-US Ver 6
- Develop/Publish NBIMS-US Guidelines

Beyond Year 5

- Continued development of NBIMS-US

Legend

- Major Milestone
- Additional Significant Activities

Figure 8: Primary Initiatives for Standards and Guidance Workstream

A description of these initiatives by Program Phase is included in Figure 9.

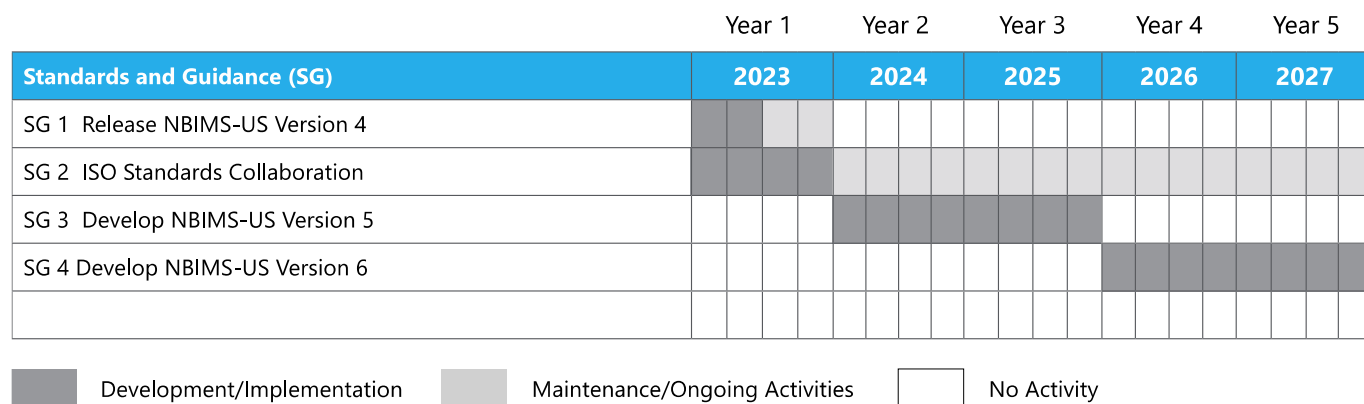


Figure 9: Timeline for Standards and Guidance Workstream

4.4 Stakeholder Engagement Workstream

4.4.1 Scope

The Stakeholder Engagement Workstream seeks to identify and support the coordination of activities among all industry stakeholders, including a clear definition of the business case (answering ‘why is NBIMS essential and how to get involved?’) and an overall roadmap.

4.4.2 Problem Statement

- Industry communities are dispersed across various organizations. There is a need to bring them together in a common setting.
- Current resources are committed to many other projects or efforts. Needed activities tend to be delayed, missing opportunities for timely action and communication. Some agreed upon tasks are delayed to the point that they are no longer relevant.
- Industry is saturated with conferences, content, and communications. For researchers and product/service providers, having multiple uncoordinated and non-prioritized topics and problem statements from different parties across the industry leads to fragmentation and ineffective investment of limited resources.
- U.S. government agencies do not currently have a way to jointly invest in common BIM standardization and adoption needs, leading agencies to spend taxpayer dollars in a fragmented and duplicative manner with limited success. Mature solutions for one agency do not effectively benefit all other agencies in an open source coordinated evolution fashion.

4.4.3 Proposed Solutions

The Workstream identified four main initiatives to address Stakeholder Engagement. The Workstream recommends these four initiatives be fully funded with dedicated resources to perform the work. This will ensure professionals can provision the appropriate amount of time to develop and execute the initiatives. The Workstream emphasizes it is important to avoid utilizing volunteers, personnel already committed to other work, or personnel that would have to learn new skills or technology to complete the initiatives, as this will likely cause delays or reduce

quality due to competing responsibilities. Timeliness and professionalism are extremely important with regard to communications and stakeholder engagement.

Although the initiatives are framed as projects below, the ongoing efforts of the Workstream would immediately start developing the initial, high-value communities prior to starting or completing each initiative. Additionally, while not necessarily within the framework of a project, developing Memorandums of Understanding (MOUs) with Partner Organizations and ongoing participation in their events are keys to successfully engaging various stakeholders. The four main initiatives are a Market Research Study, a Stakeholder Value Matrix, a Communication Strategy, and a Communication Channel.

Market Research Study

Before undertaking any substantial change, a front-end analysis is recommended. It is important to better understand the current position before setting out on a new destination. The Workstream suggests the initial project should be a market research study effort to better determine the current state of BIM adoption in the U.S. A professional research firm with expertise in the construction industry should be contracted to identify what other organizations have done, coordinate their efforts, and perform the resulting survey. Aims of the research should include investigating:

1. Where has true progress been made in terms of BIM standards and adoption?
2. What has worked well to enable the success?
3. What efforts have not worked so well and why?

For each stakeholder group there is a need to better understand:

1. How do they currently implement BIM in their organization?
2. What are their challenges implementing BIM?
3. What do they value most from their specific perspective?
4. How can value be added?
5. What are their preferred communication modes and frequencies?

The research project is estimated to last 9 to 12 months. The project should include the development of specific research instruments that will yield decision-making information to

the steering committee. The research firm should engage industry subject matter experts in the development of the interview instrument. The project should also include some level of formative feedback during the first 5 years as well as summative feedback after the first 5 years to gauge the efficacy of the NBP initiatives.

Stakeholder Value Matrix

The Workstream members believe effective communication must be relevant to specific stakeholder groups to promote engagement. The Workstream began exploring the idea of identifying all the stakeholders in the industry. Many stakeholders could be lumped together in major groups but still have specific needs and interests; therefore, they also needed to be split into minor (sub)groups. A preliminary stakeholder matrix that captures major groups and minor groups was developed. For example, designers constitute a major group and architects, engineers, and space planning constitute a minor group. The matrix also documents the general value of BIM as well as the specific value the NBP could bring to both major and minor groups.

The Workstream suggests an ongoing project will be to continually develop the stakeholder matrix where distinct stakeholder groups can be identified with specific benefits. This can serve as a means of summarizing survey data from the front-end analysis. It also serves as a guide for a communications specialist to ensure that the messaging aligns with the recipients' perceived needs and values. This initiative should not require a funded role beyond the project manager.

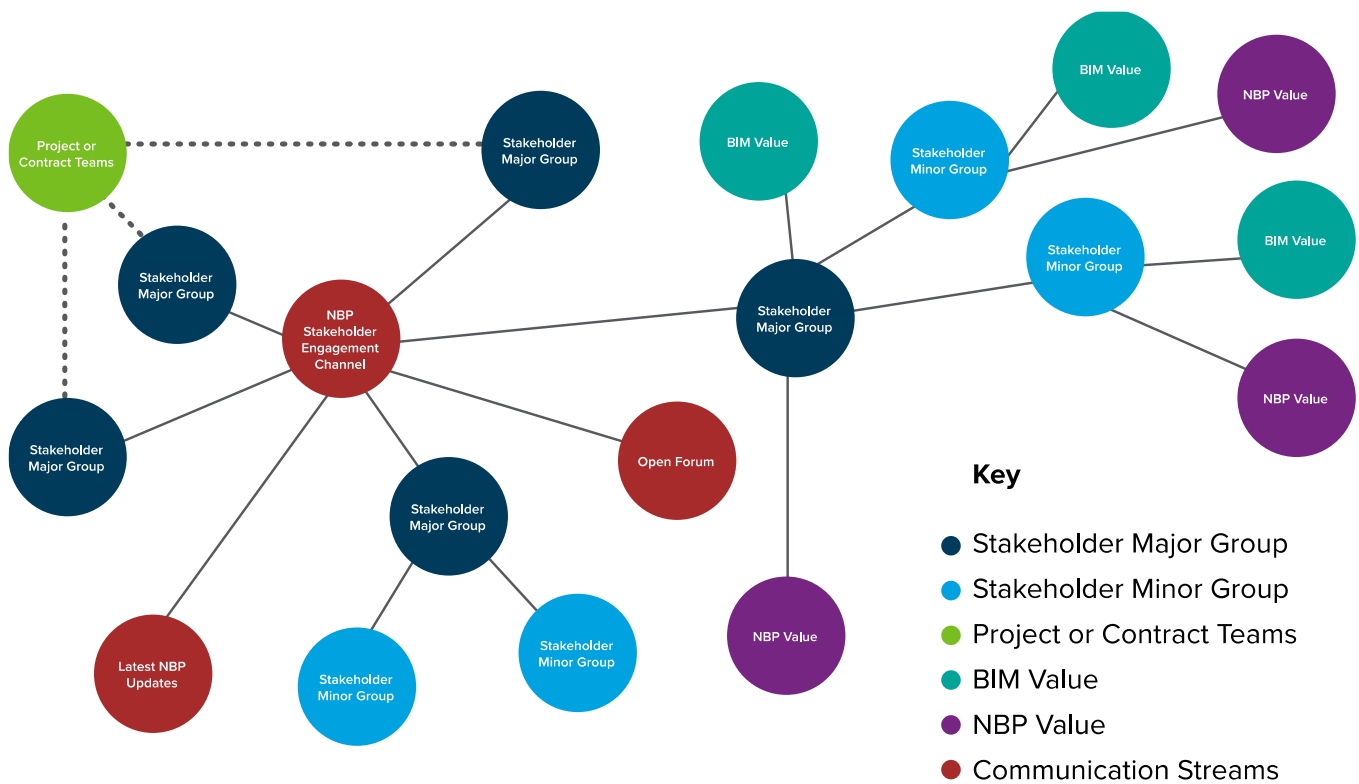
Communication Strategy

The Workstream recommends developing a comprehensive communication strategy. Components of this strategy would include harnessing relationships with existing industry member organizations. Over 30 organizations have been identified, many of which communicate frequently with their constituency through websites, digital newsletters, other media channels, hard copy mailings, continuing education materials, and conferences. It is suggested that the NBP initially engage in existing conferences and channels. They should also develop and utilize official social media channels. The

Workstream recommends designating sufficient funding for the services of a professional communication specialist to develop and execute the communication strategy.

Communication Channel

The Workstream recommends developing an official communication channel for the NBP. The channel would be the official source of information for all things NBP. The channel should be free from identifiable affiliation with an overarching parent organization to promote participation (see Figure 10). The Workstream recommends allocating funds for the planning, design, development, and maintenance of the channel.



Characteristics

- One-stop communication channel
- Teams Site with channels or website with contextual information based on stakeholder groups
- General value information area
- Stakeholder specific value information area
- Easily map participants to their stakeholder interests
- Official updates about NBP
- Feedback mechanism
- 2-way communication amongst channel members
- Easily sharable
- Messages easily redistributed
- A forum to explore (sandbox) ideas

Figure 10: Stakeholder Group Communications Channel Concept Map

Year 1

- Market Research Study - Adoption/ Standards
- Develop MOUs with Partner Organizations
- Plan for Communication Strategy
- Participation in Partner Events

Years 2 and 3

- Develop Communication Strategy
- Design and Implement Communication Channel
- Formative Market Survey for Program Impact
- Participation in Partner Events

Years 4 and 5

- Summative Market Survey for Program Impact
- Expand Communication Channel
- Participation in Partner Events

Beyond Year 5

- Confirmative Market Survey for Program Impact
- Maintain Communication Channel
- Create Conference Events for NBP
- Participation in Partner Events

Legend

- Major Milestone
- Additional Significant Activities

Figure 11: Primary Initiatives for Stakeholder Workstream

A description of these initiatives by Program Phase is included in Figure 12.

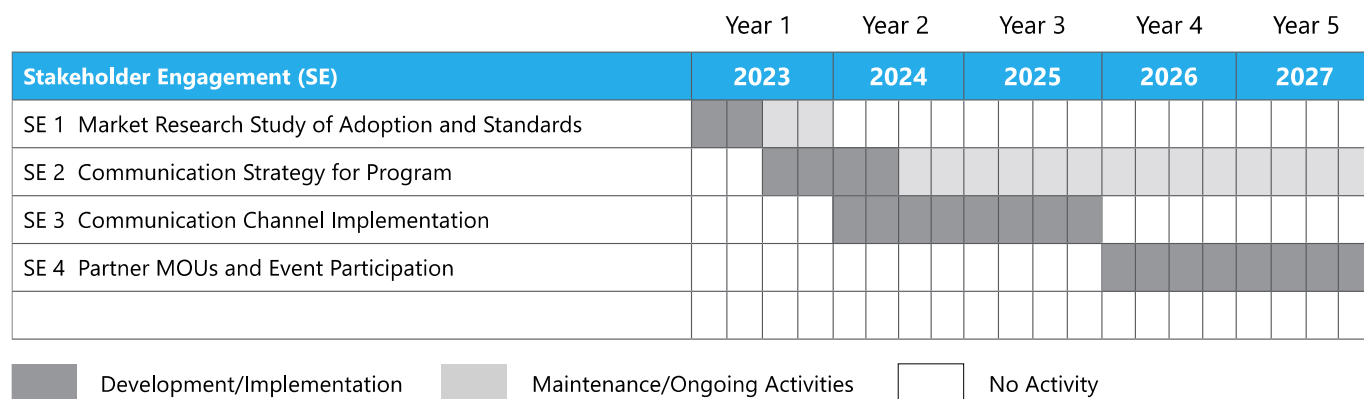


Figure 12: Primary Initiatives for Stakeholder Workstream

4.5 Education and Training Workstream

4.5.1 Scope

Define the needs for education and training about BIM standards, and provide recommendations for the identification, coordination, management, and development of educational programs and potential certifications, as appropriate.

4.5.2 Problem Statement

Industry needs a cohesive movement toward BIM education and training for owners, project teams, and users. NIBS is in a unique position to provide a comprehensive plan which incorporates the lifecycle view. There is currently no organization providing a comprehensive standard approach to training which would include academic and professional education with training, as well as multi-discipline/multi-phase guidance. Such an approach would provide guidance for organizations and instructors to develop the scope and expectations around BIM education and training.

4.5.3 Proposed Solutions

The solution includes the development of a comprehensive curriculum standard/guide to be utilized as a training document (similar to those provided by LEED, PMI, OSHA, and others) along with supporting focused training initiatives. This Workstream will focus on positioning the Program to provide a clear definition of curriculum standards. After defining the curriculum standards, a clearinghouse for training and education that meets these standards will be created. Therefore, an initial education survey of curriculum content needs will be developed in the initial phase, which will guide future curriculum development activities. Then, the curriculum guide(s) will be developed for identified areas. Ideally, the guide will lead to a form of credentialing, but this will be explored following the development of the more detailed strategy. The Workstream will also place an emphasis on raising awareness for education and training.

The primary projects envisioned for this Workstream are outlined in Figure 13. These projects and their priorities will be refined following the BIM Educational Needs Survey which will be performed in the first year of the program.

Year 1

- BIM Educational Needs Survey
- Plan Curriculum Guide Strategy

Years 2 and 3

- Develop Curriculum Guide(s)
- Develop Educational Offerings (initial)
- Research Credentialing

Years 4 and 5

- Build Additional Educational Offerings
- Pursue Credentialing (dependent on research)
- Raise Awareness of Educational Offerings

Beyond Year 5

- Build Additional Education Offerings as needed
- Raise Awareness of Education

Legend

- Major Milestone
- Additional Significant Activities

Figure 13: Primary Initiatives for Education and Training Workstream

A description of these initiatives by Program Phase is included in Figure 14.

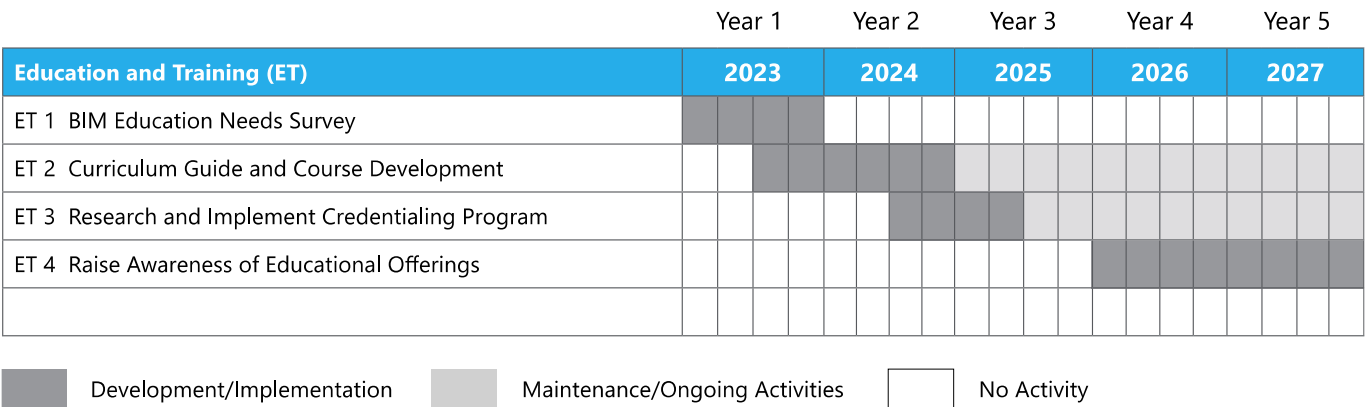


Figure 14: Primary Initiatives for Education and Training Workstream

4.6 Legal and Insurance Workstream

4.6.1 Scope

Identify the approaches to adapting legal and insurance strategies to support model-based delivery of projects. As these are developed, the efforts of this Workstream could be expanded to also address regulatory matters associated with requiring and contracting for BIM.

4.6.2 Problem Statement

There is a need for a clear, consistent approach for Owners and project team members to incorporate BIM into contracts for delivery products and services. It is also important to clearly communicate the impact of BIM on overall project risk(s) so that the financial impacts of BIM on lowering risk can be factored into the risk management costs and impacts.

4.6.3 Proposed Solutions

A core focus of this Workstream will be to define an approach to integrate BIM throughout the contracting and risk management practices within a project. An initial stage will include the development of a BIM Legal and Insurance Summit to convene leading experts who will define the core issues, current status, and future tasks needed to support the broad adoption of modeled content and data into the contractual language used by public and private owners across industry sectors. The following initiatives are envisioned as core challenges to be addressed within this Workstream, and they will be refined depending upon the results of the Summit and any further planning based upon partner feedback.

NBIMS-US Contract Resources

A core initiative of this Workstream will be to develop guidance regarding the incorporation of the Program Standards (ISO 19650, NBIMS-US, and others) content into core contracts for projects. This will include the development of guidance documents for public agencies, private owners, and project participants (e.g., construction managers, general contractors, and design firms).

An ultimate goal for this initiative will be to provide guidance for various levels of reliance on modeled content, including adopting the model as the basis for the contractual design documentation provided to the constructor. This will require collaboration with various organizations who are addressing issues related to permitting, professional certification of designs, and model data security.

Coordination with Key Contract Development Partners

There are two template contract document providers for many projects within the U.S., including the [American Institute of Architects \(AIA\) Contract Documents](#) and the [ConsensusDocs](#) template contracts. The NBP will aim to work with these organizations to support the incorporation of core NBIMS-US standards into the contract language when appropriate.

Risk Impact Study

A third initiative will focus on the identification and quantification of the change in risk profiles for projects delivered with varying levels of BIM adoption and incorporation into contracts. This initiative will identify case study projects across sectors and evaluate the detailed risks, benefits, and challenges associated with adoption of BIM into the core contracting requirements. Results will highlight the impact of BIM on overall project risk along with additional impediments that remain on projects.

Year 1

- BIM Legal and Insurance Summit
- Resources for NBIMS-US in Contracts

Years 2 and 3

- Resources for NBIMS-US in Contracts
- Research for BIM as Contract Document
- Explore Regulatory Revisions

Years 4 and 5

- Implement BIM as Contract Document
- BIM Risk Impact Study

Beyond Year 5

- Survey Impact of BIM Standards for Contracts

Legend

- Major Milestone
- Additional Significant Activities

Figure 15: Primary Initiatives for Legal and Insurance Workstream

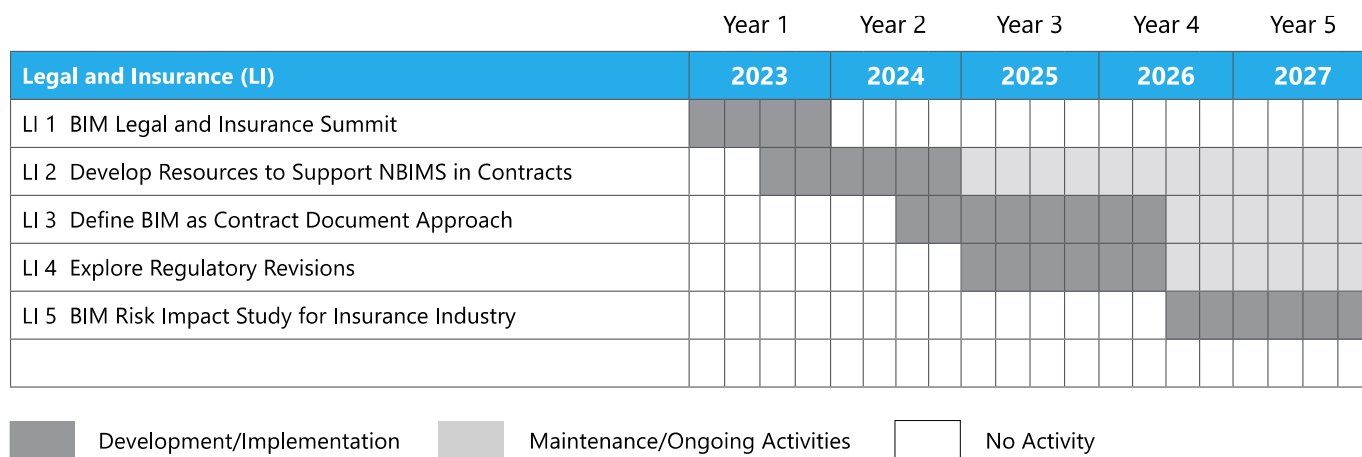


Figure 16: Primary Initiatives for Legal and Insurance Workstream

5 U.S. National BIM Program Roadmap

The Workstream activities will be closely integrated to achieve the Program vision. The initiatives have been arranged into a comprehensive roadmap. The roadmap will also aim to align with collaborative initiatives throughout the industry that are resourcing and advancing important aspects of BIM. Of particular note are initiatives from the Federal Highway Administration through their [BIM Roadmap \(FHWA 2021\)](#), along with active pooled fund initiatives supported by AASHTO, including the Bridge pooled fund and the upcoming Road pooled fund.

National BIM Program Roadmap

YEAR 1

Finalize Program 5-year plan with Steering Committee

Form Owner Community and expand Partner Relationships

NBIMS-US Ver 4 Release

Develop Educational Strategy

2023

YEAR 2

Documented Value added Business Case

Initial Educational Offerings

Contract Implementation Resources

2024

YEAR 3

NBIMS-US Ver 5 Release

Broad Communication Strategy

Documented Case Study Implementation Across Sectors

2025

YEAR 4

Expanded educational offerings

BIM as Contract Document Resources

Model-based Permitting Year 5 Approaches

2026

YEAR 5

NBIMS-US Ver 6 Release

BIM Credentialing

Global BIM Implementation Report

2027

TO 2030

Continued NBIMS-US Development

Expand Educational Offerings

Continue Communities

Expand Adoption Initiatives

Maintain Communication Channels

2030

Figure 17: NBP Roadmap with Core Initiatives across Workstreams

5.1 Year 1: Building the Foundation

The structure for the Program will be put into place during the first year. This will include the identification of a Program Director and securing the financial support needed to successfully fund the initiatives. This critical year will set the course for building the program out in subsequent years. It will help determine resources that can be funded, which will in turn impact the pace of the program.

From a project perspective, the initial year will include a series of exploratory initiatives to identify and further define the critical issues to address in future projects and efforts. This will include projects such as the Market Research Study, the BIM Educational Needs Survey, a BIM Legal and Insurance Summit, and the U.S. BIM Standards Roadmapping Summit. An additional focus on the formation of core industry communities will occur with the formation of the owner and project delivery team communities.

YEAR 1

- | | |
|---|---|
| ● Define Annual Project Cycle | ● Identify Staff for Program |
| ● Case Study Spotlights for Industry Innovators | ● Market Research Study - Adoption/ Standards |
| ● Develop Owner Community | ● Develop MOUs with Partner Organizations |
| ● Case Studies of Operational Implementation | ● Plan for Communication Strategy |
| ● Document Value Potential with Clear Metrics | ● Participation in Partner Events |
| ● Plan BIM Uses & Methods Study | ● BIM Educational Needs Survey |
| ● Complete/Publish NBIMS-US Ver 4 | ● Plan Curriculum Guide Strategy |
| ● U.S. BIM Standards Roadmapping Summit | ● BIM Legal and Insurance Summit |
| ● Update U.S. TAG to ISO TC 59/SC 13 in Collaboration with ASHRAE | ● Resources for NBIMS-US in Contracts |

LEGEND

- | | |
|-------------------------------|--------------------------|
| ● Program Management | ● Stakeholder Engagement |
| ● Owner Leadership | ● Education and Training |
| ● Project Team Implementation | ● Legal and Insurance |
| ● Standards and Guidance | ○ Major Milestones |

Figure 18: Initiatives across Workstreams in Year 1

5.2 Years 2 and 3: Early Wins

Years 2 and 3 will focus on the initial development projects along with defining the future needs. Activities identified in Years 2 and 3 are included in Figure 19.

YEARS 2 AND 3

- | | |
|--|--|
| ● Implement Annual Planning | ● Develop Communication Strategy |
| ● Compelling Business Case | ● Design and Implement Communication Channel |
| ● Develop Mentoring Program | ● Formative Market Survey for Program Impact |
| ● Guidance Document for Owner Adoption | ● Participation in Partner Events |
| ● Correlate Objectives with BIM Uses & Methods | ● Build Additional Educational Offerings |
| ● Demonstration of BIM Process in Case Studies | ● Pursue Credentialing (dependent on research) |
| ● Develop/Publish NBIMS-US Ver 5 | ● Raise Awareness of Educational Offerings |
| ● Draft/Publish US ISO 19650 Part 1&2 in Collaboration with ASHRAE | ● Resources for NBIMS-US in Contracts |
| ● Support OmniClass® Enhancements in Collaboration with CSI | ● Research for BIM as Contract Document |

LEGEND

- | | |
|-------------------------------|--------------------------|
| ● Program Management | ● Stakeholder Engagement |
| ● Owner Leadership | ● Education and Training |
| ● Project Team Implementation | ● Legal and Insurance |
| ● Standards and Guidance | ○ Major Milestones |

Figure 19: Initiatives across Workstreams in Years 2 and 3

5.3 Years 4 and 5: Advanced Transformation

Years 4 and 5 will focus on gaining additional adoption of the products developed in the initial years of the Program, along with continuing to focus on additional high-value products. Activities identified in Years 4 and 5 are included in Figure 20.

YEARS 4 AND 5

- | | |
|--|--|
| ● Implement Annual Planning | ● Expand Communication Channel |
| ● Model-based Approaches to Permitting | ● Participation in Partner Events |
| ● Roles and Responsibilities Definition | ● Build Additional Educational Offerings |
| ● Global BIM Enabled Delivery Practices Report | ● Pursue Credentialing (dependent on research) |
| ● Award Program for BIM Projects | ● Raise Awareness of Educational Offerings |
| ● Develop/Publish NBIMS-US Ver 6 | ● Implement BIM as Contract Document |
| ● Develop/Publish NBIMS-US Guidelines | ● BIM Risk Impact Study |
| ● Summative Market Survey for Program Impact | |

LEGEND

- | | |
|-------------------------------|--------------------------|
| ● Program Management | ● Stakeholder Engagement |
| ● Owner Leadership | ● Education and Training |
| ● Project Team Implementation | ● Legal and Insurance |
| ● Standards and Guidance | ○ Major Milestones |

Figure 20: Initiatives across Workstreams in Years 4 and 5

5.4 Beyond Year 5: Embedded Change

While this plan focuses on the initial five years, the NBP will continue beyond five years. Refinement of the core activities needed beyond year five through additional strategic planning initiatives during the earlier program years will be addressed. Figure 21 shows potential Initiatives after Year 5.

BEYOND YEAR 5

- | | |
|---|--|
| ● Implement Annual Planning | ● Participation in Partner Events |
| ● Continued Owner Community | ● Continued development of NBIMS-US |
| ● Award Program for BIM Successes | ● Build Additional Education Offerings as needed |
| ● Confirmative Market Survey for Program Impact | ● Raise Awareness of Education |
| ● Maintain Communication Channel | ● Survey Impact of BIM Standards for Contracts |
| ● Create Conference Events for NBP | |

LEGEND

- | | |
|-------------------------------|--------------------------|
| ● Program Management | ● Stakeholder Engagement |
| ● Owner Leadership | ● Education and Training |
| ● Project Team Implementation | ● Legal and Insurance |
| ● Standards and Guidance | ○ Major Milestones |

Figure 21: Potential Initiatives across Workstreams beyond Year 5

5.5 Program Schedule

The comprehensive initial schedule for the Program activities, combining all Workstreams and program management, is shown in Table 1.

Table 1: NBP Plan and Schedule

U.S. National BIM Program: Plan and Schedule	Year 1	Year 2	Year 3	Year 4	Year 5
Program Development and Management	2023	2024	2025	2026	2027
1.1a Secure full-time staffing from NIBS					
1.1b Continued Program Management					
1.2a Initial Fundraising from Program Sponsors					
1.2b Continued Fundraising from Program Sponsors					
1.3 Convene Program Sponsors Summit					
1.4 Develop Workstream Project Funding Model					
1.5 Workstream Projects Selected					
1.6a Develop Communication and Knowledge Platform					
1.6b Maintain Communication and Knowledge Platform					
Workstream Initiatives					
Owner Leadership	2023	2024	2025	2026	2027
OL 1 Form Owner Community					
OL 2 Develop and Maintain Knowledge Platform					
OL 3 Owner Implementation Case Studies					
OL 4 Model-based Permitting and Contracting Initiative					
OL 5 Owner Maturity Progression Analysis					
Project Team Implementation	2023	2024	2025	2026	2027
PTI 1 Document Value Potential with Metrics					
PTI 2 Correlate Objective with BIM Uses and Methods					
PTI 3 Demonstration of BIM Process through Case Studies					
PTI 4 Global BIM Enabled Delivery Practices Report					
PTI 5 Award Program for BIM Projects					
Standards and Guidance	2023	2024	2025	2026	2027
SG 1 Release NBIMS-US Version 4					
SG 2 ISO Standards Collaboration					
SG 3 Develop NBIMS-US Version 5					
SG 4 Develop NBIMS-US Version 6					
Stakeholder Engagement	2023	2024	2025	2026	2027
SE 1 Market Research Study of Adoption and Standards					
SE 2 Communication Strategy for Program					
SE 3 Communication Channel Implementation					
SE 4 Partner MOUs and Event Participation					
Education and Training	2023	2024	2025	2026	2027
ET 1 BIM Education Needs Survey					
ET 2 Curriculum Guide and Course Development					
ET 3 Research and Implement Credentialing Program					
ET 4 Raise Awareness of Educational Offerings					
Legal and Insurance	2023	2024	2025	2026	2027
LI 1 BIM Legal and Insurance Summit					
LI 2 Develop Resources to Support NBIMS in Contracts					
LI 3 Define BIM as Contract Document Approach					
LI 4 Explore Regulatory Revisions					
LI 5 BIM Risk Impact Study for Insurance Industry					

6 U.S. NBP Governance Structure

The U.S. National BIM Program will be developed through a broad coalition with representation from federal, state, and local agencies; private facility owners; designers, constructors, and operators; software and information management vendors; and other suppliers and stakeholders to the facility lifecycle process. The program will be administratively housed within the National Institute of Building Sciences (NIBS). Established by the U.S. Congress in 1974, NIBS is a non-profit, non-governmental organization with a mission to serve the public interest by advancing building science and technology to improve the built environment. For many years, NIBS has been a leader in the development of information management standards for the built environment, including the *National BIM Standard - United States® (NBIMS-US™)* and the *United States National CAD Standard®*, along with guidelines for BIM adoption including the *National BIM Guide for Owners (NBGO)*. NIBS is currently working with ASHRAE to develop the NBGO into an ASHRAE standard on BIM for Owners and participating in the ISO process through ASHRAE's role as the U.S. Technical Advisory Group (TAG) member of ISO Technical Committee 15 Buildings and civil engineering works, Subcommittee (SC) 13 Organization and digitization of information.

The National BIM Program will include a series of project partner organizations. A collaborative panel of Program Partner representatives along with the U.S. NBP Steering Committee will guide the future Program activities and be housed within the NIBS Building Information Management (BIM) Council. NIBS will reach out to organizations across the industry to gain support through strategic Memorandums of Understanding (MOUs) with stakeholder groups across industry disciplines and facility sectors, e.g., buildings, infrastructure, and industrial sectors. The Program will also seek partnerships with public and private sector participants who will sponsor the program at various levels. The Program Partners working with the Steering Committee (SC) will prioritize the projects that are recommended from each Workstream during a given year.

The SC will play a leading role in this process, along with continued review of the ongoing initiatives. The SC members will help identify and provide the definition of needs and opportunities they wish to capitalize on, including the development of future BIM standards and

guidelines, a legal framework to support standards adoption, educational initiatives, stakeholder engagements, and research and data collection. NIBS BIM Council's Project Teams (existing or newly formed) will implement the research, development, educational, and outreach activities through the volunteer Workstreams and workgroups along with defined project sponsorships.

The U.S. National BIM Program Steering Committee will maintain broad and diverse membership and include representatives from all industry stakeholder groups. A core principle of the program will be to develop content through open and transparent approaches to secure high levels of participation and adoption. The envisioned organizational structure is shown in Figure 22.

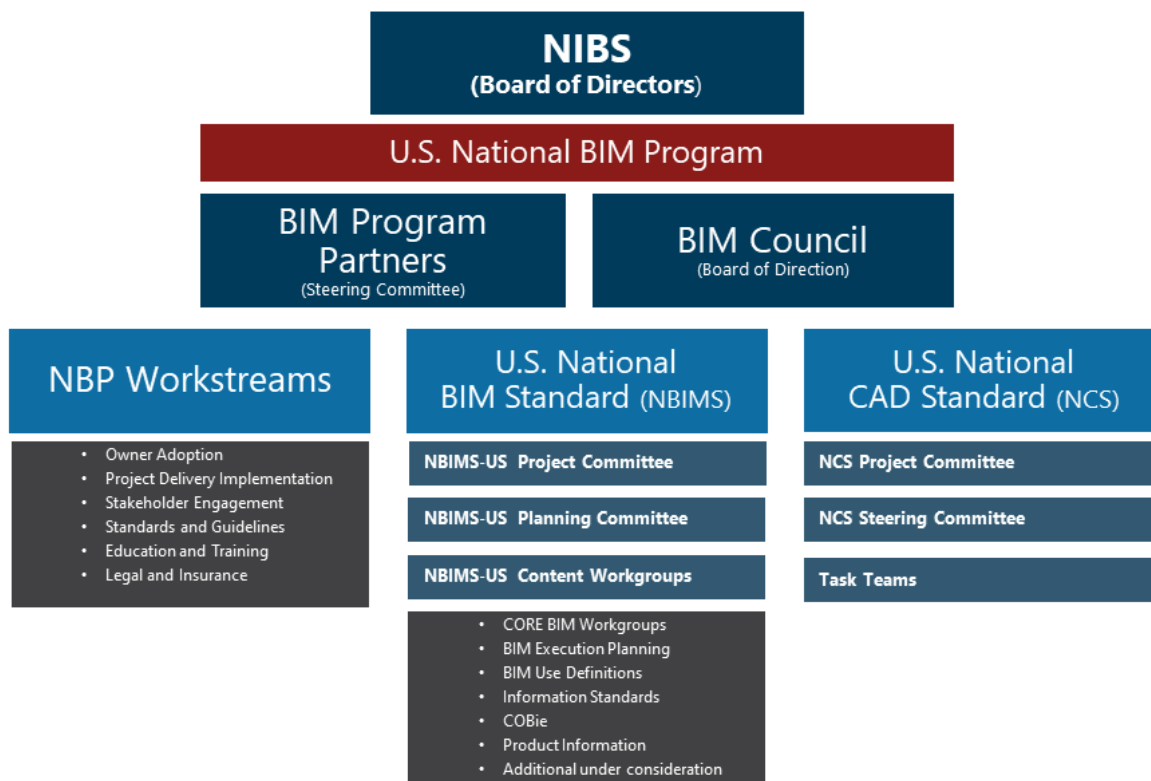


Figure 22: Organizational Structure of the National BIM Program within NIBS

7 Program Budget and Sponsorship Model

7.1 Program Budget

The Program will require funding to support both NIBS personnel and external parties to perform defined initiatives. An initial budget for the Program is shown in Table 2. This budget includes general support for the overall program management staff and resources, along with an annual budget developed by estimating the best current assessment of the quantity of work to be completed. The budget for the initial year is lower than subsequent years to account for initial time to hire employees and time needed to initiate the project process for the Workstreams. Funding levels will likely vary dependent upon the year and workload balance between the Workstreams and as the Workstream plans are refined through the planned workshops and research in year one. The projects and initiatives identified in the initial Workstream plans will be further refined over time and additional details regarding a budget will be developed and shared with Program Partners each year.

Table 2: U.S. National BIM Program Summary Budget

U.S. NATIONAL BIM PROGRAM SUMMARY BUDGET							
	Year 1	Year 2	Year 3	Year 4	Year 5		
Description	2022	2023	2024	2025	2026	Program Totals	Percent of Total
Program Management	\$256	\$226	\$ 206	\$199	\$ 205	\$1,095	12%
1 – Owner Leadership	\$50	\$103	\$106	\$109	\$113	\$481	5%
2 – Project Team Implementation	\$59	\$103	\$106	\$109	\$113	\$481	5%
3 – Standards and Guidance	\$400	\$917	\$813	\$744	\$767	\$3,641	40%
4 - Stakeholder Engagement	\$237	\$182	\$188	\$193	\$199	\$989	11%
5 – Education and Training	\$116	\$119	\$352	\$542	\$558	\$1, 687	19%
6 – Legal and Insurance	\$50	\$206	\$212	\$109	\$113	\$9,064	8%
	\$1,152	\$1,856	\$1,983	\$2,005	\$2,068	\$9,064	
Note: All Values are \$1,000							

7.2 Recommendations for Obtaining Program Support

The Program will seek support through multiple funding approaches:

1) *Public Sector Funding with Private Sector Contributions*

The ideal core funding approach would be through a large contribution from the public sector to initiate and sustain the funding for the Program. This funding could be augmented with additional organizational funding or in-kind contributions. This approach aligns with the funding structure advanced by many other countries that have supported a coordinated, national-level BIM adoption strategy through public support, including the United Kingdom, many European Nations, Singapore, and others. While ideal, it is acknowledged that this

approach is more challenging in the U.S. without a central entity with responsibility for buildings in the U.S. Government. Potentially, funding through the 2021 Infrastructure Bill directed to the Federal Highway Administration may be a candidate combined with support from individual agencies.

2) *Organizational Consortium Funding*

A complementary approach is to focus on an organizational sponsorship/partnership model along with potential funding of grants and projects. The specific model with funding levels and benefits will be refined by NIBS staff working with the Stakeholder Engagement Workstream. The initial focus will be on larger organizations who will gain significant benefit through the activities of the Program, along with their involvement in the Program. The Program will seek an annual funding level of approximately \$2 million per year starting in Year 2, with an initial target of \$1 million for Year 1 support. Partners could provide direct funding and/or in-kind resources. The funds raised through the partner program will support the operational expenses of the Program activities within the BIM Council, including the identification of a new U.S. NBP Program Director along with staff to support the effort at NIBS. Additional funds will support projects to develop standards, educational content, and other activities needed to meet the goals of the Program.

The Program partner model will recognize organizational contributors who make a significant financial contribution to the Program. Partners will also have the opportunity to contribute to the prioritization of projects through a Program Partners committee.

In addition to the financial support from sponsors and partners, broad participation of volunteers will be sought to contribute to program activities while gaining valuable adoption partners throughout the industry.

7.3 Industry Organization Partnerships

A core part of the success of the Program will be the expansion of collaborative relationships and initiatives with industry organizations. NIBS will reach out to key organizations and aim to develop mutually beneficial MOUs outlining collaborative initiatives. NIBS has collaborative MOUs in place with the U.K. Department of Business, Energy and Industrial Strategy (BEIS), the

Center for Digital Built Britain, ASHRAE and BIM Forum related to BIM standards development. NIBS will seek to develop additional MOUs with the following organizations, at a minimum: buildingSMART USA, buildingSMART Canada, the American Institute of Architects, Associated General Contractors, American Association of State Highway Transportation Officials, Construction Industry Institute / CURT, Construction Specifications Institute, Design-Build Institute of America, the Digital Twin Consortium, and the Open Geospatial Consortium. Although not specifically identified here, it will also be important to work closely with key building product manufacturing organizations. These relationships will start to be developed in the second year of the program. This list of collaborators will continue to be expanded in the future, and any organizations interested in joining this Program are welcome.

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Definitions and Terms

Asset: An item, thing, or entity that has potential or actual value to an organization. An asset may be fixed, mobile, or movable. It may be an individual item of a plant, a system of connected equipment, a space within a structure, a piece of land, an entire piece of infrastructure, or a whole building or portfolio of assets. (Source: BS ISO 55000:2014) (Additions from ISO 19650 – Note 1)

Building Information Management (BIM): The organization and control of the business process by utilizing the information in the digital prototype to affect the sharing of information over the entire life cycle of an asset. The benefits include centralized and visual communication, early exploration of options, sustainability, efficient design, integration of disciplines, site control, as-built documentation, etc.—effectively developing an asset lifecycle process and model from conception to retirement. (Source: NBIMS-US Version 3, 2015)

Building Information Model: The digital representation of physical and functional characteristics of a facility. It serves as a shared knowledge resource for information about a facility, forming a reliable basis for decisions during its life cycle from inception onwards. (Source: NBIMS-US Version 3, 2015)

Building Information Modeling: A business process for generating and leveraging building data to design, construct, and operate a building during its life cycle. BIM allows all stakeholders to have access to the same information at the same time through interoperability between technology platforms. (Source: NBIMS-US Version 3, 2015)

ISO 19650: An international consensus standard that documents a standard approach for information management using Building Information Modeling. The formal title of the standard is *Organization and digitization of information about buildings and civil engineering works, including Building Information Modeling (BIM) — Information management using Building Information Modeling*. There are currently four published parts to ISO 19650 and one additional part under development within the International Standards Organization.

U.S. National BIM Standards (NBIMS-US): A series of standards, guidelines, and template resources defining standard practices to adopt Building Information Modeling on a project and within an organization. The initial version of NBIMS-US was published by the National Institute of Building Sciences in 2007, and Version 3 was published in 2015. NBIMS-US Version 4 is currently under development.

Implementation Plan Change Log

July 2022, V1.0 - Initial Release Version

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Appendix A: Acknowledgements

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