

National BIM Standard - United States[®] Version 3

1 Scope

The buildings of tomorrow require robust, proven standard practices and technologies to make them cost effective, valuable, efficient, and beautiful. The practices of tomorrow need these same standards to increase productivity, mitigate risk, increase reward, and improve the stature and appreciation for their unique knowledge and leadership in the building industry. Building industry professionals in the U.S. have an opportunity to emerge from the current nexus of advanced technologies, changing processes, environmental concerns, and unique business opportunities as leaders in a positive, consensus effort to meet those challenges and provide success for all involved.

The National BIM Standard - United States[®] (NBIMS-US[™]) is a consensus document, where many ideas are brought together, presented to a variety of people representing different parts of the industry, discussed, debated, and ultimately subjected to the democratic process to determine which ideas rise to the stature of inclusion.

The primary focus of the NBIMS-US[™] is to provide standards to facilitate the efficient life-cycle management of the built environment supported by digital technology. This is accomplished through prescribing effective, repeatable elements and mechanisms in the creation, exchange, and management of building information modeling (BIM) data. These elements and mechanisms include reference standards of technology, classification systems, and conformance specifications; information exchange standards describing processes and exchange requirements for specific tasks during different parts of the building life-cycle; and practice standards that outline processes and workflows for data modeling, management, communication, project execution, and delivery, and even contract specifications.

1.1 The importance of NBIMS-US[™] to the industry

How does the National BIM Standard-United States[®] enable positive change in the building industry? Some of the aspects include:

1. Reducing the total cost of ownership of the built environment and its impact on the natural environment via timely, accurate, reusable information for the management of a project through its lifecycle;
2. Enabling collaboration and information sharing among all shareholders via established products, methods, and information formats;
3. Prescribing information development and sharing via consensus documents that promote a consistent, common path forward when multiple divergent paths were once available;
4. Creating a standard expectation of BIM processes and deliverables, thus creating predictability and consistency in costs and outcomes;
5. Sharing information with software vendors, as well as other product and service providers, to build solutions that support the consensus agreements of practitioners.

1.1.1 Why is the NBIMS-US[™] important to me?

With all the expertise needed to design, procure, build, and operate a building, there are many opportunities for professionals to see unique gains and positive change in their roles. Understanding these many opportunities, whether an owner, a contractor, building product manufacturer, or a design professional, gives each stakeholder the appreciation of the gains made from implementing BIM with consensus standards. Positive aspects of such implementation include:

1. Participating in efficient project delivery processes to focus on design excellence, meeting project schedules, and meeting, even exceeding, client service expectations;
2. Optimizing staff resources and expertise, performing more projects, providing a more predictable revenue stream, and overall profitability thus, increasing reward and satisfaction for effort involved;
3. Standardizing expectations of project delivery services through standard contract language;
4. Mitigating risk by creating consistency and predictability across multiple projects, project types, and clients;
5. Deploying efficient construction delivery methods through prototyping, simulations, and sharing of data with labor and material suppliers, including prefabrication methods;
6. Providing project element data via common methods and formats to streamline the interaction with product manufacturers from the design process through procurement, installation, and operational maintenance;
7. Reducing overall time, eliminating delays in the process, because important data is directly shared rather than recreated by each stakeholder;
8. Eliminating misinformation caused by multiple participants managing their related information within different systems and using different terminologies;
9. Increasing the overall value of the project by providing a high-quality result, optimizing building performance and reducing operation costs over the entire life-cycle of the building.

1.1.2 How does the NBIMS-US™ relate to the United States National CAD Standard® (NCS)?

The move from CAD to BIM is rooted in the economic and functional advantages of maturing from paper-based, redundant, and proprietary paradigms to an information-based, interoperable modeling paradigm, which, in turn, supports the functions, users, and products necessary to the lifecycle of a facility. Simply stated, the NCS addresses paper-centric drafting as a means of producing design and construction drawings.

While it is anticipated that workflows in the delivery and management of building projects will continue to evolve with changes in technology, traditional construction documents remain a primary means by which project delivery information is conveyed. Printed drawings, CAD files exported from BIMs, and/or digital documents representing sheets within a construction document set still need to follow a consensus standard to ensure the project's design, construction, or recorded electronic data is properly conveyed and understood. The NBIMS-US™ does not define standards for these types of electronic data, because the NCS already has an established consensus standard for these deliverable types. As such, there is an ongoing interconnected relationship between the NBIMS-US™ and the NCS. Both standards are products of the buildingSMART alliance® with participating members of the industry community. The standards work together to help ensure electronic project information is conveyed in a clear and usable format. While some portions of the NCS are superseded by BIM methodologies and technologies or are simply not applicable for BIM use, much of the NCS can be implemented within BIM processes and tools ensuring consistency for communicating intent. In general, items within the NCS which are based on manual drafting efforts, and that can alternatively be expressed by leveraging the intelligence of a BIM should be avoided.

1.2 Moving forward, together

Everyone is encouraged to access the content of the National BIM Standard-United States® to review its content and apply it, in whole or in part, to future projects and during the evolution of their businesses. As more owners become aware of the benefits and demand the use of BIM, all other industry professionals will have to educate themselves and take advantage of official consensus resources to provide valuable information to implement BIM in effective and efficient ways.

There is increasing pressure for adoption of BIM standards and guidelines at many different levels of jurisdiction. But not all BIM standards are created equal, nor are they all the best prescription for the growth of the large, diverse building industry. Some international markets have already shown how robust, open, consensus industry standards can benefit the owners and public, as well as the stakeholders involved in the process of design, procurement, construction, and operation. In the U.S., the industry is at a nexus from which it can emerge in such a rapidly evolving industry serving the public and society at large through implementation of BIM workflows and technologies, backed by proven, reliable consensus standards and embracing the opportunity to work together.

The National BIM Standard-United States® will continue to evolve, constantly requiring the active participation and input of industry professionals engaged in implementing BIM and standards in projects and practices. Everyone should be able to see that they have the skills, knowledge, and ability to participate in that process having an enormous impact on the industry into the future.

The National BIM Standard-United States® Version 3 (NBIMS-US™ V3) is designed for two specific audiences:

- Software developers and vendors;
- Practice documents for implementers who design, engineer, construct, own, and operate the built environment.

1.2.1 Software developers and vendors

Interoperability of data and information is an absolute requirement for designing and managing the life-cycle of the built environment. Software developers and vendors must develop and support programs to achieve the seamless exchange of data and information between users. The design and coding of software standards will allow developers to efficiently accomplish this task. NBIMS-US™ V3 has delineated the appropriate standards to cover all aspects of software development.

Two sections within the standard provide the developer with the necessary information:

- Reference standards: This set of standards provides a data dictionary, data model, web-based exchange, and structures and identifiers for building data and information.
- Exchange information standards: This section sets standards for data management, assurance, and validation, as well as exchange concepts; defines the design of exchanges for specific types of data related to building analysis; and includes Construction Operations Building information exchange (COBie).

The reference standards were developed by allied standards organizations. Also included are NBIMS-US™ generated reference standards. The exchange standards were written and balloted by the NBIMS-US™ project committee.

1.2.2 Practice documents for implementers

This section of NBIMS-US™ V3 focuses on BIM implementation within the building industry. This section describes the necessary professional knowledge, practice and judgment for all industry disciplines and professionals as well as critical management systems and tools for the building life-cycle. Thus far in the NBIMS-US™ development process, the Practice Document section has been the least developed and documented. As BIM becomes more developed as a tool and implemented within the industry, practice procedures and standards will be developed, documented and standardized. As these practices become documented, NBIMS-US™ will become the depository for such practices.

In order to structure best practices, the buildingSMART® International (BSI) has designed a system for organizing building knowledge, skills and systems into four major process domains (Tetralogy): Design, Procure, Assemble and Operate. BSI has designed the following icon to show the interrelated attributes of the four domains:



Figure 1.2.2-1 – Tetralogy process domains

In order to enrich the meaning of the tetralogy, BSI has expanded the Tetralogy into 64 discreet topics reflecting and documenting the building process. The practice document section in this version of NBIMS-US™ accommodates a very few of the 64 topics found within the expanded Tetralogy:

Design	Procure	Assemble	Operate
Requirements	Suppliers	Quality	Commission
Program	Qualifications	Testing	Startup
Schedule	Availability	Validation	Testing
Quality	Stability	Inspection	Balance
Cost	Capacity	Acceptance	Training
Site	Material	Safety	Occupy
Zoning	Submittal	Requirements	Leasing
Physical	Selection	Logistics	Building Management
Utilities	Purchase	Training	Security
Environmental	Certification	Inspection	Tenant Services
Form	Contracting	Schedule	Modify
Architecture	RFQ	Fabrication	Assessment
Structure	RFP	Deliveries	Refurbish
Enclosure	Selection	Resources	Renovate
Systems	Agreement	Installation	Demolish
Estimate	Price	Cost	Maintain
Quantity	Quantity	Productivity	Prevention
System Price	Unit Price	Solicit	Scheduled
Comparison	Labor	Pricing	Warranty
Escalation	Equipment	Selection	Contracted

Figure 1.2.2-2 – Tetralogy topics

The development of additional best practice documentation for each Tetralogy topic is the challenge and goal for future versions of NBIMS-US™.