

National BIM Standard - United States™ Version 2

3 TERMS AND DEFINITIONS

Chapter 3.1 Introduction to Terms and Definitions

The terms and definitions provides the National Building Information Modeling Standard-United States (NBIMS-US) Version 2 core vocabulary extracted and defined by almost all authors in various BIM subject matter areas.

BIM is an evolving process and will continue to mature. The core vocabulary is not exhaustive, and associative terms may require the reader to explore related topics and their definitions outside of NBIMS-US. Common industry terms may vary slightly in definition. Specialized terms intended for machine interpretation should not vary to encourage and facilitate data definition standards.

NBIMS-US terms and definitions are a “living document” that will continue to evolve as BIM becomes more ubiquitous in the Architecture, Engineering, Construction, Owners and Operators (AECOO) domain. Suggestions for the inclusion of future terms are strongly encouraged.

Term	Acronym	Definition
Accuracy		How close to the truth the information is: is the accuracy of the information known and does it meet requirements? It is important to determine both the level of detail and the level of precision expected at various points in the project process. Clearly the “build it first digitally” approach requires a very complete and very precise model for all systems included before the project enters physical construction. However, this is not the level of accuracy required in conceptual design. Some organizations, such as the U.S. Coast Guard, have defined levels of model detail required at project milestones based on the UniFormat levels.

Administrative metadata		Metadata used to manage the information and includes such fields as: intellectual property status, file format, file size, creating system, archiving date, archiving expiration date, and archiving refresh interval.
Associated General Contractors of America	AGC	Associated General Contractors is a trade organization.
AGCxml	AGCxml	A suite of XML schemas for exchanging construction project information between software applications used by facility owners and AEC firms.
Application program interface	API	API defines the proper way for a developer to request services from that program.
Association		Used to tie information and processes with data objects. An arrowhead on the association indicates a direction of flow, when appropriate.
Avoidance costs		Costs incurred to prevent or minimize the impact of technical interoperability problems.
Best practices		Techniques, methods and processes that provide consistent results superior to those achieved by other means.
BIM deliverables		Information (in numerous formats) that may be required by contract or agreement to be submitted or passed to another party.
BIM goals		Objectives used to define the potential value of BIM for a project and for project team members. BIM goals help to define how and why BIM will be used on a project or in an organization.
BIM process		A generic name for the practice of performing BIM. This process can be planned or unplanned. The BIM process may also be referred to as the BIM execution process or the BIM project execution process. The BIM project execution planning process suggests diagramming the BIM process using process maps.

BIM process maps		A diagram of how BIM will be applied on a project. The BIM project execution plan proposes two levels of process maps: BIM overview map and detailed BIM use process maps.
BIM project execution plan (BIM PxP) or (PxP)	PxP	A plan for the results from the BIM project execution planning process. This document lays out how BIM will be implemented on the project as a result of the decision of the group.
BIM project execution procedure		A process for planning the execution of BIM on a project. It consists of four primary steps: 1) identify BIM goals and BIM uses, 2) design BIM project execution process, 3) develop information exchanges, 4) define supporting infrastructure for BIM implementation.
BIM use		A method of applying building information modeling during a facility's life-cycle to achieve one or more specific objectives.
Bit preservation		Process by which one can ensure that a file is not changed or corrupted and can be handled by techniques such as checksum or digital signatures.
Building information model	BIM	A digital representation of physical and functional characteristics of a facility.
buildingSMART International	bSI	An initiative of the International Alliance for Interoperability to accelerate achieving the dynamic and seamless exchange of accurate, useful information on the built environment among all members of the building community throughout the life-cycle of a facility.
Business process mapping notation	BPMN	An industry standard for modeling business processes as sequences of activity flows, data flows, and message flows within organizational lanes. These symbols are used in information delivery manual (IDM) representations.

Capability maturity model	CMM	A framework of 11 dimensions used to score a project or an organization's ability to produce a minimum BIM.
Certification testing		Certification testing is a process for testing software's conformance with a given IFC release specification and its subsets, defined as so-called views. The aim of the certification testing is to promote quality in IFC implementations and demonstrate to end-users that the software passing the certification implements the IFC specification in a consistent way, hence being able to exchange IFC product data with other certified software unambiguously.
Characteristic (property)		Concepts that cannot be defined using other concepts; their meaning is provided through a description. Characteristics are distinguished into the following types (in alphabetic order): behavior, environmental influence, function, measure, property, and unit.
Clarity or Consistency		Clarity or Consistency represents clear and shared definitions: do creators and users of information use the same codes and terms with the same meaning? Is information received from different sources consistent in terms of naming, units and relationships? Be thorough about developing and enforcing standard terminology.
Classification		Hierarchical organization of related information.

Completeness		How much of the required information is available: is the full content of each information package supplied? Is all the required information routinely created by the project team in their normal course of activities, or do they need to do something special? Another issue here is that an information package may be generated by multiple organizations and/or in multiple phases. Thus the handover is not a single deliverable, but two or more deliverables that must be merged in some fashion to create the required information package.
Component		List of all scheduled and required building assets located within space.
Concept		As defined in IFD, a concept is described both by a set of names and definitions in multiple languages and also by relating a concept to other concepts.
Configuration control		Information that moves through a project as its status changes. For example, a drawing may start as “Issued for comment” change to “Issued for construction” and be updated to “As built.”
Connection		Logical connections between components.
Constraint		In BIM planning, one or more owner performance requirements that must be met.
Construction Operations Building information exchange	COBie	COBie is an information exchange specification for the life-cycle capture and delivery of information needed by facility managers. COBie can be viewed in design, construction, and maintenance software as well as in simple spreadsheets. This versatility allows COBie to be used on all projects regardless of size and technological sophistication.
Context		A context, in IFD, is a grouping of relationships that exists between concepts.
Coordinate		Bounding boxes for spaces, lines, or points.

Cost of organizing information		The cost incurred to obtain the information and make it available for use: Is the information supplied in a form and format that means the cost of maintaining it throughout the life of the asset has been minimized? What about the costs to manage and assure the quality of the information handovers during the project process? Information management may be a new cost item for many organizations. It is important that business managers understand that there is a cost to this activity when they determine project staffing and fees.
Cost schedule		A time frame for the tracking of a project cost elements following standard project specifications.
Data exchange		The process of taking data structured under a source schema to transform and restructure into a target schema, so the target data are an accurate representation of the source data within specified requirements and minimal loss of content.
Data object		A mechanism to show how data is required or produced by activities. They are connected to activities through associations.
Data richness		The data must be of the level of detail to support the intended use of the BIM. The level of data for a concept BIM will be different from that of a design BIM or construction BIM.
de facto standards		Formats that may have originated with a single vendor but have been made publicly available and are supported by multiple vendors and products.
de jure standards		Standards maintained by an official standards organization, such as International Organization for Standardization (ISO) or International Telecommunications Union (ITU).
Delay costs		Costs incurred when interoperability problems delay completion of a project or the length of time a facility is not in normal operation.

Deliverables		The physical information in an information handover.
Descriptive metadata		Metadata that identify and describe the information with fields such as creator, title, subject matter, responsible organization.
Design-Bid-Build		A project delivery method where the owner procures a design and bid package from an AE professional, then utilizes competitive bidding to obtain a price from contractors for all required work to build the project per the project's drawings and specifications. The owner then selects the contractor, typically based on the lowest responsible bid.
Design-Build projects (See also, Integrated project delivery)		A project delivery method where one firm, typically the Contractor, is responsible for the quality of design and construction. This includes fast-track means and methods and promotes an integrated project delivery (IPD) approach from the project's inception until final completion.
Detailed BIM use process maps		A comprehensive BIM process map that defines the various sequences to perform a specific application of BIM or BIM uses. These maps also identify the responsible parties for each process, reference information content, and the information exchanges, which will be created and shared with other processes.
Dictionary (Data Dictionary)		A dictionary is used to define names. A dictionary of construction terminology defines the use of a particular name (such as, type or property) in a consistent manner.
Electronic business extensible markup language	ebXML	Electronic business using extensible markup language is a modular suite of specifications that enables enterprises to conduct business over the Internet.
Element		A major component, assembly, or construction entity part which, in itself or in combination with other parts, fulfills a predominating function of the construction entity.

Event		An occurrence in the course of a business process. Three types of events exist, based on when they affect the flow: start, intermediate, and end.
Exchange requirement	ER	A non-technical description of the information needed by a business process to be executed, as well as the information produced by that business process.
EXPRESS		A data modeling language standardized as ISO 10303-11.
Extensible markup language	XML	Extensible markup language (XML) is a set of rules for encoding information in machine readable form that emphasizes simplicity, generality, and usability over the Internet.
Facility		Compression of IFC representation for project, site, and facility.
Facility management	FM	Facilities operations and maintenance encompasses all that broad spectrum of services required to assure the built environment will perform the functions for which a facility was designed and constructed.
Floor		Vertical levels including foundation and roof; exterior site areas.
FM handover model view definitions		The basic FM handover view defines the general requirements for design applications to enable the handover of facility management information.
Format registry		Identifies all file formats stored in the archive and their properties, and automates the assignment of preservation strategies
Functional part	FP	An information handover in sufficient technical detail for software implementation
Gateway		Used to control the divergence and convergence of sequence flow, a gateway can also be seen as equivalent to a decision in conventional flowcharting.
General Services Administration	GSA	United States General Services Administration

Global unique identifier	GUID	Unique identification number generated and assigned by a computer
Green Building XML	bXML	An XML schema developed by Green Building Studio, Inc. to facilitate the transfer of building information stored in CAD building information models, enabling integrated interoperability between building design models and a wide variety of energy analysis tools.
Group		A group represents a category of information. This type of grouping does not affect the sequence flow of the activities within the group. The category name appears on the diagram as the group label. Groups can be used for documentation or analysis purposes.
Handover plan		A documented process that results in providing an information quality management framework that describes the information handover in terms of scope, contents, constraints, coding, timing, and procedures.
ifcXML	ifcXML	An XML representation of the IFC EXPRESS model developed by the International Alliance for Interoperability.
Implementation plan		Implementation requires the alignment of work processes and software tools to produce and deliver the required handover information. The greatest efficiency will be achieved when the handover process is integrated with the information creation process. This will provide a streamlined flow of information.
Industry foundation class	IFC	IFC is a neutral and open specification that is not controlled by a single vendor or group of vendors. It is an object-based file format with a data model developed by buildingSMART to facilitate interoperability in the building industry, commonly used format for BIM.

Industry Foundation Class	IFC	Data elements that represent the parts of buildings or elements of the process and contain the relevant information about those parts. IFCs are used by computer applications to assemble a computer readable model of the facility that contains all the information of the parts and their relationships to be shared among project participants.
Information		Data referenced and utilized during the process of creating and sustaining the built environment
Information delivery manual	IDM	A standard for processes specified when certain types of information are required during the construction of a project or the operation of a built asset. It also provides detailed specification of the information that a particular user (such as, architect or building services engineer) needs to provide at a point in time and groups together information that is needed in associated activities: cost estimating, volume of materials, and job scheduling are natural partners.
Information exchange	IE	Information passed from one party to another in the BIM process. The parties involved should agree upon and understand what information will be exchanged. These are often in the form of deliverables from a process that will be required as a resource for future processes.
Information packages		Facility information required by each step in the information strategy process
Information quality		An information quality management framework describes the information handover in terms of scope, contents, constraints, coding, timing, and procedures.

Information strategy		In the general buildings sector there appear to be at least four different and effective information strategies: 1) owner strategy to optimize facility life-cycle value; 2) owner strategy to improve project delivery; 3) consultant or contractor strategy to improve project delivery; 4) supply chain strategy.
Information Technology Infrastructure Library	ITIL	Program that provides a set of best practice approaches to information management
Integrated project delivery	IPD	A collaborative approach to a project's execution that brings AEC professionals, trade workers, suppliers and fabricators together early in the project to facilitate informed decision making for project design and delivery optimization that may utilize a federated BIM model for clash detection.
International Framework for Dictionaries	IFD	A library that is, in simple terms, a standard for a terminology database. The concept for the IFD library is derived from internationally accepted standards that have been developed by the International Organization for Standardization (ISO) and the International Construction Information Society (ICIS) subcommittees and workgroups from the early 1990s to the present.

International Organization for Standardization	ISO	World's largest developer and publisher of international standards. ISO is a network of the national standards institutes of 162 countries, one member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system. ISO is a non-governmental organization that forms a bridge between the public and private sectors. Many of its member institutes are part of the governmental structure of their countries, or are mandated by their government. Other members have their roots uniquely in the private sector, having been set up by national partnerships of industry associations. Therefore, ISO enables a consensus to be reached on solutions that meet both the requirements of business and the broader needs of society.
Internet protocols		Methods by which data are sent from one computer to another on the Internet.
Interoperability		Ability to manage and communicate electronic product and project data between collaborating firms and within individual companies' design, construction, maintenance, and business process systems.
Job		Project management, safety, and other job plans, with associated resources
Lane		A sub-partition within a pool and will extend the entire length of the pool, either vertically or horizontally. Lanes are used to organize and categorize activities.
Lean construction		An initiative that identifies and attempts to eliminate the seven forms of waste: correction, over-production, motion, material movement, waiting, inventory, and processing.
Leadership in Energy and Environmental Design	LEED	Standard American-accepted benchmark for the design, construction, and operation of high performance green buildings

Life-cycle views		A complete life-cycle does not need to be implemented at this point. NBIMS recommends the data should be maintained in interoperable formats that allow for future life-cycle use.
Metadata		Metadata is a component of data which describes the data. It is data about data.
Mitigation cost		Costs of activities responding to interoperability problems, including scrapped materials costs
Model view definition	MVD	MVD is the standard methodology and format for documenting the software implementation requirements for standard IFC based data exchanges. MVD is structured to into two main divisions: 1) non-technical division to model exchange requirements for end-users and 2) a technical division for software developers.
OmniClass™		OmniClass™ is a comprehensive system consisting of 15 tables for classifying the entire built environment throughout the full project life-cycle.
Open Standards Consortium for Real Estate	OSCRE	A not-for-profit, membership funded, neutral consortium that exists to facilitate collaboration on standardised data exchange.
Overview map		A high level BIM process map that illustrates the relationship between BIM uses, which will be employed on the project.
Pool		acts as a graphical container for partitioning a set of activities from other pools
Practice guidelines		Practice guidelines are content that aids a project team or organization in the implementation of the information exchange standards.
Process		A generic term for work or activity an entity performs and is represented by a rectangle.
Process map	PM	An overview of the handover process, describing its objects and the phases in a project at which the business process is expected to be relevant and identifies all the sub-processes.

Product		Component or assembly of components intended for permanent incorporation into a facility or construction entity.
Proprietary format		The format created by specific software applications such as CAD, word processing, or BIM programs.
Reference information		Structured information resources (enterprise and external) that assist or are required to accomplish a BIM use.
Reference standards		Existing industry standards that are developed, managed, and accepted by other organizations. They are included in NBIMS-US V2 so that they can be easily referenced in BIM information exchanges.
Resource		Required materials, tools, and training
Roles or Disciplines		Minimum BIM includes the sharing of information between disciplines and documentation of the BIM's intended uses.
Schema		Structure of information. XML schemas express shared vocabularies and allow machines to carry out rules made by people. They provide a means for defining the structure, content, and semantics of XML documents in more detail.
Semantic interoperability		The ability of computer systems to communicate information and have that information properly interpreted by the receiving system in the same sense as intended by the transmitting system.
Sequence flow		Used to show the order (predecessors and successors) in which activities will be performed in a process.
Service life		The statistical mean time between target mechanism failure as reported by appropriate authority and confirmed with appropriate confidence intervals.
Space		Slab to slab volumes within the perimeter; designated site volumes
Spaces by function		Basic units of the built environment delineated by physical or abstract boundaries characterized by their function or primary use

Spatial capability		The facility need not yet be spatially located, as this is a higher-level goal to be considered a minimum BIM.
Spatial program validation	SPV	SPV is an open, IFC-based BIM information exchange that enables designers and building owners to assess the performance of a building design in satisfying spatial program requirements defined by the owner of the building.
Specification		A formal description of what software and hardware should do, but not necessarily how the tasks should be accomplished. Specifications typically include verification techniques and conformance testing to ensure candidates are technically correct, or able to be iteratively modified to solve new or expanding problems in the architecture, engineering, contractor, owner, operator (AECOO) domain.
Standard practice		Practice guidelines are content that aids a project team or organization in the implementation of the information exchange standards.
Structural metadata		Metadata that describe the internal structure of the information and relationships between its components
Structured information form		Data in a structured form that are machine-interpretable without human intervention
Subject		Something that can be distinguished from other things and that can be recognized as such, and is represented by a name. In the bSDD, a subject is distinguished as an object (tangible or intangible), where objects are defined by formal characteristics.
Syntax validation		A process to define and verify the arrangement, parameters, and values in a data set conform to specified requirements
System		Sets of components providing a service
Type		Types of equipment, products, and materials
Unstructured information form		Data that cannot be machine interpreted

Usability		Can the information be organized and presented differently for different users? For example, a cost estimator or specification writer views facility information much differently than the design engineer who created it. Are there multiple copies or versions of this information? If so, is there a master copy from which the others are derived? With BIM, there is frequently a considerable difference in the way the design team models the building compared to how the construction team models it. For example, the designers may model a large slab as a single object. The contractor may model it as a number of smaller slabs, defined by his pours. One way to handle these differences is to have the contractor, assuming he is involved during design, provide his objects for the design team to incorporate into the model. The second approach is to create a second construction model. This would then require some way of referencing the design model to ensure maintenance of design intent.
United States Green Building Council	USGBC	A non-profit U.S. based organization dedicated to sustainable building design and construction that are the developers of the LEED building rating system.
Validation		The process of ensuring an NBIMS work product or a process conforms to defined user needs, industry requirements, and specifications, by following a system of quality assurance or testing a statistically relevant set of samples.
Validator		A computer program or web service to check the syntactical correctness of code, documents, or specifications. For example, ensuring there are no broken links.
World Wide Web Consortium	W3C	The central international standards organization for the World Wide Web, also abbreviated WWW or W3.
W3C requirements		Mandatory or necessary conditions and prerequisites to ensure compliance with W3C exchange rules and protocols.

Work result		Construction result achieved in the production stage or by subsequent alteration, maintenance, or demolition processes, and identified by one or more of the following: 1) the particular skill or trade involved; 2) the construction resources used; 3) the part of the construction entity which results; 4) the temporary work or other preparatory or completion work which results.
XML schema		The structure of an XML encoding that defines the elements, attributes, hierarchy, namespaces, data types, and default or fixed values. XML schemas are written in XML and created to be extensible in future iterations.
Zone		Sets of spaces sharing a specific attribute