ASME MBE-1–2022

Model-Based Enterprise: Framework

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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This Standard will be revised when the Society approves the issuance of a new edition.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the Committee web page and under http://go.asme.org/InterpsDatabase. Periodically certain actions of the ASME MBE Committee may be published as Cases. Cases are published on the ASME website under the MBE Committee Page at http://go.asme.org/MBEcommittee as they are issued.

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The American Society of Mechanical Engineers
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FOREWORD

In October 2016, the American Society of Mechanical Engineers (ASME) received a proposal to address new digital data needs within the design and manufacturing industry. The ASME Council on Standards and Certification approved the formation of a model-based enterprise (MBE) standards committee on February 28, 2018. The ASME MBE Standards Committee's task is to develop standards or related products that provide rules, guidance, and examples for the creation, use, and reuse of model-based data sets, data models, and related elements within an MBE.

ASME MBE-1 provides a framework that enables the development of MBE architectures and specifications for the elements of an MBE. This Standard is intended for MBE standard developers, MBE solution providers, and MBE system architects, as well as other professionals who want to understand structural elements for representing an MBE.

ASME MBE-1–2022 was approved by the American National Standards Institute as an American National Standard on April 5, 2022.

ASME MBE COMMITTEE
Model-Based Enterprise

(The following is a roster of the Committee at the time of approval of this Standard.)

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CORRESPONDENCE WITH THE MBE COMMITTEE

General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions or a case, and attending Committee meetings. Correspondence should be addressed to:

Secretary, MBE Standards Committee
The American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990
http://go.asme.org/Inquiry

Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Proposing a Case. Cases may be issued to provide alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee web page.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the Standard and the paragraph, figure, or table number(s), and be written as a Question and Reply in the same format as existing Cases. Requests for Cases should also indicate the applicable edition(s) of the Standard to which the proposed Case applies.

Interpretations. Upon request, the MBE Standards Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the MBE Standards Committee.

Requests for interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at http://go.asme.org/InterpretationRequest. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt.

If the Inquirer is unable to use the online form, he/she may mail the request to the Secretary of the MBE Standards Committee at the above address. The request for an interpretation should be clear and unambiguous. It is further recommended that the Inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry in one or two words.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. Please provide a condensed and precise question, composed in such a way that a “yes” or “no” reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of “Yes” or “No,” with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. The Inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in the format described above may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

Moreover, ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Standard requirements. If, based on the inquiry information submitted, it is the opinion of the Committee that the Inquirer should seek assistance, the inquiry will be returned with the recommendation that such assistance be obtained.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The MBE Standards Committee regularly holds meetings and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the MBE Standards Committee. Future Committee meeting dates and locations can be found on the Committee Page at http://go.asme.org/MBEcommittee.

MODEL-BASED ENTERPRISE: FRAMEWORK

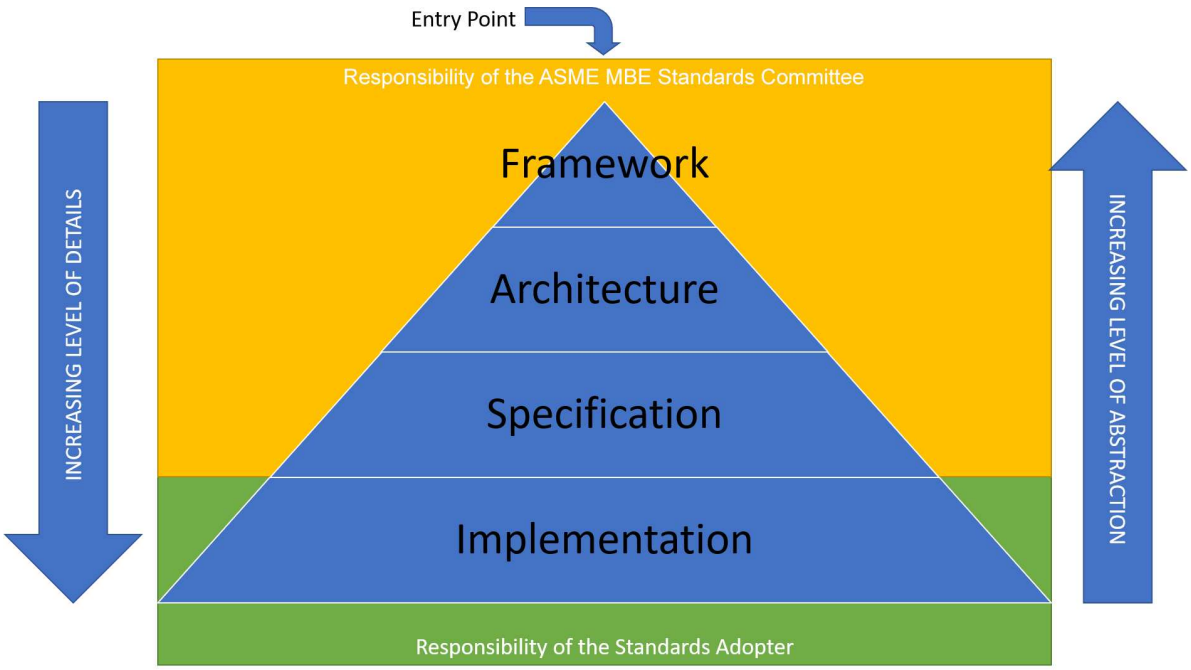
1 PURPOSE

The Model-Based Enterprise (MBE) Framework provides a high-level structural definition for the concept of an MBE and its elements. An MBE may be viewed as a system of systems in which the overall system and each constituent system have distinct components (e.g., elements and interfaces). The purpose of this Standard is to support consistent definitions of, organization of, and relationships between high-level elements of an MBE. This consistency will facilitate integration and communication between the elements of an MBE and will allow users of this Standard to apply the requirements of subsequent ASME MBE standards. The MBE Framework provides a prefabricated structure that users of this Standard can use to organize implementation of the MBE architecture into complementary views.

Figure 1-1 presents the hierarchy of standards for which the ASME MBE Standards Committee is responsible. The layers of the pyramid represent the increasing level of detail within ASME MBE standards. The MBE Framework exists at the top of the pyramid with the highest level of abstraction. The MBE Framework enables the development of MBE architectures and specifications (e.g., requirements) for the elements of an MBE. Architecture and specification, the second and third layers of the pyramid, respectively, represent ASME MBE standards currently in development. The implementation layer at the bottom of the pyramid is outside the responsibility of the ASME MBE Standards Committee. Implementation is the responsibility of the individual making decisions about a specific MBE deployment.

ASME MBE-1 is not intended to be an implementation standard. The MBE Framework does not tell the user how to implement ASME MBE standards. Users of this Standard shall make the best available decisions for implementing the standards in ways that best fit the organization.

Figure 1-1
Hierarchy of MBE Standards and Responsibilities



2 SCOPE

This Standard provides an architecture framework for the representation of an MBE. This Standard uses ISO/IEC/IEEE 42010:2011 architecture concepts to present an architectural view of an MBE and its constituent systems. The MBE Framework in this Standard defines the structure of an MBE and its elements. This Standard also provides guidance on using the MBE Framework. All conventions and common practices for describing the architecture of an MBE are within the scope of this Standard. In addition, this Standard provides a prefabricated representation of an MBE and its component systems. Decomposition of the MBE elements into architectural descriptions and specifications is out of scope for this Standard.

3 ORGANIZATION OF ASME MBE-1

This Standard is organized as follows:
(a) Section 1 states the purpose.
(b) Section 2 states the scope.
(c) Section 3 describes the organization.
(d) Section 4 provides the mandatory (normative) reference.
(e) Section 5 describes the intended audience.
(f) Section 6 defines terms.
(g) Section 7 defines the MBE Framework.
(h) Nonmandatory Appendix A provides an informative recommended practice for using the MBE Framework.

4 MANDATORY REFERENCE

ISO/IEC/IEEE 42010:2011, Systems and software engineering — Architecture description
Publisher: International Organization for Standardization (ISO), Central Secretariat, Chemin de Blandonnet 8, Case Postale 401, 1214 Vernier, Geneva, Switzerland (www.iso.org)

5 AUDIENCE

This Standard is intended for use by MBE standard developers, MBE solution providers, and practicing MBE system architects. Users of this Standard should be familiar with general enterprise architecture concepts, architecture frameworks, and reference architectures. This Standard is also recommended for product and plant managers, information technology managers, business managers, and others who want to understand structural elements for representing an MBE, constituent systems of an MBE, and all the elemental relationships within the boundaries of an MBE.

6 DEFINITIONS

This Standard defines *may, shall*, and *should* as follows:

may: the verb used to indicate a course of action permissible within the limits of this Standard.

shall: the verb used to indicate mandatory requirements, which the user shall follow strictly to comply with this Standard.

should: the verb used to indicate that a possibility among a set of possibilities is recommended as particularly suitable (without mentioning or excluding other possibilities) or that a certain course of action is preferred but not necessarily required.

See Merriam-Webster's Unabridged Dictionary at https://www.merriam-webster.com/ for definitions of words used in this Standard but not explicitly defined in this Standard.

7 MBE FRAMEWORK

The MBE and its elements shall represent an interacting system of systems. The MBE Framework shall be the basis for defining architecture descriptions that express the architecture exhibited by each system within an MBE. The boundaries of a system shall depend on stakeholder concerns and may include an entire MBE, a subset of MBE elements, or one or more products, processes, services, or other aggregations of interest. A system should be represented by models as defined within or in the context of the system environment and should trace back to an overall MBE. A system may be engineered, naturally occurring, or a combination thereof.