

# MBE Framework, Ed. 1

## 1. Purpose

The Model-Based Enterprise (MBE) Framework defines the concept of an MBE, and its elements, by providing a high-level structural definition. An MBE may be viewed as a system of systems having its own elements and interfaces. The purpose of this standard is to support consistent definition, organization, and relationships for high-level elements of an MBE to facilitate integrating elements of an MBE, sharing information across the constituent elements of an MBE, and exploiting the requirements defined in the MBE standards. This standard will provide understanding of what may comprise a specific MBE and the relationships between the elements in that enterprise. The MBE Framework will provide a prefabricated structure that the standards adopter can use to organize its implementation of the MBE architecture into complementary views.

The MBE Framework outlines the relationship of many elements that may make up an MBE. Figure 1 presents the hierarchy of standards for which the ASME MBE Standards Committee (SC) is responsible. 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. The implementation layer of the pyramid is outside the responsibility of the MBE SC, but rather the responsibility of the standards adopter while making decisions about its MBE deployment. More details are provided through the standards as the reader moves down the layers of the pyramid. The MBE Framework should be the entry point into the MBE Standards for the adopter.

The MBE Framework is not intended to be an implementation standard. The MBE Framework will not tell the reader how to implement the standards for an MBE. The standards adopter shall make the best available decisions for implementing the standards in ways that best fit its organization.

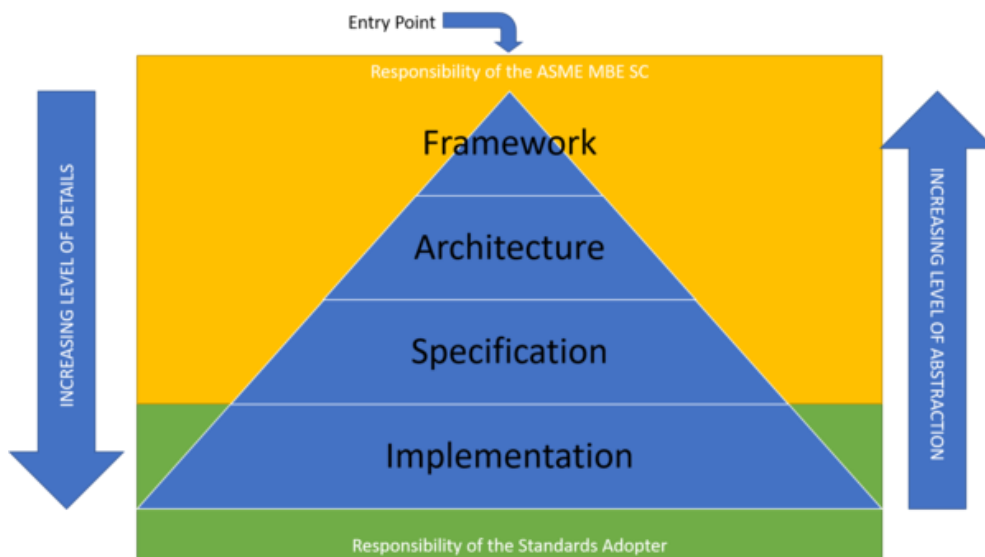


Fig. 1 Hierarchy of MBE Standards and Responsibilities.

## 2. Scope

The scope of this standard is the [architecture framework](#) for the representation of an MBE. This standard presents an architectural view of an MBE and its constituent systems using *ISO/IEC/IEEE 42010:2011* [1] architecture concepts. The scope of the MBE Framework focuses on providing structural definition and guidance for an MBE and its elements across an entire enterprise. All MBE conventions and common practices for an architecture description established within a specific system of interest or stakeholder community 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. Standard Structure

This standard is organized as follows:

- Section 4: Provides the mandatory (normative) references
- Section 5: Describes the intended audience
- Section 6: Describes terms and verbal forms
- Section 7: Defines the MBE Framework
- Appendix 1 (Nonmandatory): Provides informative user scenarios for the MBE Framework
- Appendix 2 (Nonmandatory): Provides an informative recommended practice how to use the MBE Framework within in a company

## 4. Mandatory References

1. ISO/IEC/IEEE 42010

## 5. Audience

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

## 6. Terms and Verbal Forms

The verbal forms *shall*, *should*, and *may* are defined as follows for use within this standard.

### 6.1 Shall

The verbal form "shall" indicates mandatory requirements to be followed strictly to conform to this standard and from which no deviation is permitted. Shall is synonymous with "must."

### 6.2 Should

The verbal form "should" indicates 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.

### 6.3 May

The verbal form "may" indicates a course of action permissible within the limits of the standard.

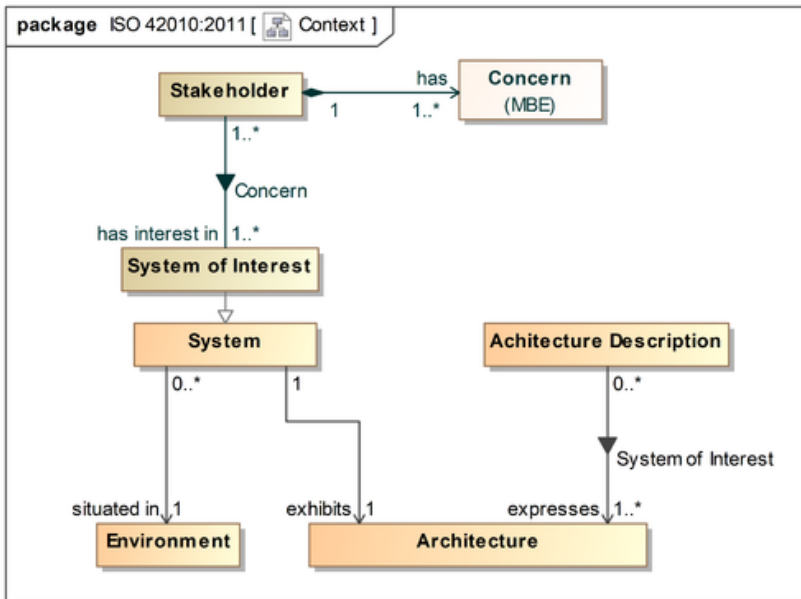
### 6.4 Standard Dictionary

[Merriam-Webster](#) is the official dictionary of ASME. The reader shall refer to Merriam-Webster for all definitions of terms contained within this standard that are not explicitly defined in the standard.

## 7. MBE Framework

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 exhibited by an architecture 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 situated in its environment and trace back to an overall MBE. A system may be man-made, natural, or a combination thereof.

Figure 2 presents the context of architectural descriptions as defined in ISO 42010:2011 [1]. The MBE Framework, combined with eventual architecture descriptions, shall be the basis for understanding an MBE's properties pertaining to its behavior, composition, deployment, utility, and maintainability, including the ability to be updated or disposed.



**Fig. 2** Contextual overview of Architectural Descriptions as defined in ISO 42010:2011.

The definition of the MBE Framework is shown in Figure 3. An MBE shall consist of one or more *Stakeholder* (Figure 3) that have interest in one or more *System of Interest*, (Figure 3) which have one or more *Viewpoint* (Figure 3) that use one or more *Resource* (Figure 3). The MBE Framework shall define the complete environment for an MBE. The MBE Framework shall determine the totality of influences upon an MBE, including the MBE's interactions with its environment. The environment of an MBE shall be bound by its stakeholders and their concerns.

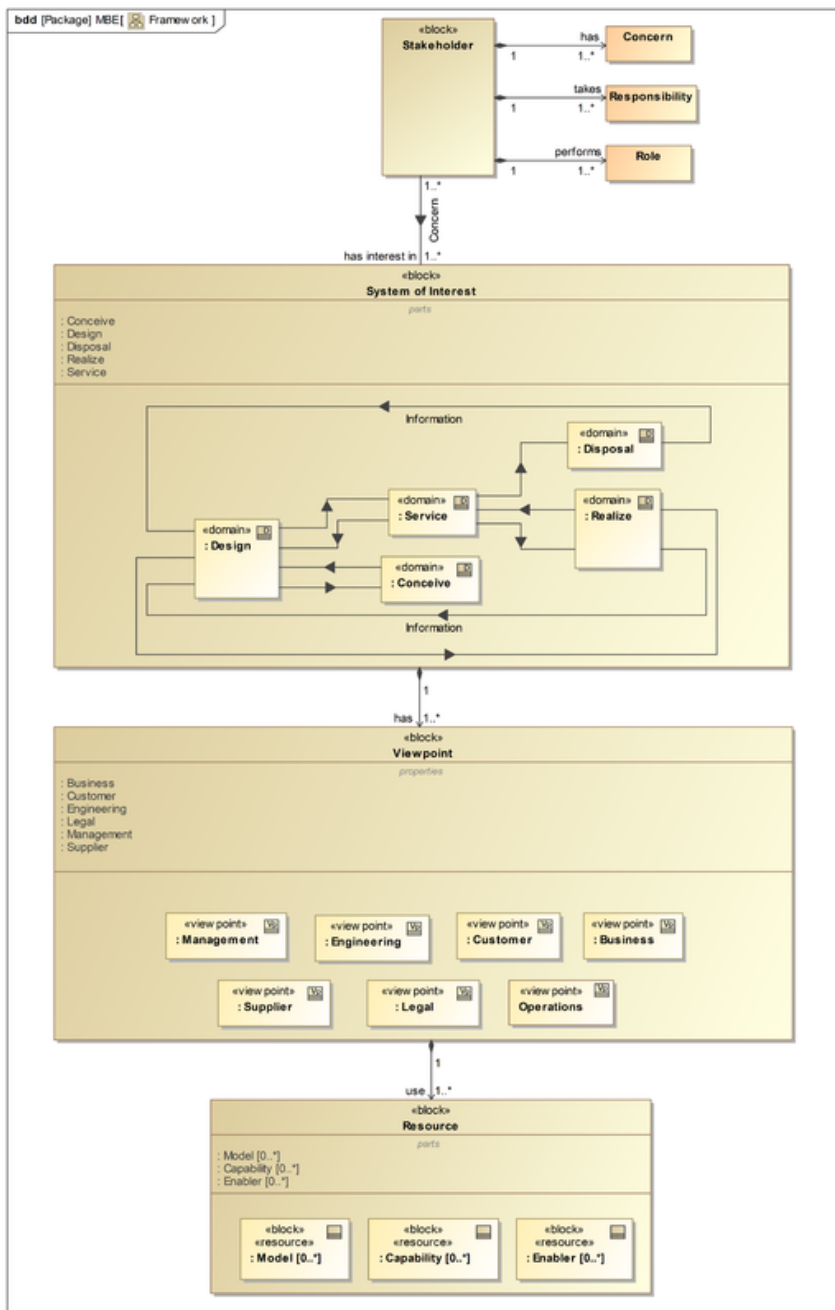


Fig. 3 Block Definition Diagram that describes the definition of the MBE Framework.

## 7.1 Stakeholders

A Stakeholder shall have concerns, take responsibilities, and perform roles. A Stakeholder shall have interest in one or more system of interest, which shall be defined by the boundary of the stakeholder's concern. There may be one or more stakeholders with one or more systems of interest.

A stakeholder may be an individual, group, or organization that hold concern for the system of interest. A concern shall be any interest in the system by one or more stakeholder. A concern shall pertain to any influence of a system in its environment.

A stakeholder shall take one or more responsibilities and perform one or more roles. A stakeholder's responsibility shall be defined by requirements for which the stakeholder is called to account as the primary cause, motive, or agent of an activity. A stakeholder's role shall be defined by the functional requirements of the actors and activities of a domain. All functional roles of an organization (e.g., engineer, manager, technologist, operator, analyst) should be encapsulated and accounted for in the Stakeholder block of the MBE Framework.

## 7.2 System of Interest

System of Interest shall provide a boundary for a domain. System of Interest shall define what is internal versus external of a domain. System of interest shall include one or more viewpoints and account for the activities, lifecycle phases, roles, responsibilities, and resources for a specific domain in which a stakeholder has a concern.

A System of Interest shall be defined in one of the following domains:

- **Conceive:** The activities of imagining, specifying, planning, innovating an MBE's products and services.
- **Design:** The activities of describing, defining, developing, testing, analyzing, and validating an MBE's products and services.
- **Realize:** The activities of making, building, procuring, producing, selling, and delivering an MBE's products and services.
- **Service:** The activities of using, operating, maintaining, supporting, and sustaining an MBE's products and services.
- **Disposal:** The activities of phasing-out, retiring, recycling, and disposing an MBE's products and services.

The System of Interest shall be the starting point where an organization maps its structure to the framework and then selects the appropriate viewpoints to identify the MBE requirements that apply to the concerns of the stakeholder.

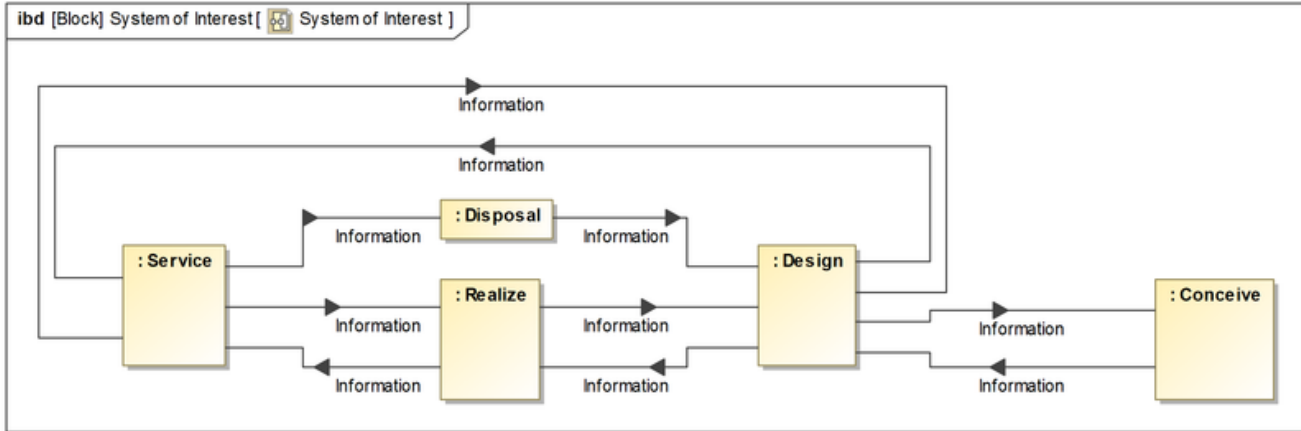


Fig. 4 Internal Block Diagram that describes the domains of the Systems of Interest in the MBE Framework.

### 7.3 Viewpoints

A Viewpoint shall provide the perspective and context for a stakeholder's concern in a System of Interest. A stakeholder's Viewpoint shall reconcile with an architecture Viewpoint. ISO/IEC/IEEE 42010:2011 defines an architecture viewpoint as, "[a] work product establishing the conventions for the construction, interpretation, and use of architecture views to frame specific system concerns." A Viewpoint shall set the boundaries for the resources that are used within the identified System of Interest.

A Viewpoint shall be defined in one of the following views:

- **Business:** The perspective and context for a stakeholder that is focused on external facing concerns (e.g., marketing) related to the business functions of a System of Interest.
- **Customer:** The perspective and context for a stakeholder that is focused on concerns related to the customer functions of a System of Interest.
- **Engineering:** The perspective and context for a stakeholder that is focused on concerns related to the engineering functions of a System of Interest.
- **Legal:** The perspective and context for a stakeholder that is focused on concerns related to the legal functions of a System of Interest.
- **Management:** The perspective and context for a stakeholder that is focused on internal facing concerns (e.g., human resources) related to the management functions of a System of Interest.
- **Operations:** The perspective and context for a stakeholder that is focused on concerns related to the operations functions of a System of Interest.
- **Supplier:** The perspective and context for a stakeholder that is focused on concerns related to the supplier functions of a System of Interest.

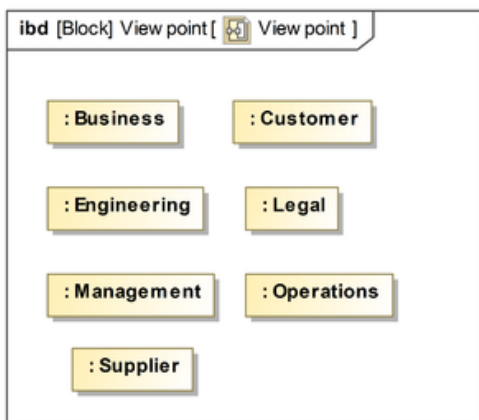


Fig. 5 Internal Block Diagram that describes the Viewpoints of the Systems of Interest in the MBE Framework.

## 7.4 Resources

Resources shall define the Models, Capabilities, and Enablers used by a Viewpoint in a System of Interest. A Viewpoint may use one or more Resources.

A **Model** shall be a representation that is physical (e.g., tangible), descriptive (e.g., logical), or analytical (e.g., mathematical). The model shall represent a real-world object, system, entity, phenomenon, or process. The model shall be purpose-built and defines the boundaries of the stakeholder's concern.

A **Capability** shall be a conceptual feature or faculty, within the scope of the MBE Standards Committee, that has the quality or state of having attributes required for accomplishing a task. Requirements for capabilities shall be controlled by the MBE Standards Committee.

An **Enabler** shall be a conceptual feature or faculty, outside the scope of the MBE Standards Committee, that provides the means or opportunity to a capability, a stakeholder, or both for accomplishing a task. Requirements for enablers shall be controlled by an entity that is not the MBE Standards committee. Enablers may be leveraged, applied, and deployed to support an MBE.

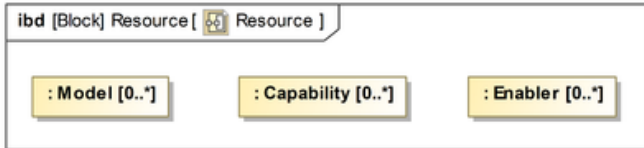


Fig. 6 Internal Block Diagram that describes the Resources used by the Viewpoints in the MBE Framework.