Reaching Consensus on System Modeling by use of the Business Motivation Model (BMM)

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The purpose of this presentation is to provide:

• Awareness of BMM and its potential value for systems
• An example of how BMM can be used to envision and define a customized modeling approach
• Awareness of a modeling approach customized for systems as partially described by a BMM plan
• Examples of the potential of modeling to manage complexity at several levels
Topics

A tale of two models:

1. The BMM standard specified by the OMG
2. A BMM-based Plan for Coherent Modeling
Business Motivational Model (BMM) Specification Document

- BMM is notable for addressing motivation, i.e., the "why question“ – why are we doing this?
- The BMM Document is our starting point (level 0)
The Crucial ‘Why Question’?

“If you don't know where you want to go, any road will get you there”

• Where do we want to go?
• Perhaps the greatest value BMM offers is to put the proper focus on exactly what is desired, called *Vision* by BMM (similar to Ackoff’s *Ideal*); this must be the first step
• Should always be able to answer the questions:
  – What are we trying to achieve and why?
  – Why does each element of the plan exist?
• Need to:
  – define a Vision
  – align all plan elements to fit the Vision
  – align the plan and community via shared understanding and collaboration
  – maintain global coherence by continuously adapting the whole including the *Vision* to new knowledge and understanding as it develops
Model 1. BMM UML Model

- BMM can be expressed as a UML model of classes and associations; such a form provides many advantages.
- The BMM standard can be better grasped as a whole in the form of a graphical and text-based model.
- This model also enables plans to be created by instantiating the model’s classes and associations; a modeling tool can ensure plan-standard consistency.
- As a model, the BMM standard (and any plans instantiated from it) can be easily customized.
Four General BMM Components

Quotations are from the BMM specification
BMM End

- OMG Definition of End

*End* is defined in more detail ...
End: Three Implementable Components

Note: One Vision per plan with any number of Goals and Objectives
**End**: (Complete) with Generalizations

Note: Sub-Goals and Sub-Objectives are allowed
Example of Instantiations

• Classes can be instantiated to create a particular plan consistent with the BMM
• Only one instance of Vision but any number of Goals and Objectives is allowed per plan

Classes:
(The BMM standard)

Class
Instances:
(A BMM plan)

Consistency between the plan and standard can be tool-enforced
EU Rental Company – A Simple OMG BMM Example

• The following is a fragment of an example of the fictitious EU Rental Company from the BMM Spec
BMM Means

• OMG Definition of Means

"...what an enterprise has decided to do in order to become what it wants to be"

More Means to follow ...
**Means:** Implementable Components

- **Mission:** "...the ongoing operational activities of the enterprise ... what the business will be doing on a day-to-day basis."

- **Strategy:** "...represents the essential Course of Action to achieve Ends -- Goals in particular."

- **Tactic:** "...represents part of detailing of Strategy."

- **Business Policy:** "a non-actionable Directive whose purpose is to govern or guide the enterprise."

- **Business Rule:** "...a Directive, intended to govern, guide, or influence business behavior in support of Business Policy ... formulated in response to a SWOT."

**Relationships:**
- Strategy is a component of the plan for Mission.
- Tactic implements Strategy.
- Tactic affects the enforcement level of a Business Rule.
- Business Policy is the basis for a Business Rule.
- Business Policy includes a more specific Business Policy.
**Means** (?Complete) w Generalizations

"...the ongoing operational activities of the enterprise ... what the business will be doing on a day-to-day basis"

"...what an enterprise has decided to do in order to become what it wants to be"

Note: Sub-Strategy, Sub-Tactics, and Sub-BusinessPolicy are allowed
BMM Whole

- End and Means are two components of a larger coherent plan; the whole can be presented in multiple views – see next slides
- The other two major components, *Influencer* and *Assessment*, are not further addressed in this presentation
End: Including Relationships to Means
Means: Including Relationships to End (and Influencer)

"...the ongoing operational activities of the enterprise ... what the business will be doing on a day-to-day basis"

"...what an enterprise has decided to do in order to become what it wants to be"

Directives support achievement of desired results.

"...a Directive, intended to govern, guide, or influence business behavior in support of Business Policy ... formulated in response to a SWOT"
Model 2.
Plan for Coherent Modeling

• The following describes a quite different model: one particular plan that follows the BMM standard and is created by instantiating the classes and associations of the BMM standard

• This model
  – provides a realistic example of a partial BMM plan model
  – shows how a plan can be created directly from and maintain coherence with the BMM standard
  – provides the beginnings of a plan for coherent system modeling
Beyond Model 2.
Coherent Systems Modeling

- The plan (2) addresses modeling of a type developed specifically for modeling systems.
- The model of systems (3) which the plan addresses is the ultimate aim; it is under development but is not further addressed here.
Two Levels Presented Together

- The following diagrams depict the BMM class definitions (level 1) along with the plan instance (object) definitions (level 2) which makes it possible to validate consistency between the two.
- For example, the definition of Goal is presented along with instances of specific goals.

```
Goal
"... a statement about a state or condition of the enterprise to be brought about or sustained through appropriate Means"
```

```
Coherence:
Goal
The model shall be "true as a whole" and "hang together"
```
Vision for Coherent Modeling

"describes the future state of the enterprise, without regard to how it is achieved"; may possibly be unattainable and compound rather than focused on a single aspect.

A system that can produce full and systems-oriented understanding based on the unification of all available domain knowledge, in effect, the elimination of the fragmentation problem in which knowledge is dispersed among many communities, artifacts and minds in incommensurable forms and languages.

A model that can hold and represent the unified knowledge and remain alive indefinitely while adapting readily to new knowledge and interpretation. The model develops incrementally via many changes over an extended period. In this way the model can be improved indefinitely and so approach -- if never quite reaching -- perfection. Continuous improvement can be made to all aspects of the model enabling it to approach ever closer to the ideals of perfect accuracy, completeness, coherence, and full understandability. By capturing knowledge permanently the model eliminates the need to ever repeat such effort, and can focus efforts on integration, unification, and coherence.

The model provides value by presenting views of integrated knowledge not otherwise available. A reinforcing feedback loop develops to drive model improvement as the model-provided value encourages collaboration which elicits more knowledge and in turn produces more value. The value produced includes better understanding based on more complete, accurate, accessible, systems-oriented, and well-presented knowledge. A community of interest is established that systematically improves the model via collaboration mediated by the model. The model facilitates effective communications via the alignment of mental models and establishment of a common ontology of well-defined and uniquely named concepts.
Vision with Three Goals

- Holistic System Understanding: Goal
  - The whole can be grasped fully and understood as a system of systems

- Coherent Modeling System: Vision
  - Amplifies Vision

- Perfectibility: Goal
  - All aspects of the system are improvable indefinitely; perfection can be ever more closely approached if never quite reached

- Broad Collaboration: Goal
  - A community works together effectively to share knowledge and ideas and improve the model; all useful sources are tapped

"... a statement about a state or condition of the enterprise to be brought about or sustained through appropriate Means"
Vision, a Goal with Sub-Goals

- Coherent Modeling
- System: Vision
- Holistic System Understanding: Goal
- Goal

- Vision: Holistically and entirely understood as a system of systems.
- Coherence: Goal
- Completeness: Goal
- Conciseness: Goal
- Rigor: Goal
- System Oriented: Goal
- Abstract/Detailed: Goal
- Consistency: Goal

V ... a statement about a state or condition of the enterprise to be brought about or sustained through appropriate Means.

All pertinent details are captured but presented selectively; abstraction is used to present the whole understandably without distracting detail.

The model shall be “true as a whole” and “hang together.”

Covers entire domain of interest.

Includes nothing unnecessary.

Every element is defined unambiguously.

Fully and accurately depicts systems including parts, relationships, processes of interactions, and emergent properties and functions.
From Vision to Strategy and Tactics

Objective

Strategy

Tactic

TacticImplementsStrategy

Coherent Modeling System: Vision

Perfectibility: Goal

Adaptability: Goal

Zero Redundancy: Objective

Create No Redundancy: Strategy

Single Model: Tactic

No Redundant Textual Descriptions: Tactic

- amplifies Vision

- sub-goal

- quantifies Goal

- desired result

- course of action

The model can live forever because all aspects are easy to change in both small and large ways including complete reorganization.

All aspects of the system are improved indefinitely; perfection is ever more closely approached if never quite reached.

Nothing is defined more than once. (May depict a thing multiple times so long as it is defined only once)

Follow from the beginning a modeling process that never defines anything more than once.

Integrate all pertinent domain information into a single (logical) model.

Never repeat in textual descriptions what is defined by model elements, e.g., by "consists of", "part of", or "type of".
A Common Theme: Complexity Management by Model

• Since systems are inherently complex, complexity management constitutes the great challenge; modeling can be a potent tool for managing complexity

• Modeling is employed similarly to manage the complexity that exists at several distinct levels:
  – BMM planning standard (planning components and relationships)
  – Coherent Modeling plan (plan components and relationships)
  – Model of Systems (system components and relationships)
  – UML Meta-model (modeling components and relationships)
Complexity Management by Model

A model can be a potent tool for complexity management by

– Enabling knowledge to be accumulated, integrated, and unified into a coherent whole
– Maintenance of coherence via coordination of all definitions
– Defining “non-things”, such as relationships, interactions, and processes, as first-class elements
– Presenting multidimensional relationships graphically
– Rendering the whole understandable and reviewable by presenting it in multiple views at various levels of abstraction
– Enabling continuous model improvement and extension via a feedback loop. An effective feedback loop is made possible by understandable presentation which enables critical review, and high adaptability which enables incremental improvement; incremental improvement and extension makes it possible to address even large and complex domains over time
Final Thoughts

• It would be helpful to carefully define the vision/ideal (or several) to which we aspire; the process of envisioning/idealizing can surmount hidden mental limitations leading to new and better approaches
• Given an initially defined vision, appropriate supporting goals and other downstream elements can be developed to produce a complete, coherent plan
• The BMM provides a well-considered, and well-defined way to do so in the form of a model
• The model form enables the plan to be made understandable and adaptable and so enable broad critical review leading to continuous improvement over an extended period
• A well understood consensus vision and plan provide a basis for effective collaboration and development of a community of interest
• As an adaptable model the plan could be updated by new knowledge and interpretation and so survive and provide value indefinitely
Questions and comments?
Appendix: Possible Enhancements

- Two possible enhancements are under consideration:
  - Capture rationale as an optional separate textual component for each component
  - Change the name of Vision to Ideal and consider customizing BMM to be more Idealized Design-like
BMM Enhancement: *Rationale*

• Concise definitions of elements are preferred; however it is important to also capture the “why”, the reasoning behind the definition.

• Hence, a new element, rationale, has been added as a provisional enhancement to BMM. The purpose is to optionally capture the reasoning for adopting a particular plan element, and to do so separately from the element definition.

• This illustrates model improvability, i.e., how easy it is to enhance the BMM standard model.

• Two examples of rationale follow...
Rationale (enhancement to BMM)

Coherent Modeling System: Vision

Rationale for Coherent Modeling of Systems:

1. System models must be developed incrementally because (1) systems are large, complex, and can only be understood holistically; (2) learning must be expected to continue indefinitely since systems are profound, diverse, and still far from fully understood; and (3) circular relationships, a standard feature of systems, can only be unraveled iteratively; (4) knowledge of systems is highly fragmented due to their diversity and parochial study in multiple disciplines; (5) understandable presentation of knowledge inevitably elicits corrections and extensions and sparks new insights.

2. An incremental process requires many changes and thus a highly adaptable model.

3. To maintain model adaptability requires eliminating redundancy, i.e., anything defined more than once.

4. Model structuring is required to eliminate redundancy; this includes leverage of typing, generalization, aggregation, abstraction, patterns, and meta-modeling.

5. Steering a process, as for all steering, requires feedback, which comes from critical review of the model. The more rapid and effective the feedback the better the steering and more rapid the model improvement.

6. To be critically reviewed, the model must be presented so as to be sufficiently understandable. For the large and complex, this requires many views. For systems, this in particular requires presenting "the big picture", i.e., a holistic view. Both require management of detail (use of abstraction).

7. Critical review of systems requires many diverse reviewers because knowledge of systems is fragmented due to its great diversity and spread across many traditional disciplines.

8. Diverse reviewers from many disciplines deploy many diverse languages; collaboration requires a common language (which the model can provide).
Vision and Three Goals with Rationales

- Vision: "... a statement about a state or condition of the enterprise to be brought about or sustained through appropriate Means"

- Holistic System Understanding: Goal
  - Rationale: Reality is primarily a system of systems, and can only be understood holistically; fragmentation is a fatal impediment to system understanding and must be overcome
  - The whole can be grasped fully and understood as a system of systems

- Perfectibility: Goal
  - Rationale: All aspects of the system are improvable indefinitely; perfection can be ever more closely approached if never quite reached
  - The whole can be grasped fully and understood as a system of systems

- Broad Collaboration: Goal
  - Rationale: No single person knows the whole; pertinent knowledge is fragmented across many artifacts and minds, and systems cross traditional disciplines; collaboration is essential to assemble holistic understanding
  - A community works together effectively to share knowledge and ideas and improve the model; all useful sources are tapped

- Coherent Modeling System: Vision
  - Rationale: A holistic model must be developed incrementally over an extended period in an ongoing process requiring many changes; learning will presumably continue indefinitely
  - Amplifies Vision

- Holistic System Understanding: Goal
  - Amplifies Vision

- Perfectibility: Goal
  - Amplifies Vision

- Broad Collaboration: Goal
  - Amplifies Vision
Another Possible Enhancement: Change Vision to Ideal

• The BMM Vision is similar to Ackoff’s Ideal (Ackoff, et al, Idealized Design, 2006)

• One idea is to change the name of Vision to Ideal (which can be easily done since it is defined only at a single point)

• Further customizing BMM for Ackoff’s Idealized Design should be investigated