

Using the ArchiMate[®] Modeling Language with BMM[™]

**Representing the Concepts of the
Business Motivation Model (BMM) using the
ArchiMate 3.0 Specification**

A White Paper by:

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August 2017

Using the ArchiMate® Modeling Language with BMM™

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Executive Summary

The Object Management Group's Business Motivation Model (BMM) [1] provides a scheme or structure for developing, communicating, and managing business plans in an organized manner.

The motivation elements of ArchiMate®, an Open Group Standard [2], were inspired partly by the BMM. The ArchiMate modeling language recognizes the role of the BMM in providing more detailed fine-grained modeling of business motivation.

This White Paper will be of interest to practitioners of Enterprise and Business Architecture in at least three circumstances:

- Where the BMM is currently used, or will be used, as a basis for work on business motivation, but there is a desire to link this to the ArchiMate language which is being used for its comprehensive coverage of all Enterprise Architecture concerns
- Where the ArchiMate language is currently in use, or will be in use, but practitioners would like to gain more perspective and a deeper understanding of the motivation elements defined in the ArchiMate language
- Where there is a preference for modeling motivation in the image of the BMM but there is also a desire to leverage the power of the ArchiMate language to do the actual modeling

This White Paper supports The Open Group vision of Boundaryless Information Flow™ by promoting the convergence and interoperability of complementary standards in the Enterprise Architecture space.

Introduction

Motivation elements identify the factors influencing the current and future direction of the enterprise and model the determinations made by the enterprise's leadership team as a result. As such, these elements are of significant interest to Enterprise and Business Architects since they provide the context for the design of the Enterprise Architecture, and provide the rationale behind the corresponding implementation plans.

The Object Management Group (OMG) [8] administers the Business Motivation Model (BMM), which is the subject of this paper.

The BMM specification is currently at Version 1.3, dated May 2015. The specification describes the BMM as follows:

“[BMM contains] ... a set of built-in concepts that define the elements of business plans. They are associated in a structure that is methodology-neutral; it will support a range of approaches for creating and maintaining a Business Motivation Model for an enterprise, and is particularly strong in support of processes that are driven by business change.” ([1]; §1.2)

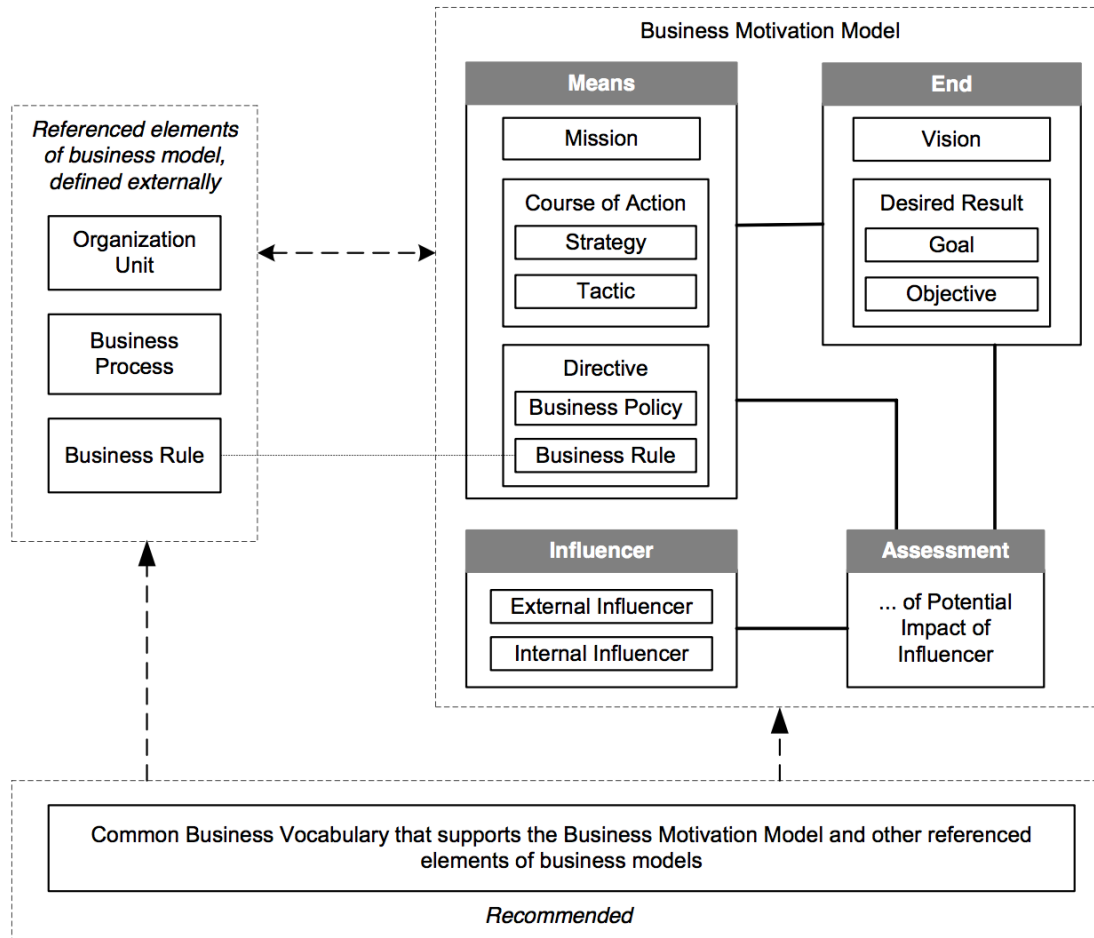
The specification goes on to say that the BMM contains “roles” for the concepts of Business Process, Business Rule, and Organization Unit. These particular elements are associated with concepts that are referenced in the BMM, but fall outside the scope of the BMM, with the expectation that other standards will supply pertinent definitions and modeling languages. Hence, the BMM was deliberately designed to be a “plug-in” with connections to other standards, such as BPMN [3] and the Semantics of Business Vocabulary and Rules (SBVR) [4].

The ArchiMate Specification, an Open Group Standard, is currently at Version 3.0, which was released in June 2016. The ArchiMate language has its own Motivation Aspect partly inspired by the BMM, which deals with the motivation elements that set the context for Enterprise Architecture. Many Enterprise and Business Architects will use these elements natively to model the motivational context for their Enterprise Architecture, but others may already be using the BMM or an adaptation of it, and there may be a need in any case to adopt both standards, to deal with the need for modeling at differing levels of granularity.

The purpose of this White Paper is to provide a short guide to the BMM and then demonstrate how the concepts in the BMM are matched by similar concepts in the ArchiMate language. Our hope is that this will provide the basis for fluent translation between the standards, in both directions, and facilitate the adoption of both the BMM and the ArchiMate language for use in modeling relevant Enterprise Architecture concerns.

Introducing the Business Motivation Model

The graphic that informally summarizes the main ideas in the BMM is reproduced in Figure 1.



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Figure 1: BMM Informal Overview ([1]; Fig. 7.1, used with permission)

This “picture” representation serves to orientate the BMM user, but the formal metamodels describing the BMM use the conventions of the UML [7] Class Diagram. Essentially this type of diagram uses a rectangle to depict each relevant concept and labeled association lines to express important relationships between instances of these concepts. The use of a white closed arrow in these diagrams indicates generalization of a concept, in the direction of the arrow, and is used to depict a specialization hierarchy. Figure 2 is an example of such a metamodel.

The main thesis underpinning the BMM is that an enterprise has a “reason to be”, expressed as its *Vision/Mission*. In view of this Vision/Mission, there are relevant *Influencers* that are subject to *Assessments*, as a result of which *Ends* are pursued by some *Means*. The Means are realized by elements of the Enterprise Architecture. Specifically mentioned are *Organization Units*, *Business Processes*, and *Business Rules*. The

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whole model is subject to a recommendation to create a common business vocabulary which is then used consistently throughout the motivation model and the Enterprise Architecture.

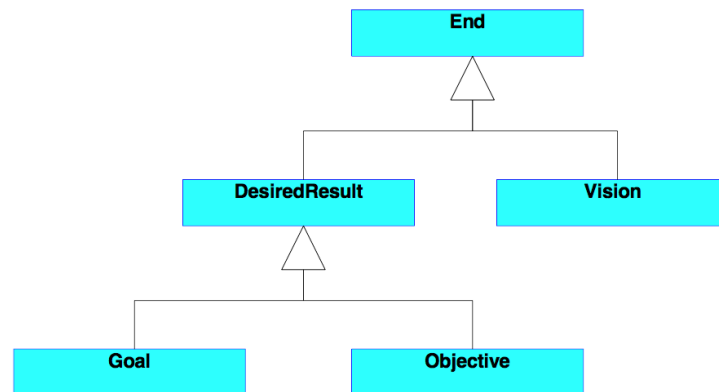
Notice that the BMM considers it is not enough to simply specify Courses of Action as Means in a motivation model. A governance model, based on *Directives*, is also required, which will guide and constrain the execution of the Courses of Action in pursuit of the Ends.

It is important to appreciate that a business motivation model applies equally to the Business-as-Usual (BaU) and the Change and Transformation (CaT) environments of the enterprise. In BaU, there is a set of Means and Ends that sets the context for the current working environment. In CaT, there are Means and Ends allied to Program and Project initiatives that deal with improving business capabilities. This sits well with the approach to Enterprise Architecture espoused by TOGAF®, an Open Group Standard [5], where there is a recognition of the need for baseline, transition, and target architectures. Each stable state of the architecture will realize a corresponding business motivation model.

In the following paragraphs we will briefly explore each of the main concepts identified in the BMM. In general terms, we will confine ourselves in this White Paper to a discussion centered on the concepts identified in the informal graphic (Figure 1). The full list of concepts in the BMM is extensive, and indeed useful, but it covers ground well beyond our requirements for this White Paper.

End

Ends “are about what an enterprise wants to be” ([1]; §7.3.1). Ends describe the state of the enterprise at some point in time. This state is often expressed in terms of the future state of the configuration of its resources or capabilities. Ends are divided into two groups: *Vision* and *Desired Result*.



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Figure 2: BMM Hierarchy of Ends ([1]; Fig. 8.1, used with permission)

Vision “is an overall image of what the organization wants to be or become” ([1]; §7.3.1). This is often expressed in qualitative terms, as a continuing aspiration; for example: “our vision is to be the UK’s number one car park operator”.

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The character of Vision is that it is relatively permanent. It expresses a desirable *ongoing state*. If, for example, the car parking enterprise above did in fact become, under some criteria, “number one”, it would in all likelihood still wish to continue to exist, striving to maintain this position.¹

Desirable Results are more specific Ends than the expression of Vision, and are intended to determine how subordinate states could contribute to the Vision. BMM distinguishes between *Goals* and *Objectives*:

- **Goals** are end states expressed in high-level terms, in support of the Vision
They are usually associated with targets for strategic initiatives, and are often qualitative, coarse-grained expressions. An example of a goal-like expression is “increased market share within three years”. This level of enterprise Ends is, for example, the answer to the question “what are the three or four things that *must* be got right in the next three to four years?”
- **Objectives** are end states described in more detail, which are expected to obey the guidelines given in the much used SMART acronym²
Objectives are often associated with tactical, more fine-grained initiatives, and their achievement contributes to the achievement of Goals. Hence an example of an Objective expression could be “a significant competitor organization acquired within the next 12 months”.

It is not always possible to define a clear distinction between Goals and Objectives, but the notion that there is a difference is useful nonetheless. Goals are “big picture” descriptions that need to be broken down into further detail. The expectation is that tactical Objectives form milestones whose achievement contributes towards reaching strategic Goals. In practice, business modelers will help the leadership to establish a hierarchy of Goals and Objectives, demonstrating how these eventually support the Vision. Such a hierarchy is useful as the basis for the enterprise’s Management Information System (MIS).

In CaT, the Goals/Objectives split can be organized to mirror the Program/Project split, which is widely recognized as the best practice delivery mechanism for business change.³ This theme is taken up by the TOGAF standard in its Capability-Based Planning (CBP) approach.

Means

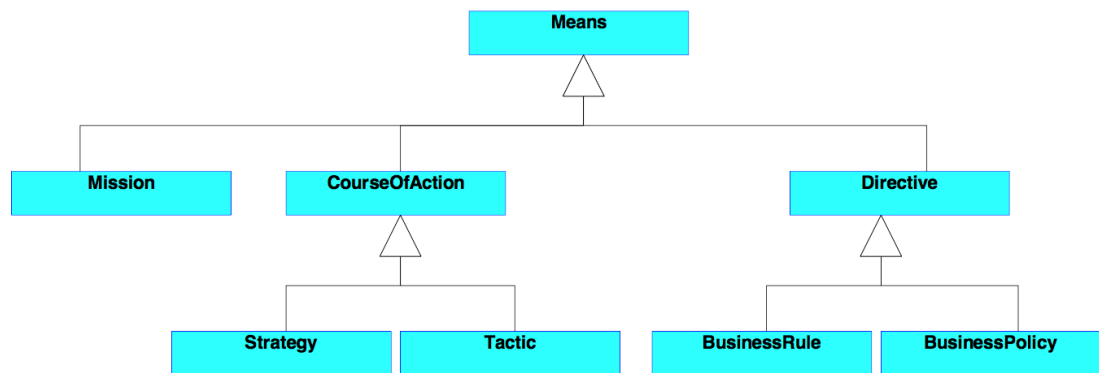
Means “*are about what an enterprise has decided to do in order to become what it wants to be*” ([1]; §7.3.2). Hence Means address how to achieve the Ends.

Means are divided into three groups; *Mission*, *Course of Action*, and *Directive*.

¹ This is not necessarily true for all organizations. Some define their Vision in terms of a concrete end state after which the enterprise will disband. Take, for example, a pressure group campaigning against an additional runway at a local airport.

² There are various interpretations of this acronym. BMM suggests: Specific, Measurable, Attainable, Relevant, Time-based.

³ For example, see the UK Office of Government Commerce (OGC) MSP and PRINCE methodologies [9].



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Figure 3: BMM Means Hierarchy ([1]; Fig. 8.5, used with permission)

Mission “... indicates the ongoing operational activity of the enterprise” ([1]; §7.3.2). An enterprise’s Mission indicates its ongoing, essential activity, bound by its Vision. The main thing that distinguishes Mission and Vision from the other Means and Ends is their relatively permanent nature. It should be possible to summarize the Mission/Vision of an enterprise in a relatively short statement, expressing what the organization is in business to do and how in general terms it intends do it. Unless the essential *purpose* of the organization changes radically, which is rare,⁴ these statements remain relatively stable, independent of time.

Courses of Action “are what the enterprise has decided to do” ([1]; §7.3.3) to sustain its Mission/Vision. Corresponding with the Ends breakdown between Goals and Objectives, Courses of Action are distinguished between *Strategy* and *Tactics*. Again, as with Ends, it is not possible to expect a clear distinction here, merely to understand the general character of each. Strategy is seen as a long-term high-level plan of action, whose purpose is to achieve one or more Goals. Tactics are seen as concrete, short-term plans of action to achieve tactical Objectives. The process by which a hierarchy of Means and Ends is established depends on recognizing these characteristics.

Directives establish the basis for the internal governance regime that will serve to guide the achievement of Ends by suitably constraining the Means. Directives are split into *Policy* and *Business Rules*:

- **Policy:** “... tends to be less formally-structured [than Business Rules]; it may not be atomic (i.e., not focused on a single aspect of governance or guidance) and may be less formally articulated” ([1]; §7.3.4); also “Business Policies provide broader governance or guidance that is not directly practicable” ([1]; §8.3.9)
- **Business Rule:** Business Rule is a core concept in the BMM, but the BMM standard also states: “... apart from its role in the structure, ‘Business Rule’ is outside the scope of the Business Motivation Model. Its place in the structure provides a “hook” to another model, where ‘Business Rule’ is defined and associated with other concepts” ([1]; §7.3.4); the SBVR is the preferred choice of the BMM for the

⁴ Rare certainly but not unknown. The outstanding exception, that proves the rule, is Nokia, which changed from running paper mills to manufacturing mobile telephony.

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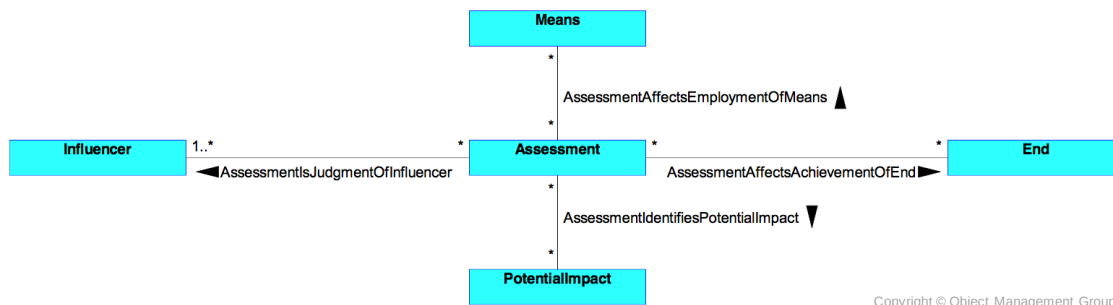
modeling of Business Rules

Table 1 summarizes some aspects of the BMM concepts encountered so far:

Table 1: Summary of Certain Aspects of BMM Concepts

End	Means/ Course of Action	Means/Directive	Timeframe	Scope
Vision	Mission	N/A ⁵	Permanent	Enterprise
Goal	Strategy	Policy	Long-term	Wide/High-level
Objective	Tactic	Business Rule	Short-term	Narrow/Detailed

Influencer and Assessment



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Figure 4: BMM Concepts for Assessments of Influencers on Ends and/or Means ([1]; Fig. 8.14, used with permission)

According to the BMM, a business motivation model should also document *Influencers* and *Assessments*. These concepts capture the factors that affect the enterprise in some way, and the Assessments made concerning these factors. The establishment and maintenance of Means and Ends are the enterprise's response to Influencers and Assessments.

Influencer

Influencers can be external or internal. “An *Influencer* is something that can cause changes that affect the enterprise in its employment of its Means or achievement of its Ends” ([1]; §7.3.5).

External⁶ Influencers are factors in the enterprise's environment which affect the enterprise in some way, but which the enterprise does not control. Examples of these are things like legislation, government policy, socio-cultural trends, etc.⁷

⁵ Although not part of the BMM, it could be argued that there is a level of Directive here in all enterprises. The form this would take would be whatever represented the *constitution* of the enterprise. In the case of a commercial venture, for example, this would be its Articles of Association (AoA).

⁶ The terms “external” and “internal” are employed with respect to the scope of the enterprise whose motivation model is being formed.

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Internal Influencers are factors in the enterprise's internal environment which it can control, because it owns or has the use of the resources affected. Examples of factors here include the enterprise's products and services, its manpower, financial arrangements, assets, reputation, etc.

The BMM itself suggests categories for both the factors in the internal and external environments, but these are just suggestions, and therefore not normative.

The BMM recognizes the importance of the role of stakeholders here:

"In describing Influencers, it is also useful to document who recognizes the Influencer and at what point in time, so that an audit trail exists for future reference. This practice, of course, cannot always be mandated" ([1]; §8.5.1). An Influencer must be a concern to *somebody* fulfilling a role in the enterprise, since this is the only way the influence can be recognized by the enterprise as relevant. BMM also suggests associating external Influencers in particular with an *Influencing Organization* ([1]; §8.5.3), where that is appropriate.

Assessment

Influencers are identified "neutrally", which is to say that they are simply statements of fact. Assessments are required in order to understand the potential impact of an Influencer on the enterprise. An Assessment *"is a judgment about the influence on the enterprise's ability to employ its Means or achieve its Ends"* ([1]; §7.3.6).

The ubiquitous SWOT⁸ acronym might be used to assess the influence of both internal and external Influencers. Assessments may reveal that a particular Influencer has a potentially negative or positive impact on some Means or some Ends. This may lead to new Means and Ends being formulated, or to changes to existing ones. Sometimes an Influencer may be assessed as having potentially *both* negative *and* positive impacts, depending on how it is dealt with. A common illustration of the latter is the existence of disruptive technologies; for example, 3D printing.

The BMM makes the point that Assessments are done in the end by people (stakeholders), and so are naturally subjective judgments. In so far as a motivation model is designed to be useful to functions like corporate planning and Enterprise Architecture, the "people" aspect of both Assessments and Influencers will be captured by understanding which roles in the enterprise's leadership team, and elsewhere, are associated with each one. Roles are recognized in the BMM via the Organization Unit placeholder association.

Placeholders

As we have seen, the concepts expressed in a motivation model deal with defining a desirable "end state" of the enterprise consistent with its Vision/Mission, together with the means of achieving that state. The realization of this end state is defined in terms of the configuration of the resources of the enterprise, whilst the realization of the means is captured in the BaU and CaT process environments, as discussed earlier.

⁷ The acronym PESTLE is often employed to help identify these factors.

⁸ Strengths, Weaknesses, Opportunities, and Threats.

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Placeholders identify concepts that a motivation model would expect to be associated with, in the Enterprise Architecture models that lead to the BaU and CaT environments. This association is generally expressed as a *realization*⁹ relationship.

Placeholders in the BMM are referenced *only* to the extent that they have a role in interpreting the structure of a motivation model, and in particular their full definition is expected to be held externally. Placeholders are also expected to be the subject of other modeling techniques and standards, and these may well elaborate placeholder concepts in ways that are not focused purely on motivation.

The placeholders defined explicitly in the BMM standard are *Asset*, *Organization Unit*, *Business Process*, and *Business Rule* ([1]; §8.6).¹⁰ Business Rule is different from the other placeholders, however, as it *also* forms a core BMM concept and therefore it is fully part of a motivation model. The metamodel that includes Business Rule was given above (Figure 3).

The expectation is that placeholder concepts will be fully defined and elaborated using other modeling standards. These standards are not specified by the BMM, although a preference is expressed for OMG standards where they exist. Currently, that means using the BPMN for Business Processes and the SBVR for Business Rules, but there is no reason why this couldn't include the ArchiMate language.

The metamodels that follow define the relationships that the BMM expects between placeholders and core BMM concepts, and between placeholders themselves. However, these relationships are not normative, nor are they meant to be comprehensive.

Organization Unit

The BMM defines Organization Unit as a “performer” of behavior and this can be a specific individual or some grouping of people. For example, an Organization Unit has a role of defining Ends.

⁹ A *realization* relationship may be illustrated as follows: If element B realizes element A, then B is more concrete than A in the sense of being on the pathway to making A “real”. If the reader reflects on the phrase “I realized my dream”, the general sense of this becomes clear.

¹⁰ *Asset* is not listed in the overview graphic reproduced in Figure 1, but it features prominently in the body of the text.

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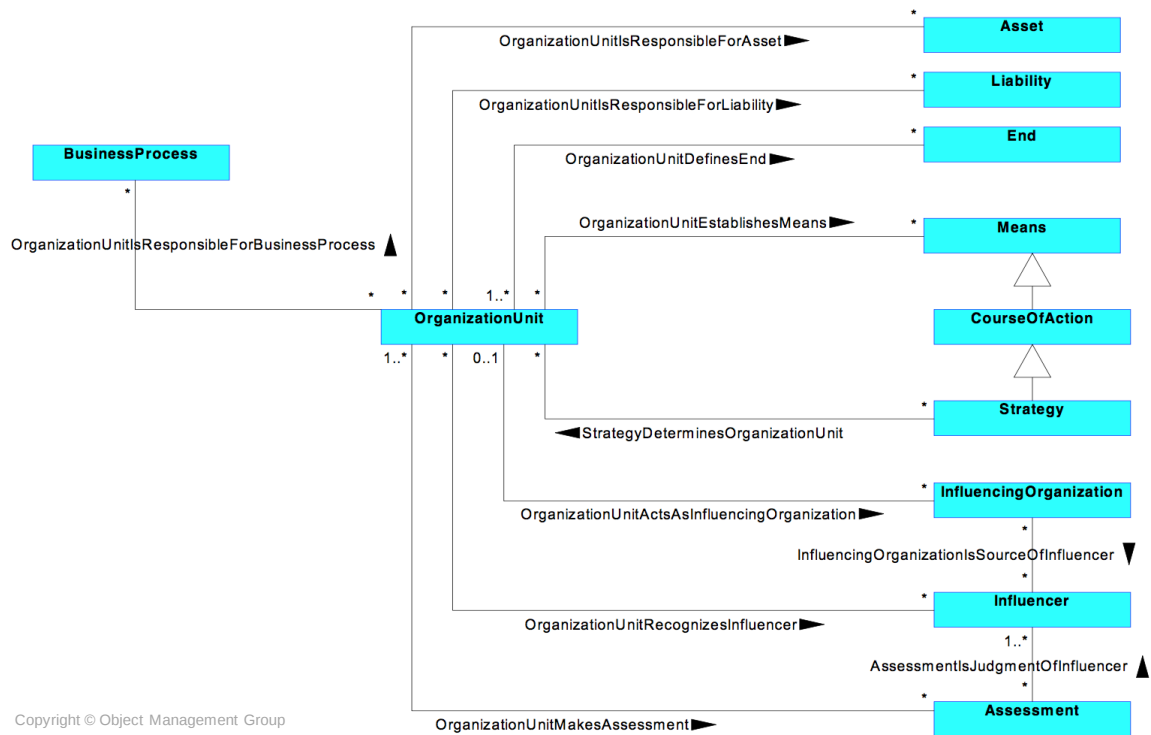


Figure 5: Metamodel for Organization Unit as Placeholder ([1]; §8.19, used with permission)

Business Process

In the BMM, the main role of a Business Process is that it realizes a Course of Action. Notice then that the concept of a Business Process includes both BaU processes and CaT processes.

The standard for modeling Business Processes preferred by the BMM is the BPMN.

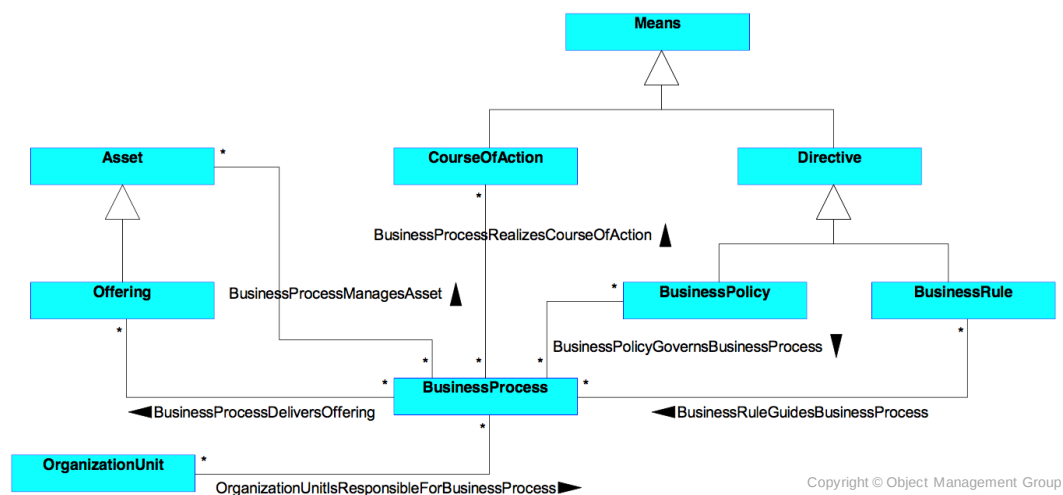


Figure 6: Business Process Placeholder ([1]; §8.20, used with permission)

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Asset

“When Courses of Action are being defined, ‘things’ that are used in operating the enterprise often have to be considered. They are represented in the [BMM] as Assets ...” ([1]; §8.6.3).

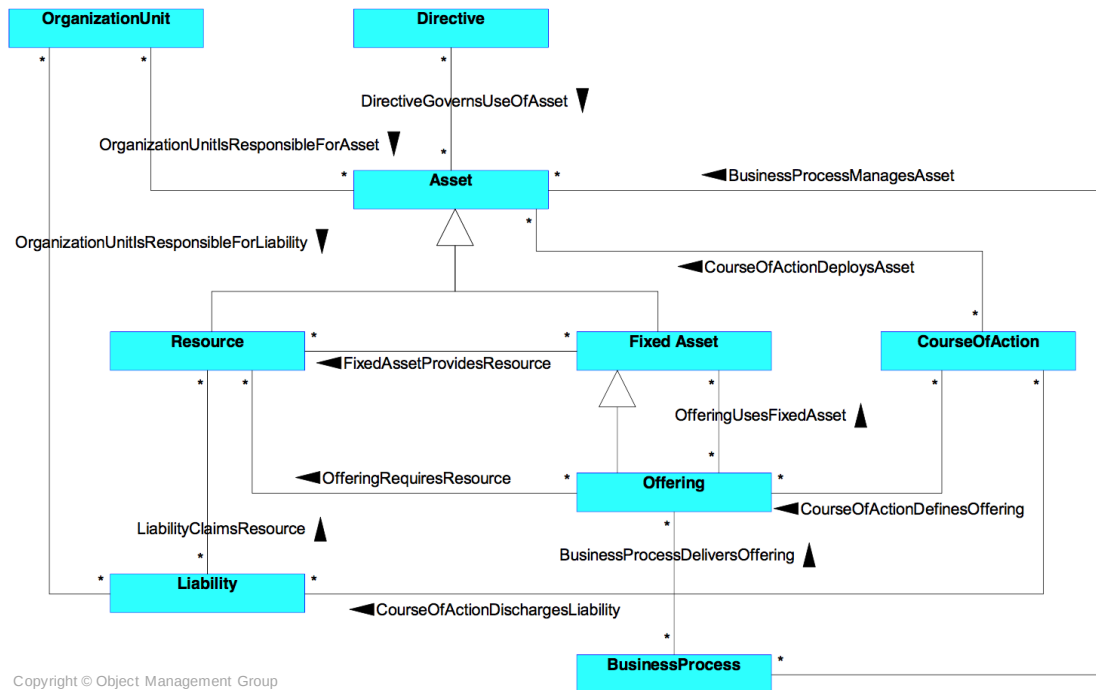


Figure 7: Placeholder Metamodel for Asset ([1]; Fig. 8.22, used with permission)

A motivation model’s interest in Assets are expressed as follows: “... *Asset, Resource, and Fixed Asset are placeholders (references to things defined in detail elsewhere in the enterprise) outside its BMM. Only those that are relevant to governance decisions need to be included. There is no requirement for a coherent, complete structure of Assets within a BMM; that will be maintained in the system(s) referenced by the BMM placeholders. Asset and Liability need only be included in a BMM to the extent that they are the object of governance*” ([1]; §8.6.3).

Common Business Vocabulary

The final part of the BMM overview identified in the informal graphic (Figure 1) is the use of a *Common Business Vocabulary*. The BMM recommends the use of a common business vocabulary to integrate the description of the concepts used in the motivation model with those used in the rest of the Enterprise Architecture.

Introducing the ArchiMate 3.0 Specification

The ArchiMate visual modeling language is increasingly popular for representing architecture descriptions. In this section we visit only those parts of the ArchiMate language that are relevant for the purposes of this White Paper.

The Full ArchiMate Framework from the ArchiMate 3.0 Specification is shown in Figure 8.

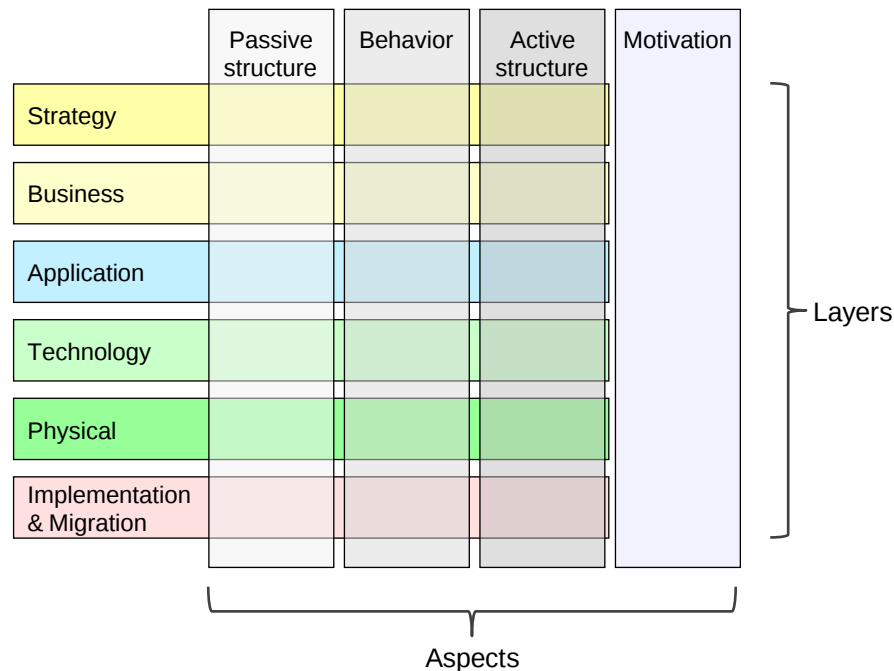


Figure 8: Full ArchiMate Framework

For the purpose of this White Paper it is the Motivation Aspect that mostly concerns us, along with the relationships that elements in this aspect may have with the Strategy and Business Architecture Layers in particular. The ArchiMate language recognizes the influence that the BMM has had in the structure of the Motivation Aspect and the Strategy Layer ([2]; Annex D).

Below we present the metamodels for the Motivation Aspect and the Strategy Layer. The metamodels used in the ArchiMate Specification again resemble UML Class Diagrams, and can be read in a way that is similar to the formal metamodels in the BMM. We defer a discussion of the concepts shown in these metamodels to a later section.

Motivation Aspect

Motivation elements “are used to model the motivations, or reasons, that guide the design or change of an Enterprise Architecture” ([2]; §6.2). The metamodel for the ArchiMate Motivation Aspect is reproduced in Figure 9.

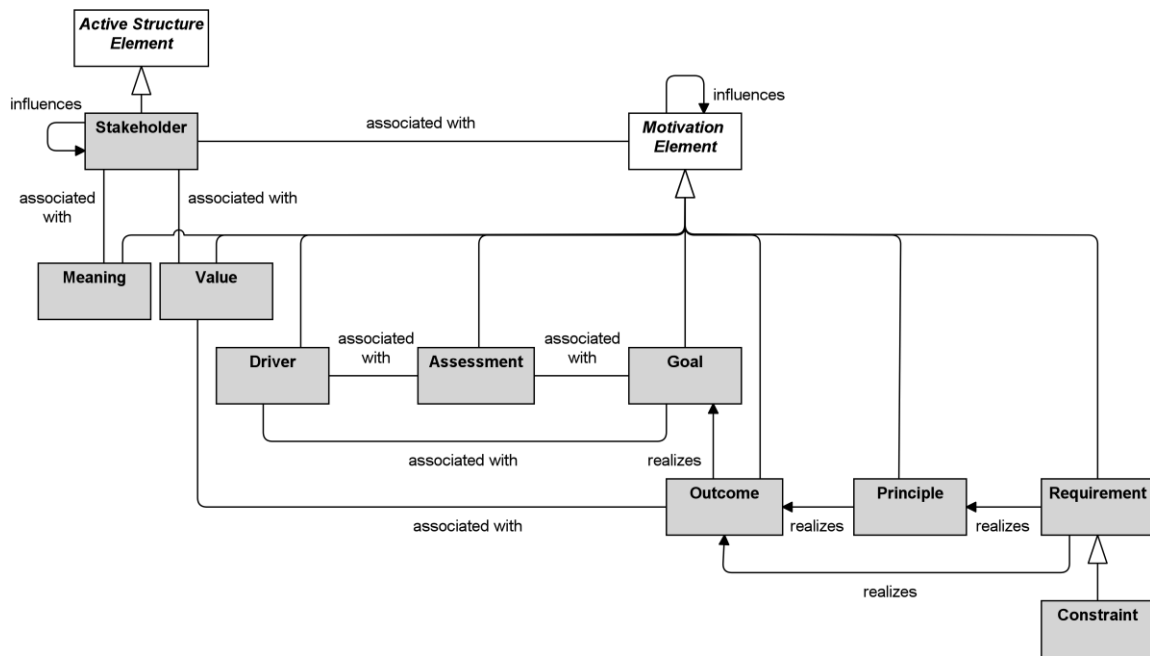


Figure 9: Metamodel Motivation Aspect ([2]; Figure 32)

Strategy Layer

Certain concepts identified in the BMM must be mapped to the Strategy Layer in the ArchiMate language. The metamodel for the Strategy Layer is given in Figure 10.

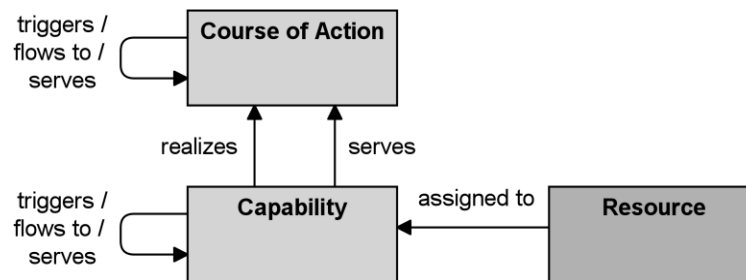


Figure 10: ArchiMate Strategy Layer Metamodel ([2]; Figure 44)

One of the most important metamodels for the purpose of this White Paper is Figure 11, which shows the relationships between Strategy Layer concepts, concepts in the Motivation Aspect, and Core Enterprise Architecture concepts.

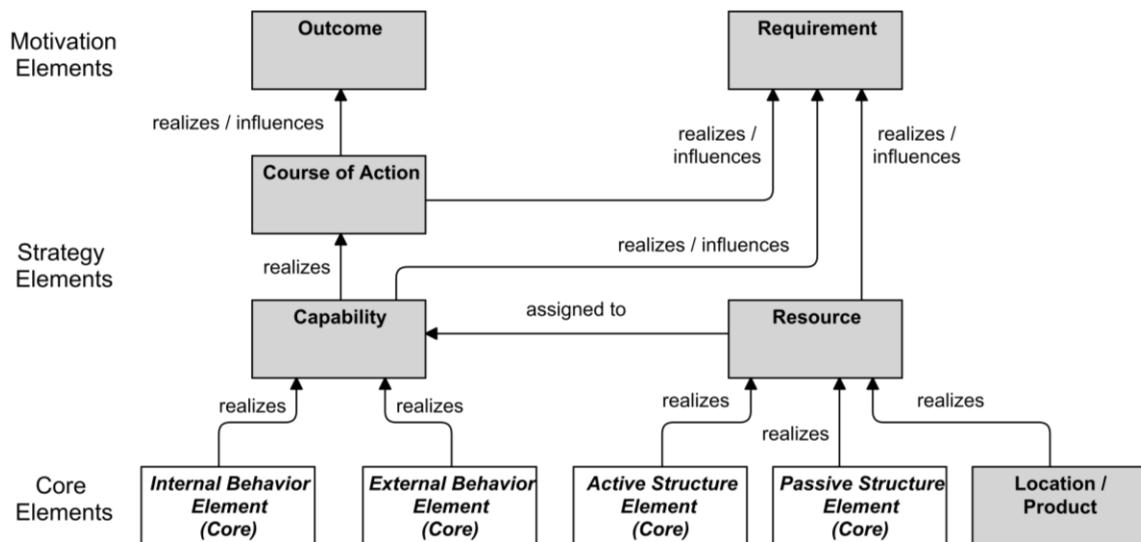


Figure 11: Relationships between Strategy Elements and Motivation Elements ([2]; Figure 48)

Language Extension – Specialization and Profiles

The ArchiMate language allows element types to be specialized, as a way of extending the language using a mechanism which is similar to the mechanism used in UML.

“Specialization is a simple and powerful way to define new elements or relationships based on the existing ones. Specialized elements inherit the properties of their generalized elements (including the relationships that are allowed for the element), but some of the relationships that apply to the specialized element need not be allowed for the generalized element. Also, new graphical notation could be introduced for a specialized concept, but preferably with a resemblance to the notation of the generalized concept; e.g., by adding an icon or other graphical marker, or changing the existing icon. A specialized element or relationship strongly resembles a stereotype as it is used in UML. The stereotype notation with angled brackets may also be used to denote a specialized concept” ([2]; §15.2).

Profiles are collections of attributes which can be added to standard or specialized elements.

“A profile is a data structure which can be defined separately from the ArchiMate language, but can be dynamically coupled with elements or relationships; i.e., the user of the language is free to decide whether and when the assignment of a profile to a model element is necessary. Profiles are specified as sets of typed attributes. Each of these attributes may have a default value that can be changed by the user.”

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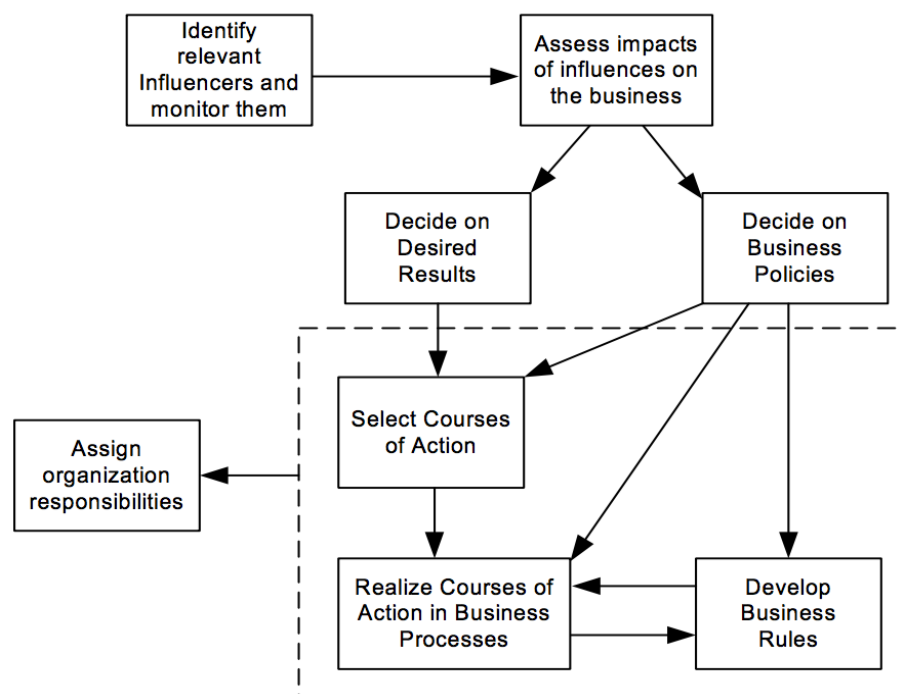
The facility for extension is already proving popular with Enterprise Architecture modelers, since it allows them to use the ArchiMate language in domains for which it wasn't strictly designed.¹¹ So it is that, in order to model motivation in the style of the BMM, it may well be desirable to employ these extension mechanisms.

¹¹ An outstanding recent example of this is contained in The Open Group White Paper: Modeling Enterprise Risk Management and Security with the ArchiMate® Language [10].

Process for Deriving a Motivation Model

In this section we present the outline of an approach for organizing thinking around the derivation of an enterprise's motivation model. It is such approaches that the BMM and the ArchiMate language are designed to support.

The BMM explicitly states that it doesn't include the definition or recommendation of any particular formal method. *"The Business Motivation Model is neutral with respect to methodology"* ([1]; §7.4). However, it does offer a suggested generic approach, as illustrated in Figure 12.



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Figure 12: Logical Progression through the BMM ([1]; Fig. 7.2, used with permission)

The ArchiMate standard refers us to the TOGAF standard for suggestions concerning any architecture process, so let's examine what the TOGAF standard has to say about suitable approaches in the motivation area.

The TOGAF standard, like the ArchiMate standard, recognizes the influence of the BMM over its thinking around business motivation. The TOGAF standard recommends in the Preliminary Phase to consider ([5]; §6.2):

"Defining the enterprise [and] identifying key drivers and elements in the organizational context."

and in Phase A ([5]; §7.2):

"Normally, the business principles, business goals, and strategic drivers of the organization are already defined elsewhere in the enterprise. If so, the activity in Phase A is involved with ensuring that existing

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definitions are current, and clarifying any areas of ambiguity. Otherwise, it involves defining these essential items for the first time.”

The TOGAF standard provides further guidance concerning methods for approaching motivation modeling, in the section called *Guidelines and Techniques* ([5]; §8). Of special interest is Capability-Based Planning (CBP), something we return to again below.

Limitations of Formal Methods

It is beyond the scope of this White Paper to include an in-depth treatment of the process of modeling motivation. But it is essential to summarize typical approaches to some degree, as this will lead to a greater understanding of the meaning, and the need for, the various concepts made available both in the BMM and in the ArchiMate language.

First, though, a few caveats are warranted about formal methods and modeling this area of the business:

- We should be clear that it is a mistake to think there is some form of standard algorithm for achieving long-term success with any particular enterprise
The magic ingredient that determines the difference between success and failure is often supplied by the leadership team, among others, and luck and random events will also play a part.
- The success of the strategic planning process depends as much upon imagination, awareness of the organization context, flair, and creativity as it does upon formal methods
It is for the leadership team¹² to articulate their insights and establish the “big picture”. The planners, including the architects, are then tasked with elaborating those things into a myriad of practical details.
- Furthermore, it is one thing to formulate a strategic plan, and quite another to execute it accurately
There is no harm in reminding ourselves of the words of the bard: “*The best laid schemes of mice and men, go often askew.*”¹³

Yet, despite their limitations, formal methods for documenting a motivation model do have a part to play in organizing the activities of the enterprise, and may sometimes lead to insights that otherwise would not have emerged. For example, formal models can help with:

- Accurate communication of business plans across the organization
- Design of measurement systems providing feedback on the achievement of objectives and goals
- Institution and administration of the governance regime required to keep the enterprise focused on the end goals
- Design of a suitable Enterprise Architecture

¹² But ... let us not forget Steve Jobs’ pithy observation: “*Ideas don’t happen in the boardroom, they happen in corridors*”, the late Steve Jobs, at that time CEO of Apple.

¹³ Robert Burns, Scottish Poet: “To a Mouse”.

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- Formalization of the business cases for investment in change

As far as the modeling process is concerned, the following actions, based on those mentioned in Figure 12, are all eventually required, but not necessarily in the order given, and, in any case, such actions are likely to be exercised in an iterative and continuous fashion, sometimes even quite informally:

- Affirm the purpose of the enterprise, its Vision and Mission
- Identify relevant Influencers and make Assessments; associate these with Stakeholders
- Establish and/or affirm Goals

In principle there should not be too many Goals, as this can lead to a lack of focus and a dilution of the effectiveness of enterprise resources.

- Decompose Goals into Objectives
- Identify/modify existing Courses of Action for achieving Goals and Objectives
- Formulate new Courses of Action for achieving Goals and Objectives
- Assess existing capabilities, define new or improved capabilities
- Establish change programs aimed at improving capabilities, and configure change projects within the programs

The fundamental correspondence between goal setting, goal achievement, and the change environment is considered in the TOGAF standard in the section on *Capability-Based Planning* ([5]; §32), which is the subject of The Open Group White Paper: Capability-Based Planning [11]. Of particular relevance to the theme of this paper is Figure 32.4 of the TOGAF standard, reproduced below.

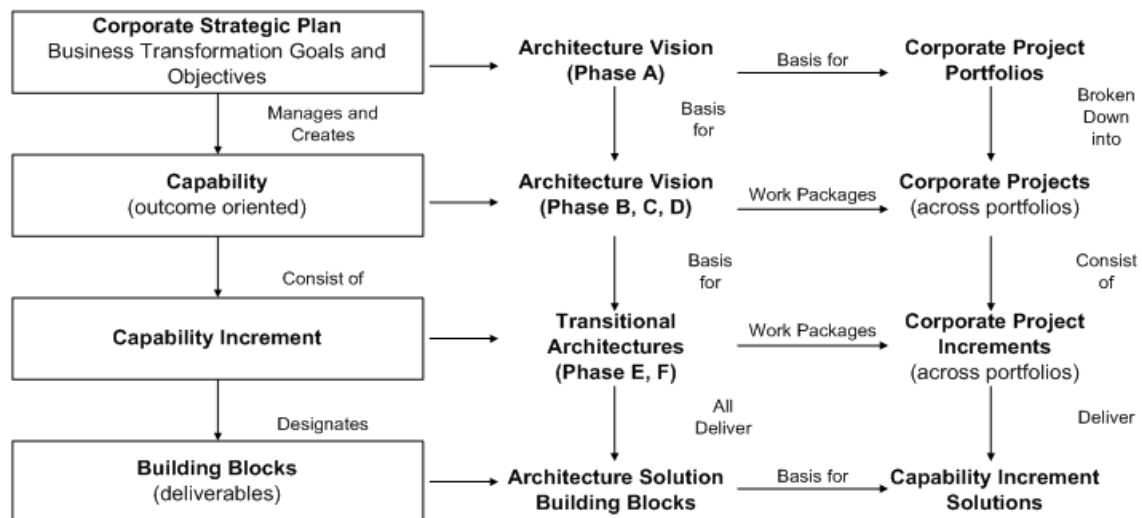


Figure 13: Capability-Based Planning ([5]; Figure 32.4)

Mapping the Standards – BMM Concepts and ArchiMate 3.0 Element Types

As any professional translator will testify, expressing the concepts of one language in another is often a matter of judgment and there may be many valid alternatives and opinions to consider.

In Table 2 there is a summary of some suggested mappings between the key concepts identified in the BMM, as discussed above, and the element types defined in the ArchiMate 3.0 Motivation Aspect, and Strategy and Business Architecture Layers. This table is consistent with the section of the ArchiMate Specification that suggests specializations, on an informative basis ([2]; §15.2.1).

Table 2: Mapping of Concepts between the BMM and the ArchiMate Language

BMM Concept	ArchiMate Element Type(s)	ArchiMate Definition
<i>End: Vision</i> <i>End: Desired Result: Goal</i>	<i>Motivation: Goal</i>	A Goal represents a high-level statement of intent, direction, or desired end state for an organization and its stakeholders.
<i>End: Desired Result Objective</i>	<i>Motivation: Specialization of Goal or Outcome</i>	An Outcome represents an end result that has been achieved.
<i>Means: Mission</i> <i>Means: Course of Action: Strategy and Tactics</i>	<i>Strategy: Course of Action</i>	A Course of Action is an approach or plan for configuring some capabilities and resources of the enterprise, undertaken to achieve a Goal.
<i>Means: Directive: Business Policy</i>	<i>Motivation: Principle</i>	A Principle represents a qualitative statement of intent that should be met by the architecture.
<i>Means: Directive: Business Rule</i>	<i>Motivation: Specialization of Principle or Constraint</i>	A Constraint represents a factor that prevents or obstructs the realization of Goals.
<i>Influencer: External and Internal</i>	<i>Motivation: Driver</i>	A Driver represents an external or internal condition that motivates an organization to define its Goals and implement the changes necessary to achieve them.
Assessment	<i>Motivation: Assessment</i>	An Assessment represents the result of an analysis of the state of affairs of the enterprise with respect to some Driver.
<i>Placeholder: Organization Unit</i>	<i>Business Architecture: Actor</i>	A Business Actor is a business entity that is capable of performing behavior.
<i>Placeholder: Business Process</i>	<i>Business Architecture: Business Process</i>	A Business Process represents a sequence of business behaviors that achieves a specific outcome such as a defined set of products or business services.
<i>Placeholder: Business Rule</i>	<i>Business Architecture: Specialization of Business Object</i>	A Business Object represents a concept used within a particular business domain.

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BMM Concept	ArchiMate Element Type(s)	ArchiMate Definition
<i>Placeholder: Asset</i>	<i>Strategy: Resource</i>	A Resource represents an asset owned or controlled by an individual or organization.

In the following paragraphs we will elaborate a little more where required on the match between the concepts defined in these two standards.

BMM Concepts

End: Vision, Goal, and Objective

The ArchiMate Goal is the closest match for the Vision and Goal concepts expressed in the BMM. A BMM Vision could be defined as a stereotyped ArchiMate Goal, with profile attributes to emphasize its relatively permanent character.

Since both Goals and Objectives are types of End, one option to consider for mapping a BMM Objective is to simply model it as a stereotyped ArchiMate Goal, and include suitable profile attributes, above all for quantitative measures and time constraints.

However, Goals and Objectives have quite distinct characteristics in the BMM, so another option is to consider a stereotype of Outcome. The specification says of Outcomes: “*Outcomes are tangible, possibly quantitative, and time-related, and can be associated with assessments ... Outcomes are closely related to requirements, goals, and other intentions*”. That is, Outcomes are SMART, which is a basic test for a BMM Objective, and the specification makes it clear that Outcomes may realize Goals ([2] §6.1 and §7.6).

We should bear in mind that *Outcome* covers both negative outcomes as well as positive ones. An Outcome could be the undesirable, but anticipated, result of a particular course of action; for example, a certain Course of Action could bring benefits, but also a reduction in Customer Satisfaction. Since BMM Objectives identify only planned desirable results, then an ArchiMate Outcome must be suitably constrained, by stereotyping, if the mapping is to be valid.

Other options to consider for this area of mapping include:

- In the ArchiMate language, a Goal can aggregate or compose other Goals, which allows us to model a hierarchy of Goals, as suggested in the BMM, implying greater and more precise detail as the hierarchy deepens
- Another possibility is to model ArchiMate Goals influencing other Goals; by attaching profiles to lower level goals, the effect of the BMM Goal/Objective binomial can be replicated

Means: Mission, Strategy, and Tactics

In a fashion that mirrors the approach to modeling the BMM Ends just discussed, we can use the ArchiMate language to model Means:

- We can specialize the ArchiMate Course of Action as Mission, Strategy, and Tactics
- In the ArchiMate language a Course of Action can aggregate or compose other Courses of Action, which allows us to model the hierarchy of Means suggested in the BMM

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- Another possibility is to model Courses of Action serving other Courses of Action

Means, Directive: Business Policy

The ArchiMate Principle is the closest to the concept of Business Policy in the BMM.

Influencer

The BMM Influencer concept maps directly to the ArchiMate Driver element type from the Motivation Aspect.

The BMM specializes Influencer between External and Internal. This is an important distinction in a motivation model, since the enterprise controls Internal Influencers but does not control External Influencers. In the ArchiMate language, this distinction is easy to achieve through stereotyping and profiling appropriately.

Assessment

This concept is identical in both standards.

Placeholder: Organization Unit

The BMM Organization Unit, as an entity capable of performing behavior, maps directly to the ArchiMate Actor element from the Business Architecture Layer.

Placeholder: Business Process

The BMM Business Process maps directly to the ArchiMate Business Process element from the Business Architecture Layer.

Means, Directive: Business Rule

In the BMM, Business Rules are the breakdown of Business Policy into concrete practicable directives that guide specific Business Processes. Since we have mapped BMM's Policy to ArchiMate Principle, it makes sense to map Business Rule in the Directive's hierarchy to ArchiMate Requirement or Constraint.

The definition of Constraint in the ArchiMate Specification follows the one used in the TOGAF standard: “A constraint represents a factor that prevents or obstructs the realization of goals” ([2]; §6.3.5). This definition may seem a little odd at first sight, but the ArchiMate Specification goes on to say: “... *in contrast to a requirement, a constraint does not prescribe some intended functionality of the system to be realized, but imposes a restriction on the way it operates or may be realized*”. That is, the effect of Business Rules, which may imply functionality, is to guide the conduct of Business Processes. Business Rules remove a degree of freedom from the conduct of the Process. Hence, the notion of Constraint seems to fit very well here.

In the BMM Business Rule is *also* a Placeholder that must be represented in the Business Architecture. In the ArchiMate language, the corresponding element in the Business Architecture could be a Business Object specialized (stereotyped) as a <<Control>> or as a <<Rule>>.

Another option is to specialize the ArchiMate Principle to match the BMM Business Rule.

In this area of the BMM, the standard defers to another body of knowledge, which is promoted by the Business Rules Group (BRG), whose principal sage is Ronald Ross. The work of the BRG extends beyond the scope of this paper, but the reader is encouraged to review their work on the nature and formulation of

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Business Rules, which includes a language for expressing Business Rules and the definition of different types of rule [13]. In the BRG, for example, a Constraint is a *type* of Business Rule.

Placeholder: Asset

This concept can be mapped to the ArchiMate element type Resource, found in the Strategy Layer. However, note that Resource has a wider coverage than simply (passive) Assets, so specialization would again be appropriate.

Although we have dealt with many of the main BMM concepts here, it should be noted there are a number of other core concepts mentioned in the BMM. Readers should refer to ([1]; Figure 7.3) in particular, reproduced in ANNEX A: BMM Diagrams (on Page 36).

ArchiMate Concepts not Explicitly Mentioned by the BMM

Capability

It is worth reflecting that Placeholders, instead of being listed by the BMM, could simply be designated as *Capabilities*. Capability is not a term used in the BMM, but it is certainly common modeling practice to define a business model, including the Mission/Vision, then define a set of capabilities that would support the business model. Once a list of capabilities is established, the task is then to work out how to deliver each capability, via the Enterprise Architecture.

This is the approach implied by the ArchiMate language, which provides the use of a Capability element type in the ArchiMate Strategy Layer. This has the potential to greatly simplify the modeling of the realization of the motivation model by the Enterprise Architecture, and to reduce the number of direct dependencies between the motivation model and the Enterprise Architecture. All of the placeholders nominated and referenced by the BMM can be considered “dimensions of capability”, so they can be modeled in that way. As a result, changes in the way a Capability is put together need not affect the enterprise’s business motivation model.

Requirement

Requirement does not appear by that name in the BMM. This is a significant difference between the BMM and the ArchiMate language.

ArchiMate thinking behind the structure of the Motivation Aspect is that all motivation elements will eventually lead to the derivation of a set of Requirements which will then be realized by the Enterprise Architecture. In this respect, the ArchiMate language follows the TOGAF standard closely. If we include the Strategy Layer too, then the realization of Requirements comes through Courses of Action, themselves realized by Capabilities and Resources and then the core Enterprise Architecture (see Figure 11).

The BMM makes a conscious decision to exclude Requirements from a motivation model. The BMM considers Requirements to be a separate concern, which naturally follows on from motivation modeling, and in particular drives the change processes mentioned in the BMM. A given BMM motivation model could give rise to many different requirements formulations, which would need to be evaluated and approved by the business leadership.

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Value and Meaning

These concepts are not represented in the BMM, not even by association with placeholders. However it could be argued that these concepts are important things to represent in a motivation model. For example, as the BMM recognizes, elements like Assessments are intrinsically subjective to particular Stakeholders. So, for example, what an Assessment *means* could be different between Stakeholders who hold different world views. The idea of a Value Proposition is considered central to the definition of a Business Model [12].

Outcome

While we have suggested the possibility of Outcome as a mapping to Objective, the ArchiMate language recognizes that not all predicted outcomes are desirable. Undesirable outcomes can fuel motivation too, and influence the decision-makers' choice of options. Real businesses often have to balance and judge the desirable and the undesirable consequences of their courses of action.

Stakeholder

The BMM has two concepts around “people groups”: *Organization Unit* and *Influencing Organization*.

Organization Units are seen by the BMM as entities that perform the work that supports the motivation model. However, the BMM also mentions that Organization Units are responsible for setting both Ends and Means.

The BMM recommends that Influencing Organizations should be identified wherever possible with External Influencers (only), so that the nature of the influence can be investigated further or affirmed. The definition of “external” is relative to the definition of the enterprise whose motivation model is being defined.

Mapping the Standards – Relationships

The enumeration and definition of concepts is complemented by the identification of relationships or associations between instances. Relationships identify facts in the domain that help us understand the role that instances of one concept have with respect to instances of another.

In this section we will examine some of the main associations mentioned in the BMM¹⁴ and make suggestions for expressing them using the ArchiMate language. Note that the BMM has a very detailed set of relationships, so we have not attempted to map all of them here. Our main focus has been on the relationships expressed in the Core Concepts diagram, reproduced in ANNEX A: BMM Diagrams (on page 36).

In the ArchiMate language the principal relationships used in the Motivation Aspect are *association*, *influences*, and *realizes* (see Figure 9).

Association: “An association models an unspecified relationship, or one that is not represented by another ArchiMate relationship” ([2]; §5.4.2).

Influences: “The influence relationship models that an element affects the implementation or achievement of some motivation element” ([2]; §5.2.3).

Realizes: “The realization relationship indicates that an entity plays a critical role in the creation, achievement, sustenance, or operation of a more abstract entity” ([2]; §5.1.4).

Note that *self-realization* is not currently permitted in the ArchiMate language; i.e., an element may not realize another element of the same type. Some BMM relationships would tend to suggest self-realization, such as “Tactic implements Strategy” ([1]; Figure 7.3).

The most common relationships between elements in the Strategy Layer and the Motivation Aspect are *influences* and *realizes* (see Figure 11).

In mapping the BMM to the ArchiMate language, the following additional relationships prove useful in attempting to reflect as accurately as possible the spirit of the associations used in the BMM. They are:

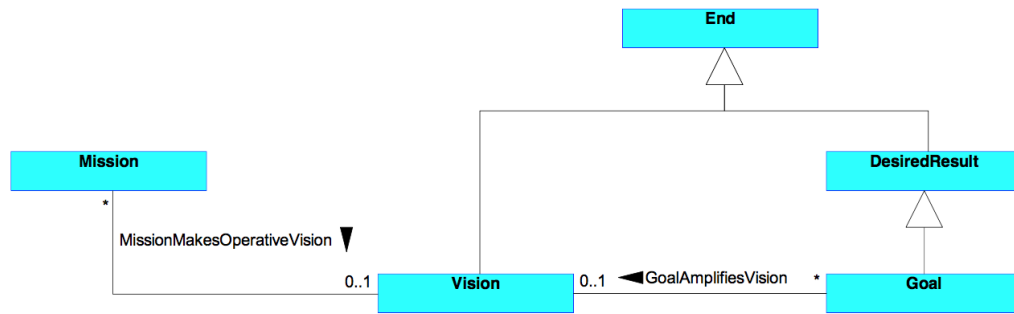
Aggregation: “The aggregation relationship indicates that an element groups a number of other elements” ([2]; §5.1.2). Aggregation is always permitted between elements of the same type in the ArchiMate language.

Serving: “The serving relationship models that an element provides its functionality to another element” ([2]; §5.2.1). The definition makes it clear that this can only apply to behaviors.

Specialization: “The specialization relationship indicates that an element is a particular kind of another element” ([2]; §5.4.1).

¹⁴ The UML association labels are also expressed in the BMM as “fact types” using the Structured English style recommended in the SBVR ([1]; §9).

Vision Association with Mission

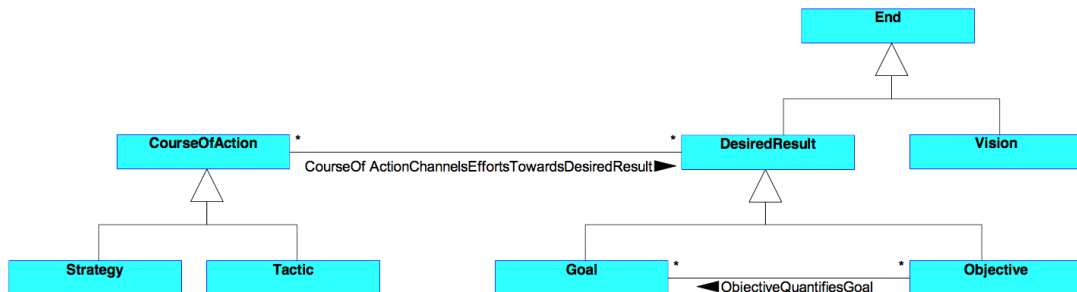


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Figure 14: BMM Vision Association with Mission ([1]; Fig. 8.2, used with permission)

BMM Association	Possible ArchiMate Relationships	Notes
Mission <i>makes operative</i> Vision.	Mission <i>realizes</i> Vision.	
Goal <i>amplifies</i> Vision.	Goal <i>influences</i> Vision.	Note the multiplicity – a Goal may not be part of a Vision.

Course of Action Association with Desired Result

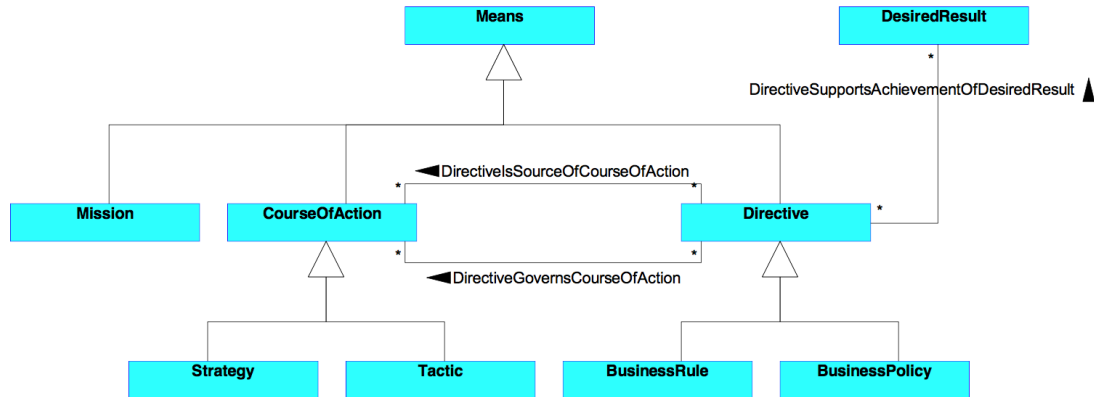


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Figure 15: BMM Course of Action Association with Desired Result ([1]; Fig. 8.3, used with permission)

BMM Association	Possible ArchiMate Relationships	Notes
Course of Action <i>channels efforts towards</i> Desired Result.	Course of Action <i>realizes</i> Outcome. Course of Action <i>realizes or influences</i> Goal.	
Objective <i>quantifies</i> Goal.	Outcome <i>realizes</i> Goal. Goal <i>influences</i> Goal. Goal <i>aggregates</i> Goal.	High-level Goal aggregates lower-level Goals, suggesting a hierarchy.

Directive Association with Course of Action and End

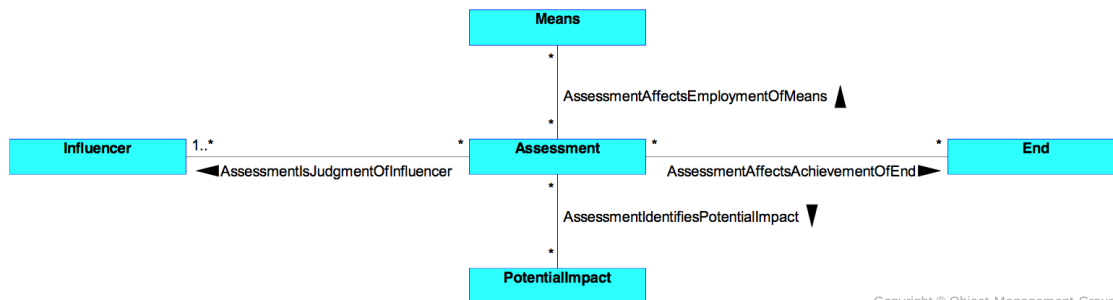


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Figure 16: BMM Directive Association with Course of Action and End ([1]; Fig. 8.8, used with permission)

BMM Association	Possible ArchiMate Relationships	Notes
Directive <i>supports achievement of</i> Desired Result.	Constraint or Principle <i>realizes</i> Goal. Constraint or Principle <i>influences</i> Goal.	
Directive <i>is source of</i> Course of Action.	Course of Action <i>realizes</i> Constraint or Principle.	
Directive <i>governs</i> Course of Action.	Constraint or Principle <i>associated with</i> Course of Action.	Association labeled as “governs”. <i>Influence</i> between Constraint or Principle and Course of Action is not currently permitted in the ArchiMate language.

Assessment Association with Means, End, and Influencer



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Figure 17: BMM Assessment Association with Means, End, and Influencer ([1]; Fig. 8.14, used with permission)

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BMM Association	Possible ArchiMate Relationships	Notes
Assessment <i>affects employment of Means.</i>	Assessment <i>is associated with</i> Course of Action.	<i>Influence</i> between Assessment and Course of Action is not currently permitted in the ArchiMate language.
Assessment <i>affects achievement of End.</i>	Assessment <i>influences</i> Goal.	
Assessment <i>is judgement of</i> Influencer.	Assessment <i>is associated with</i> Driver.	
Assessment <i>identifies</i> Potential Impact.	Assessment <i>aggregates</i> Assessments.	

BMM Modeled using the ArchiMate 3.0 Language

Overview BMM Model

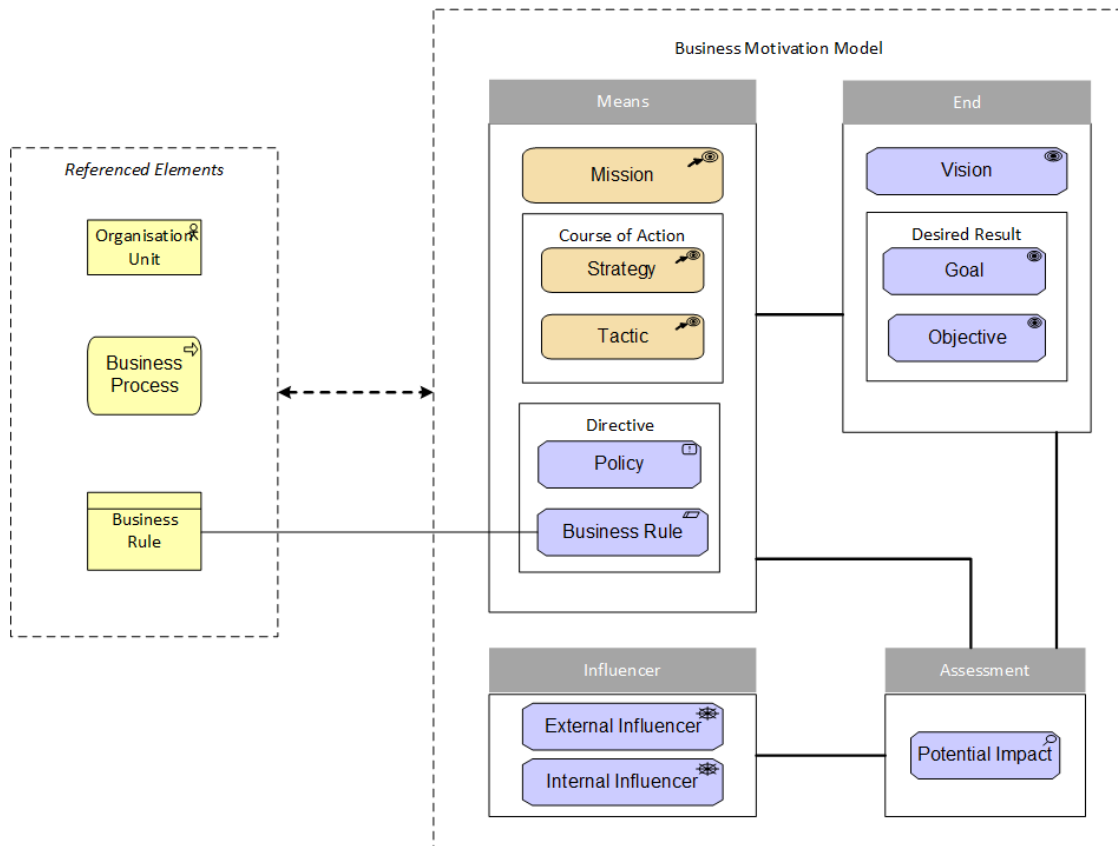


Figure 18: BMM Overview Modeled using the ArchiMate 3.0 Language (based on [1]; Fig. 7.1, used with permission)

BMM Core Concepts

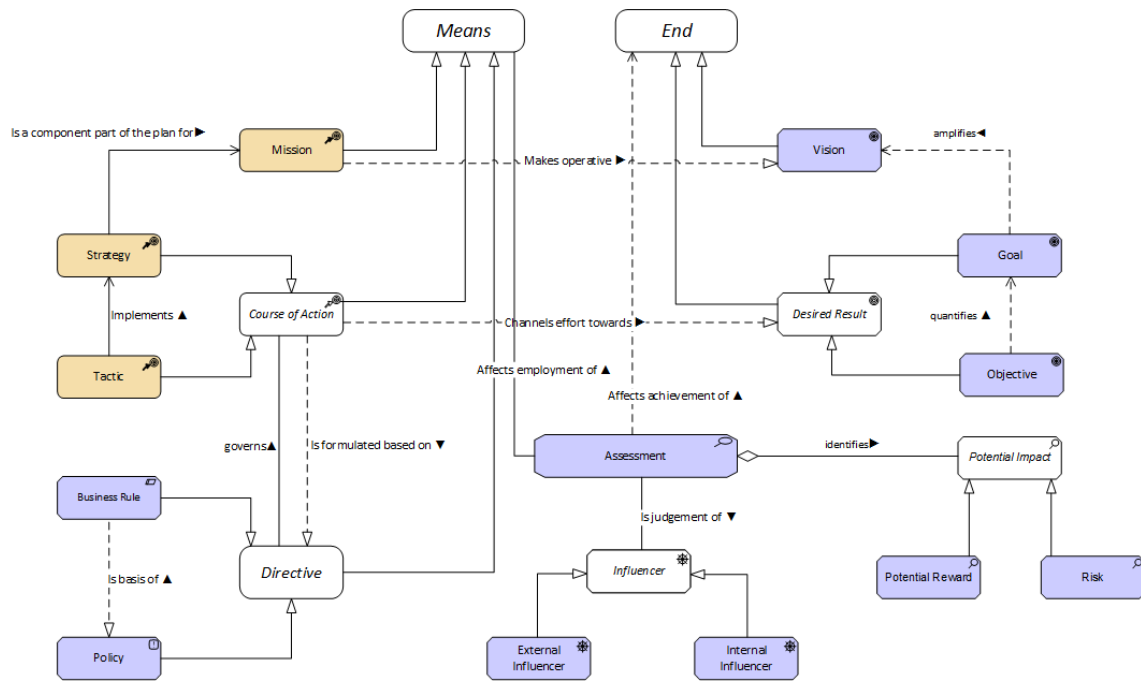


Figure 19: BMM Core Concepts Modeled using the ArchiMate 3.0 Language (based on [1]; Fig. 7.3, used with permission)

This diagram is based on the BMM Core Concepts diagram [1]. However, some details in the original have been omitted as they are deemed irrelevant to this White Paper:

- *Category* concepts have been omitted, of which there are several in the original
- Recursive relationships have been omitted
- Some redundant relationships, that could be inferred from others, have been omitted
- The concept of *Influencing Organization* has been omitted, although this could have been mapped to an ArchiMate Stakeholder

There is a restriction, however, imposed on an *Influencing Organization* by the BMM, which is that it can only be associated with an *External Influencer*. There is also the question as to whether all *Influencing Organizations* would necessarily be stakeholders in the ArchiMate sense.

Example: Using the ArchiMate Language to Express Motivation in the Style of the BMM

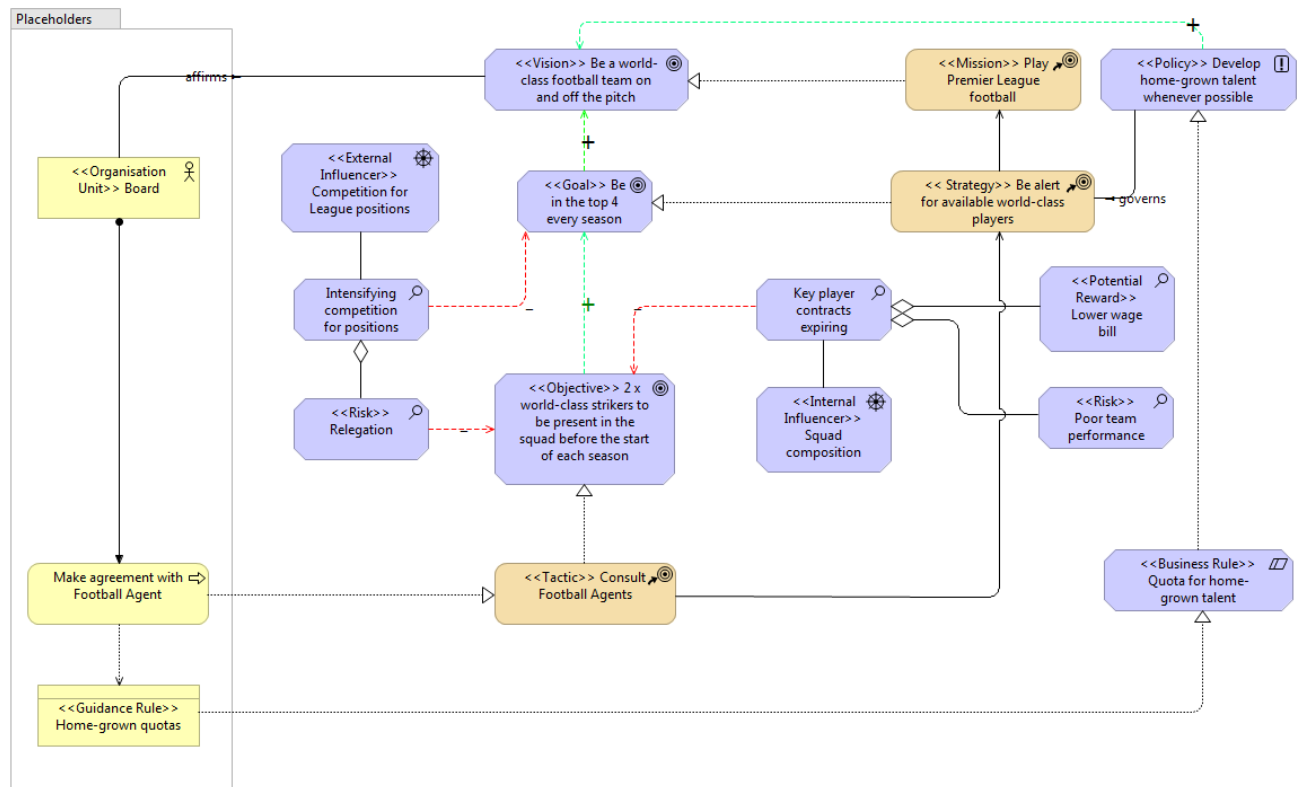


Figure 20: Melchester Rovers Motivation and Governance Model in the Style of the BMM

This fictitious scenario has been constructed to show at least one example of each concept in the metamodel of Figure 19. The narrative implicitly follows the processes described in Figure 12.

This enterprise’s “reason to be” is expressed in its Vision/Mission: “Be a world-class football team on and off the pitch by playing Premier League football”.

Given the Vision/Mission, a significant External Influencer is the intensity of competition for positions in the Premier League. Too low a position for a team can lead to relegation, while top positions can lead to lucrative Champions League football in Europe.

“Squad composition” is a relevant Internal Influencer, since it underpins the ability to field a full strength team every match.

The leadership team thinks there is the need for a Business Policy to “Develop home-grown talent whenever possible” to reflect its Vision accurately, especially its social responsibilities “off the field”.

A recent Assessment of the competition for league positions judges that the competition is intensifying. This brings with it a Risk of relegation.

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An Assessment of “Squad composition” reveals that some key player contracts are expiring soon. While there is a Potential Reward in terms of a “Lower wage bill”, there is also a Risk of “Poor team performance”.

A strategic Goal is therefore created to remain within the top four positions in the Premier League. One strategic Course of Action that supports this is to be continuously alert for available world-class players.

The strategic Goal is supported by a tactical Objective to ensure at least two world-class strikers are present in the squad before the start of each season. The Objective is realized in part by a tactical Course of Action to “Consult Football Agents”. The Objective would be threatened by relegation, if it happened, since it would be harder to attract world-class players.

The “home-grown” policy has been partly manifested as a Business Rule that guides management on squad selection and recruitment. This rule is, however, for guidance only.

The example illustrates possible connections with Placeholders, as defined by the BMM:

- The Board Of Directors (Organization Unit) affirms the Vision
- The Course of Action to “Consult Football Agents” is realized by a Business Process “Make agreement with Football Agent”
- The Business Rule “Quota for home-grown talent” is realized by a Guidance Rule (Business Object) “Home-grown quotas”

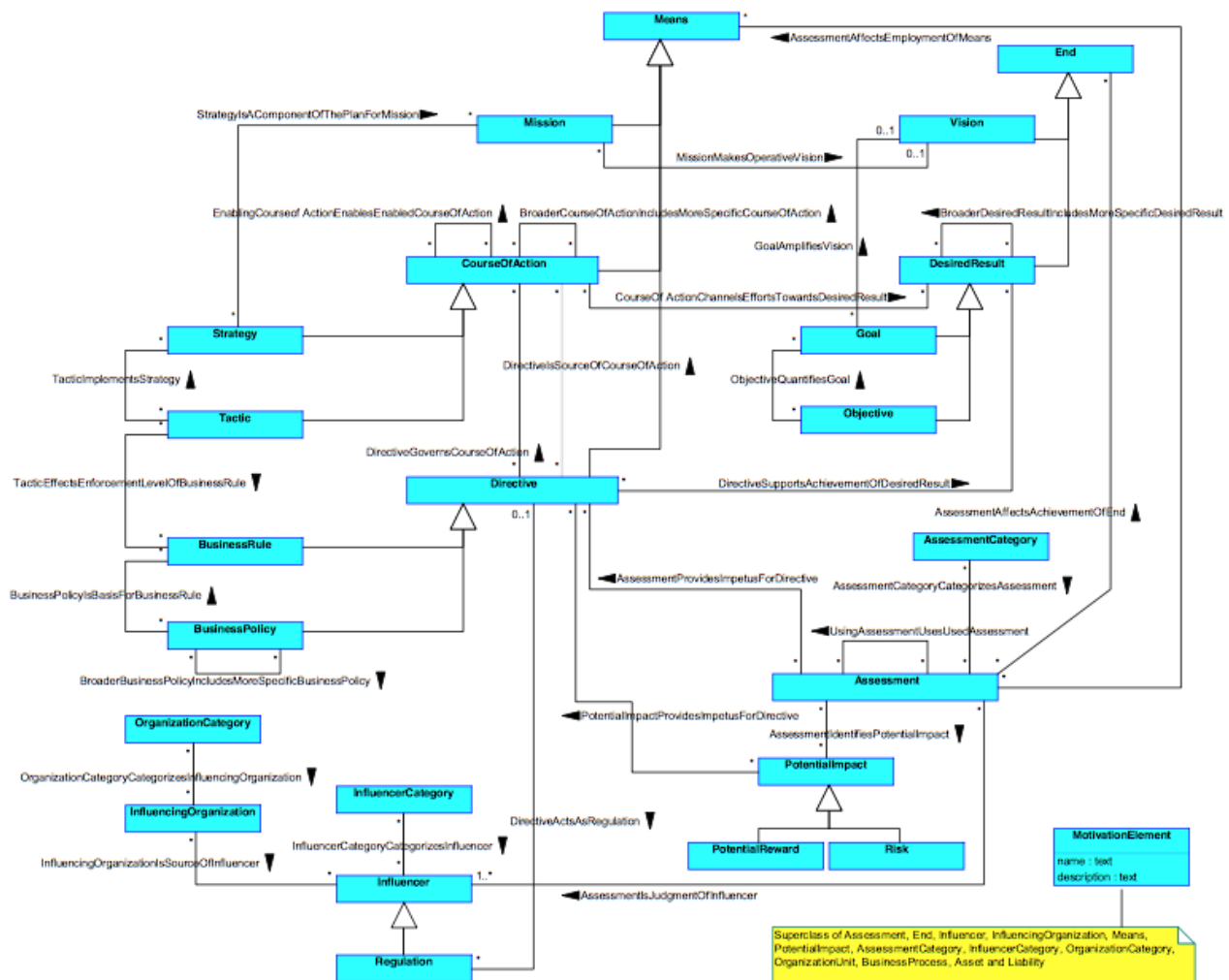
Adding Additional ArchiMate Motivation Elements

The example could be enhanced by adding in additional elements from the ArchiMate palette of motivation and strategy elements. For example:

- **Stakeholders** could be added such as “Owner’s Representative” and the club “Manager”; they could be associated, for example, with the Assessments shown
- **Value** could be included; for example, a Value Proposition “Provide Entertainment” could be associated with the Vision
- **Meaning** could be included; for example, the Meaning of the “top four place” is the “opportunity to play Champions League football”
- **Capability and Resource**; for example, a “world-wide talent scouting” Capability could realize the strategy mentioned, with “scouting teams” assigned as Resources
- **Requirement**; for example, the Capability mentioned above could realize a Requirement to “Recruit world-class players”

ANNEX A: BMM Diagrams

BMM Core Concepts Diagram ([1]; Fig. 7.3)¹⁵



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¹⁶ Used with permission from OMG.

References

(Please note that the links below are good at the time of writing but cannot be guaranteed for the future.)

- [1] Business Motivation Model™ (BMM™), Version 1.3, Object Management Group (OMG); refer to: www.omg.org/spec/BMM. (Note: You may also see references to a BRG version of BMM. The BMM Specification was given to OMG by BRG, but OMG BMM, Version 1.3 is the latest stable version.)
- [2] ArchiMate® 3.0 Specification, an Open Group Standard (C162), June 2016, published by The Open Group; refer to: www.opengroup.org/bookstore/catalog/c162.htm.
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