Are Capabilities Architecture?

There has been a lot of discussion on some business architecture forums lately about the relationship between capabilities and processes and their role in business architecture. Some practitioners feel that processes provide the focus necessary to lead a business optimization or improvement activity and that capabilities provide nothing new that isn’t already being done. Other’s feel that a process isn’t always the right focus (such as a merger or divestiture) and that capabilities provide a much more flexible / architectural / enterprise approach.

I wrote about this last year in my Column “Process, Value Stream, Capability”. In it, I tried to differentiate (more or less successfully) between the IT centric BPMN process, and the higher-level End-to-End Process that would be part of a Business Process Architecture. It is primarily the lower-level, IT focused process that is considered an implementation artifact, rather than an architectural one, leading some to say that processes are not part of business architecture.

After much discussion and hundreds of posts, the consensus (if it could be called that) seems to be that capabilities are a description of ‘what’ the business does whereas processes are one way to describe ‘how’ the business does them. Both have their place in a business architecture approach. Capabilities are realized by some combination of organization, process, and information. Organization, process and information may be realized by some combination of people, systems, and technology. Capabilities by themselves only provide an indication of ‘what’. Value chains, value streams, processes, and business scenarios provide the context within which decisions about the ‘what’ can be made. For example, which capabilities are more or less important to strategy or other initiatives? How do we prioritize and allocate investments in these capabilities?

Also from the discussion, there was some convergence around the idea that many people (myself included) find that capabilities are a good fundamental organizing principle for business architecture. By separating the capability from it’s realization we find that a big picture insight is easier to achieve, and that we can then focus on a variety of perspectives of the business such as value, process, or optimization. Other practitioners find that a value stream or process are a fundamental organizing principle for business architecture. Of course, what you think is the best approach will depend on the problem you’re trying to solve (your architectural goals), and your particular world view, as formed by your experience.

In the discussion, an interesting question was raised by BPTrends author Ralph Whittle: who asks: “Are Capabilities Architecture?” To examine this question we need to know what architecture is. Again, like capabilities and processes, there are many interpretations of what this means. One common definition of architecture is: ‘the structure of fundamental elements and their relationships within an environment”. If we say that the business is the environment, that capabilities, information, organization, and value are fundamental elements, and that the mappings between them are the relationships, then business architecture and capabilities easily
fits this description.

But to some, this is too subjective. So, let's look at a more objective source for defining architecture: “ISO/IEC/IEEE 42010:2007, Systems and Software Engineering -- Recommended Practice for Architectural Description of Software-intensive Systems”. This is an international standard for how to describe architecture, not for what architecture should describe. The major concepts of 42010 include:

- A system is "a collection of components organized to accomplish a specific function or set of functions."
- A system exists within an environment (or context), where “the environment determines the boundaries of the system relative to other systems”.
- A system has one or more stakeholders.
- A stakeholder has one or more concerns relative to the system. Concerns are "those interests which pertain to the system’s development, its operation or any other aspects that are critical or otherwise important to one or more stakeholders."
- A system has an architecture which can be described in an architectural description.
- The architectural description can be divided into views which are "a representation of a whole system from the perspective of a related set of concerns." Each view addresses one or more stakeholder concerns.

So, let's briefly look at how to apply this definition to capabilities and business architecture.

- system, components – the system is the business, and the ‘components’ that make it up are the capabilities, information, etc.
- environment – the context of the enterprise, its market, competitive, regulatory, etc. environment
- stakeholders – the organizations and internal and external actors of the business, such as customers, suppliers, business operations, etc.
- stakeholder concerns – value, as illustrated in value streams
- architectural description and views – these are the capability model, information model, organizational model, value streams, and the mappings between them.

I think we can reasonably conclude that business architecture and capabilities can meet these criteria. But, 42010 also defines conformance, including: identifying the key stakeholders for the architecture, separating the description into views, defining techniques for documenting each of these views, and insuring consistency between views. There has been a lot of work in terms of business architecture and capabilities published here and other forums that addresses the stakeholders, views and techniques, so again, I think we are safe in saying that capabilities can fit within this description.

There are, of course, other ways to think about what is or is not architecture. For example, John Zachman distinguished between architecture and engineering in terms of primitives and composites. Another approach is to formalize architecture in terms of an architectural model (or metamodel). In fact, this is key to achieving the consistency between views that 42010 conformance requires. Following this train of thought, if we agree that architecture is “the structure of fundamental elements and their relationships within an environment”, then the underlying model needs to define the scope of the environment and what types of elements and relationships exists. That model then provides the structure on which an architectural framework can be applied.

Now we can wonder what the best structure for that underlying model might be. There are two common and related approaches, one is to define an ontology, another is to define a meta-model. For example, the Zachman Framework was actually renamed in its version 3 to be subtitled “The Enterprise Ontology”. Other frameworks, such as TOGAF or DoDAF are based on formal meta-models.
Wikipedia tells us that “meta-models are closely related to ontologies. Both are often used to describe and analyze the relations between concepts:

- “An ontology formally represents knowledge as a set of concepts within a domain, and the relationships between pairs of concepts. It can be used to model a domain and support reasoning about entities. An ontology renders shared vocabulary and taxonomy which models a domain with the definition of objects and/or concepts and their properties and relations.”

- "Metamodeling" is the construction of a collection of "concepts" (things, terms, etc.) within a certain domain. A model is an abstraction of phenomena in the real world; a metamodel is yet another abstraction, highlighting properties of the model itself."

The meta-model is not a part of the target ontology. Rather, its functions are to explicitly represent the underlying design principles and to establish common standards and constraints for the design and organization of the target ontology. Thus, the meta-model ensures a consistent modeling style across the ontology. And, if you want to get really ethereal, there is even a metamodel for defining ontologies, called the Ontology Definition Metamodel (ODM) published by the Object Management Group (OMG) that provides consistency in designing ontologies.

While ontologies are important to technology, they have a much longer history in the realm of philosophy. So we might find it insightful to look back at how they are used there. Metaphysics is the philosophical study of the nature of being, existence, or reality, as well as the basic categories of being and their relations. Ontology, a subfield of metaphysics, deals with questions concerning what entities exist or can be said to exist, and how such entities can be grouped, related within a hierarchy, and subdivided according to similarities and differences.

So, relating this to our architecture discussion, the domain (or environment) is the business, where the ontology defines what entities exist in that domain, and the categories and hierarchies of those entities. The metamodel is a formal representation of the entities and their relationships. The meta-model defines how the generic business architecture concepts, as defined by the ontology, are related. A business model uses the rules and concepts of the metamodel to define the specifics of a particular business.

For example, an ontology for business architecture identifies such concepts as capabilities, information, value, organization, etc., and further refines the concepts into more details, categories and hierarchies. The metamodel defines the explicit relationships between these concepts and the rules for combining them. A particular business architecture identifies the actual capabilities, information, value, etc. for a specific business (for example customer management, product, profit) and the relationships (mappings) between them.

There are several examples of good architecture meta-models that include capabilities as a fundamental entity, including models from the OMG, Business Architecture Guild, and an interesting model from Enterprise Architect Nick Malik (http://msdn.microsoft.com/en-us/architecture/aa699429.aspx).

So getting back to the original question, "are capabilities part of business architecture", I feel confident that we can say "Yes". We can clearly align this with the common definition of architecture, and with the more rigorous definition provided by international standards. Finally, we can also define a consistent ontology and formalize it with a metamodel, and then successfully apply that across a variety of viewpoints, at different levels of abstraction, to achieve architectural goals.
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