Chapter 10
A Model-Based Approach to Aligning Business Goals with Enterprise Architecture

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ABSTRACT
Modern organizations need to address increasingly complex challenges including how to represent and maintain their business goals using technologies and IT platforms that change on a regular basis. This has led to the development of modelling notations for expressing various aspects of an organization with a view to reducing complexity, increasing technology independence, and supporting analysis. Many of these Enterprise Architecture (EA) modelling notations provide a large number of concepts that support the business analysis but lack precise definitions necessary to perform computer-supported organizational analysis. This chapter reviews the current EA modelling landscape and proposes a simple language for the practical support of EA simulation including business alignment in terms of executing a collection of goals against prototype execution.

INTRODUCTION
Business and IT alignment has remained an ongoing concern for organizations since the 1980s (Luftman, 2000). Throughout this period, researchers have addressed the importance of alignment and in particular the need for congruence between business strategy and IT strategy (Chan & Reich, 2007). While there are multiple definitions for Business and IT Alignment (BIA) including integration, linkage, bridge, fusion or even fit, most are consistent with the definition derived from the Strategic Alignment Model (SAM) (Henderson & Venkatraman, 1993). They state that alignment is the degree of fit and integration among business strategy, IT strategy, business infrastructure, and IT infrastructure.

Enterprise Architecture (EA) aims to capture the essentials of a business, its IT and its evolution, and to support analysis of this information: it is a coherent whole of principles, methods, and models that are used in the design and realization of an enterprise’s organizational structure, business processes, information systems and infrastructure.
A Model-Based Approach to Aligning Business Goals with Enterprise Architecture (Lankhorst, 2009). In addition to presenting a coherent explanation of the what, why and how of a business, EA aims to support specific types of business analysis including: alignment between business functions and IT systems, and business change describing the current state of a business (as-is) and a desired state of a business (to-be). Thus EA has the potential to serve as the basis of machinery that can be used to address BIA (Wang, Zhou & Jiang, 2008; Pereira & Sousa, 2005).

Various informal frameworks have been proposed for expressing EA, business goals and BIA including SAM, TOGAF, ArchiMate, BMM, KAOS and i*. In general these methods and technologies support a wide range of business facing modelling concepts that are appropriate for the business analyst, but that present problems in terms of a precise analysis of business alignment.

In general, BIA involves comparing business goals with business design. Goals express the why of an organization in terms of requirements, motivations, policies, and regulations. Business designs express the how of an organization either in terms of business processes and information structures, or in terms of configurations of software components. As such, BIA can be viewed as verifying that the operational aspects of a business are correct with respect to the required behaviour.

The view of BIA raises similar issues to software verification where a system implementation must be shown to be correct with respect to a system requirement. Many formal and informal techniques have been developed over the last 40 years that aim to support this process for software development. Our proposal is that these techniques are appropriate for BIA; however, they must be modified in order to accommodate the broader nature of organizational architecture.

In particular, it would be interesting to leverage the precise nature of software requirements expressed in formal logic. A significant problem with such an approach is that EA model tend to be discursive and business facing and therefore lack a precise semantics would be necessary for a logic-based language to be used to express the goals. Our proposal is to provide a small and well-defined collection of modelling concepts into which the business concepts can be mapped (Clark, Barn & Oussena, 2012). Given such a precise basis, business goals can then be expressed using a formal language.

Business goals fall into two different areas: behavioural requirements for an organization and non-functional requirements. Our claim is that a precise basis for an EA model is necessary to facilitate definitions and analysis of both of these types of goal. In order to effectively express non-functional business goals, the organizational model must be both precise and provide a means to measure a given non-functional property as a function of the model (or its semantics). For example, a quality based attribute such as reliability requires that the model associate each structural and behavioural feature of the organization with a reliability function such that a goal can be expressed in terms of an invariant over the value of the function, or a relative change in the case of an as-is and to-be business change. This chapter does not address non-functional goals, however our approach is described in (Barn & Clark, 2012).

Behavioural goals express a required behaviour for an organization. Work on intentional systems development such as KAOS has proposed a formal language for expressing behavioural goals similar to that used for specifying the dynamic behaviour of software systems. Having expressed the behavioural goal, the question arises: how to achieve BIA?

Having represented the goal in a precise way, it follows that the organizational architecture must be represented in a precise way to support BIA. However, there is a lack of consensus regarding a precise language for EA since, as described above, current EA languages tend to be business facing and to provide a rich collection of (often overlapping) business modelling concepts.

Furthermore, having such a precise basis for both what and how in EA does not guarantee an
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