White Paper

ArchiMate® 2.0: The First Modeling Language to Make TOGAF® 9.1 Practical

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Louw is a Managing Partner at CS Interactive Training, a specialist IT consultancy focused on providing methodology consulting, training and systems to organizations who need to build internal capacity within their Analysis, Architecture, Design, and Requirements Management environments. Louw is passionate about all aspects of information management and has had the opportunity to act as strategist, architect, speaker, trainer, analyst, modeler and developer within this field over the past 20 years.

The title of this white paper might upset some TOGAF practitioners, but my intention is not to dismiss TOGAF as a non-practical framework, but rather to highlight the importance of using modeling standards when developing architectures. I will start with a short introduction to TOGAF 9.1 and ArchiMate 2.0, highlighting key parts of these Open Group standards to create a context for the rest of the white paper.

TOGAF 9.1 was released on the 1st of December 2011, and the introductory chapter provides a good background on the benefits of using enterprise architecture in organizations. I just want to highlight a single benefit from this first chapter to emphasise the point that TOGAF is meant to support business transformation:

> "Any organization undertaking, or planning to undertake, the development and implementation of an enterprise architecture for the support of business transformation will benefit from the use of TOGAF."

I believe an organization will benefit from using TOGAF, but there is a gap that needs to be filled before TOGAF can be used consistently across organizations to support **business transformation.**

I believe that with the release of ArchiMate 2.0, this gap can be filled. To substantiate my claim that ArchiMate 2.0 is required to make TOGAF 9.1 practical I will use ISO 15704 (Requirements for enterprise-reference architectures and methodologies) as a generalised framework for

describing the components needed for an enterprise engineering or enterprise change initiative. The ISO 15704 standard includes an annex known as the Generalised Enterprise Reference Architecture and Method (GERAM) that I will use to graphically highlight the components required to successfully implement change in an organization.

I will conclude the white paper by briefly explaining how the ArchiMate 2.0 models support the different TOGAF 9.1 Architecture Development Method phases.

TOGAF® 9.1

The TOGAF 9.1 standard is logically divided into the follow Parts (see figure 1 for a graphical view): (source: http://pubs.opengroup.org/architecture/togaf9-doc/arch/welcome.html#tag_01_01)

- **PART I: Introduction**
  This part provides a high-level introduction to the key concepts of enterprise architecture and in particular the TOGAF approach.
- **PART II: Architecture Development Method (ADM)**
  The ADM describes a step-by-step approach to developing an enterprise architecture.
- **PART III: ADM Guidelines and Techniques**
  This part contains a collection of guidelines and techniques available for use in applying TOGAF and the TOGAF ADM.
- **PART IV: Architecture Content Framework**
  This part describes a structured meta-model for architectural artefacts, the use of re-usable architecture building blocks, and an overview of typical architecture deliverables.
- **PART V: Enterprise Continuum & Tools**
  This part discusses appropriate taxonomies and tools to categorize and store the outputs of architecture activity within an enterprise.
- **PART VI: TOGAF Reference Models**
  This part provides a selection of architectural reference models (The TOGAF Foundation Architecture and the Integrated Information Infrastructure Reference Model).
- **PART VII: Architecture Capability Framework**
  This part discusses the organization, processes, skills, roles, and responsibilities required to establish and operate an architecture function within an enterprise.

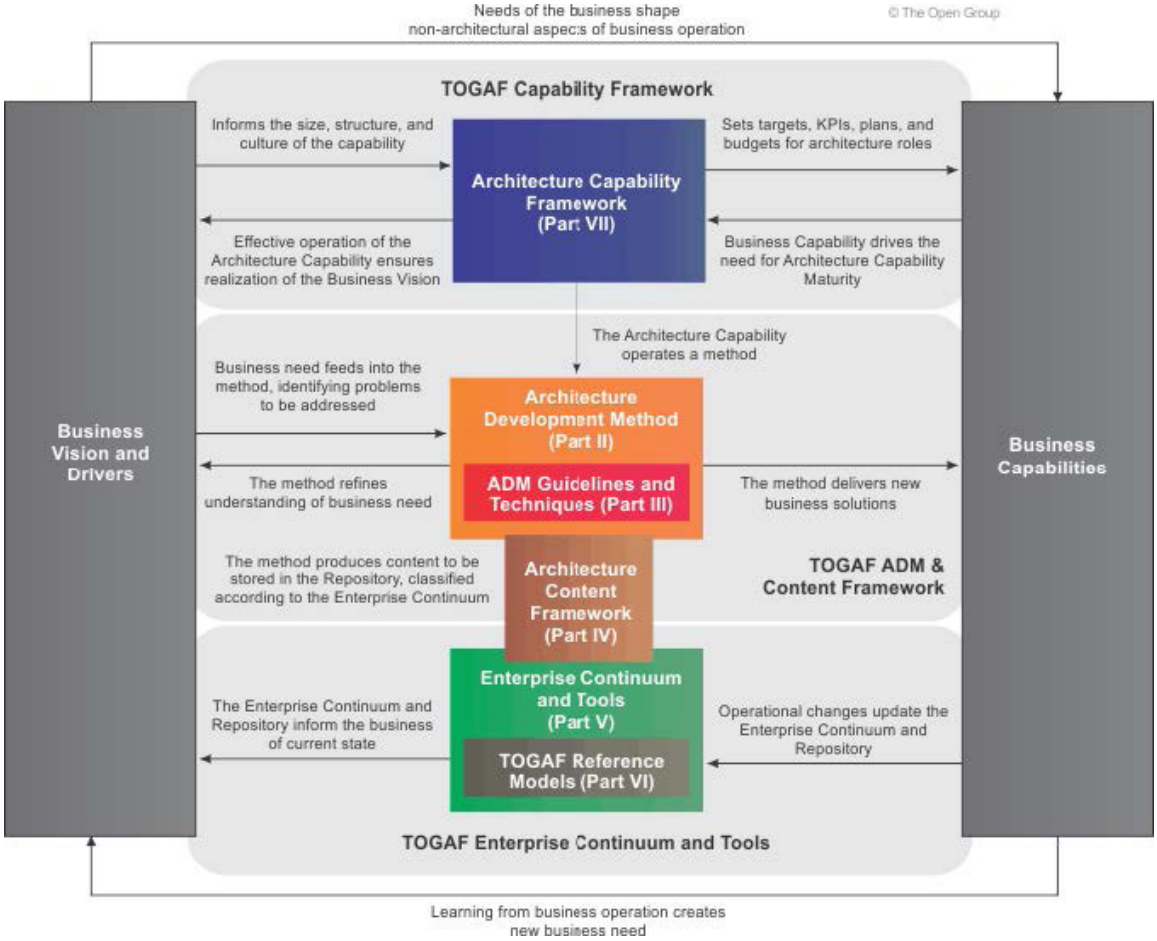

Figure 1: The structure of the TOGAF 9.1 Document
(Source: http://pubs.opengroup.org/architecture/togaf9-doc/arch/welcome.html#tag_01_01)

ArchiMate® 2.0

I found the following statement published on the Open Group ArchiMate forum's website very concise and to the point in explaining the purpose of the ArchiMate language:

> "Just like an architectural drawing in classical building architecture describes the various aspects of the construction and use of a building, ArchiMate offers a common language for describing the construction and operation of business processes, organizational structures, information flows, IT systems, and technical infrastructure. This insight helps stakeholders to design, assess, and communicate the consequences of decisions and changes within and between these business domains."
>
> http://opengroup.org/archimate/

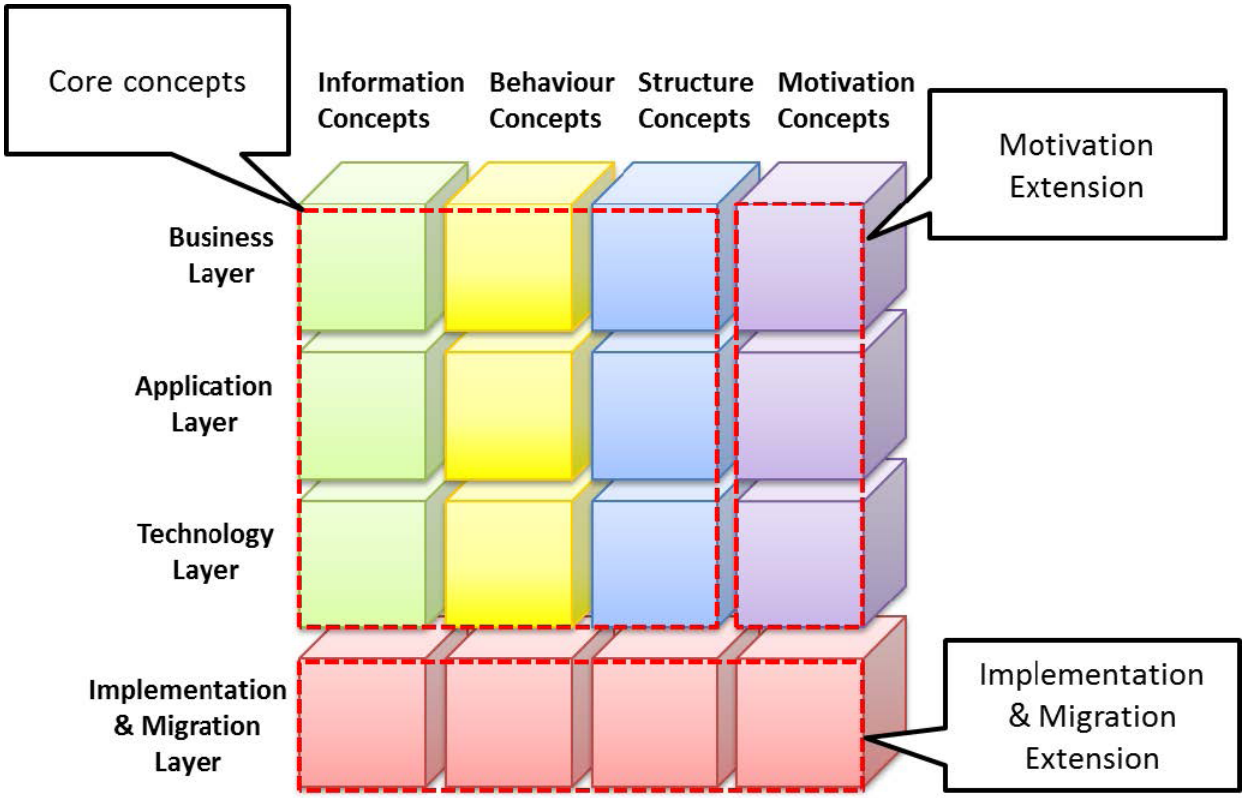

Figure 2: ArchiMate Core Concepts & Extensions

The ArchiMate Architecture Modeling Language can conceptually be represented as a matrix (see figure 2). The core of the language addresses behavioural, structural and information concepts through business, application and technology layers. ArchiMate 2.0 includes extensions to the core concepts that were originally defined in version 1 of the language. The motivational extension add additional concepts related to the management of requirements and planning of architecture initiatives, while the Implementation and Migration extension add an additional layer of realization that assist architects with implementation and architectural concepts.

Using ArchiMate® to make TOGAF® practical

Is TOGAF 9 a good architecture framework? Is it good enough to support the diverse group of organizations that need architectural support?

In short the answer is yes, I conducted my own research and experiments (I will give more detail about this in a later white paper for those who are interested) and decided to use the Generalised Enterprise Reference Architecture and Methodology (GERAM) as a framework in evaluating TOGAF.

> "GERAM is intended to facilitate the unification of methods of several disciplines used in the change process, such as methods of industrial engineering, management science, control engineering, communication and information technology, i.e. to allow their combined use, as opposed to segregated application."

While reviewing GERAM I also highlighted the interdependence of methodology, notation and modeling repository (as indicated in Figure 3 below); I highlighted the main components defined in the GERAM overlaid with TOGAF 9, ArchiMate and iServer.

From Figure 3 it is clear that stakeholders from different disciplines need to share information and that using a software modeling or enterprise architecture modeling tool will enable different stakeholders to have a consistent view of the organization and that all changes can then be managed in a structured process.

Currently TOGAF does provide a good Enterprise Engineering Methodology with a well-established community of practitioners supporting the methodology, but although TOGAF also describe a set of viewpoints that is based on a Content Framework, the visualisation of and definition of the views created is not consistent and differs between organizations. There is also currently no consistent tool support either, leaving it up to practitioners to decide how to implement the different views in their organization or even different departments within the same organization.

The lack of tool support for the TOGAF Content Framework is also forcing practitioners to adapt languages like UML and BPMN and extending them beyond their intended purpose to address Enterprise Architecture issues and concepts.

In the following sections the main components defined by GERAM are discussed together with a brief overview on how TOGAF and ArchiMate support each component.

All definitions used below were extracted from the GERAM standard that is available here: http://www.ict.griffith.edu.au/~bernus/taskforce/geram/versions/geram1-6-3/v1.6.3.html#_Toc447291705

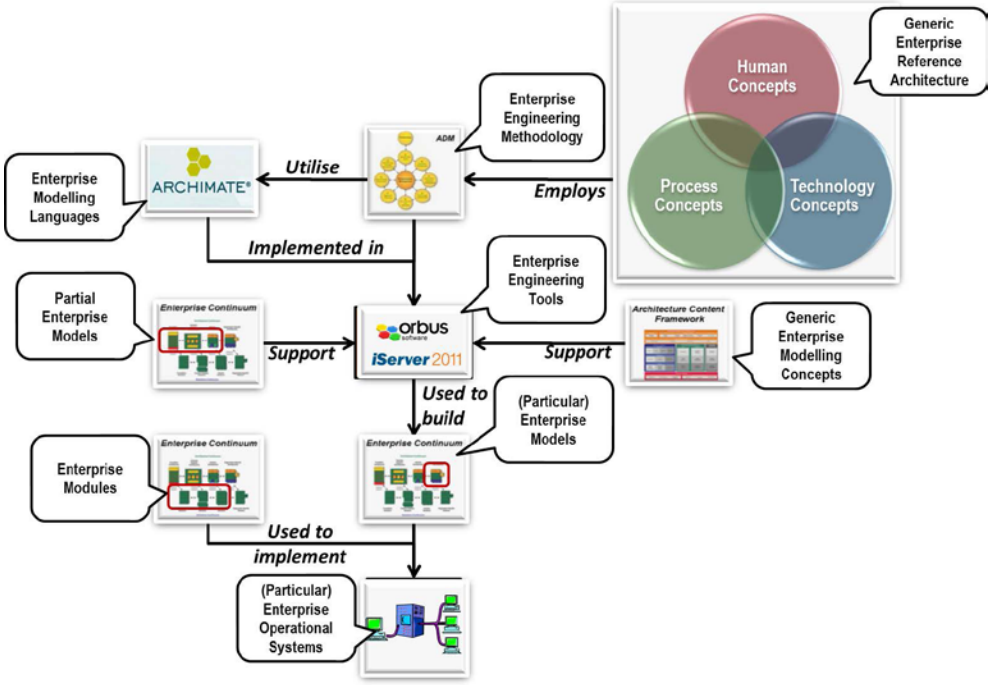

Figure 3: GERAM Conceptual Model – adapted from GERAM (http://www.ict.griffith.edu.au/~bernus/taskforce/geram/versions/geram1-6-3/v1.6.3.html#_Toc447291705)

Generic Enterprise Reference Architecture (GERA)

The Generic Enterprise Reference Architecture component defines the enterprise related generic concepts recommended for use in enterprise architecture / engineering and integration projects. These concepts are categorised as; Human Oriented, Process Oriented and Technology Oriented concepts. The complexity of representing these concepts in a single model is overcome by the use of views where only certain aspects of the enterprise model are visualized, depending on the perspective required.

TOGAF 9 uses a viewpoint library to hide complexity from stakeholders when creating integrated enterprise models. The views defined in TOGAF 9 are based on an integrated meta-model and the change to a single model or view is reflected throughout the integrated model.

ArchiMate provide similar functionality with the added benefit that with ArchiMate 2.0 you now have the motivation extension that can be used to model the stakeholder, viewpoint and concern in a standard notation that can be used to create more consistent stakeholder viewpoint definitions.

Enterprise Engineering Methodology (EEMs)

EEMs describe the processes that must be followed when performing the enterprise engineering or enterprise architecture activity. According to GERAM, an enterprise engineering methodology may be expressed in the form of a process model or structured procedure with detailed instructions for each enterprise engineering and integration activity.

The TOGAF 9 Architecture Development Method is the core of the TOGAF standard and detail process steps are described and explained in the standard TOGAF 9.1 document, available for online viewing at http://www.togaf.info.

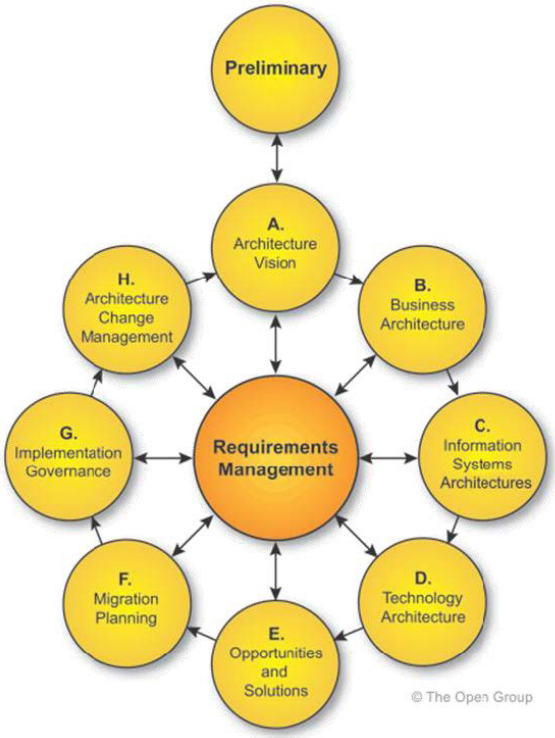

Figure 4: The TOGAF 9 Architecture Development Method
(Source: http://pubs.opengroup.org/architecture/togaf9-doc/arch/welcome.html#tag_01_01)

Enterprise Modeling Languages (EMLs)

EMLs define the generic modeling constructs for enterprise modeling adapted to the needs of architects who are creating and stakeholders who are using enterprise models.

In particular enterprise modeling languages will provide constructs to describe all the concepts defined within the Generic Enterprise Reference Architecture, including Human, Process and Technology concepts.

TOGAF does provide a meta-model for use in defining these concepts, but the framework is modeling notation agnostic.

ArchiMate 2.0 was developed as a specific Enterprise Modeling Language that adheres to the requirements of this component. With the release of ArchiMate 2.0, the working relationship between the Architecture Forum and ArchiMate forum is quite evident. Together they ensure that the ArchiMate language is tightly aligned and integrated into the TOGAF 9.1 Architecture Development Method, allowing seamless integration for architects using these standards together.

In figure 6 below the different TOGAF 9.1 ADM phases are plotted onto the ArchiMate Conceptual Framework.

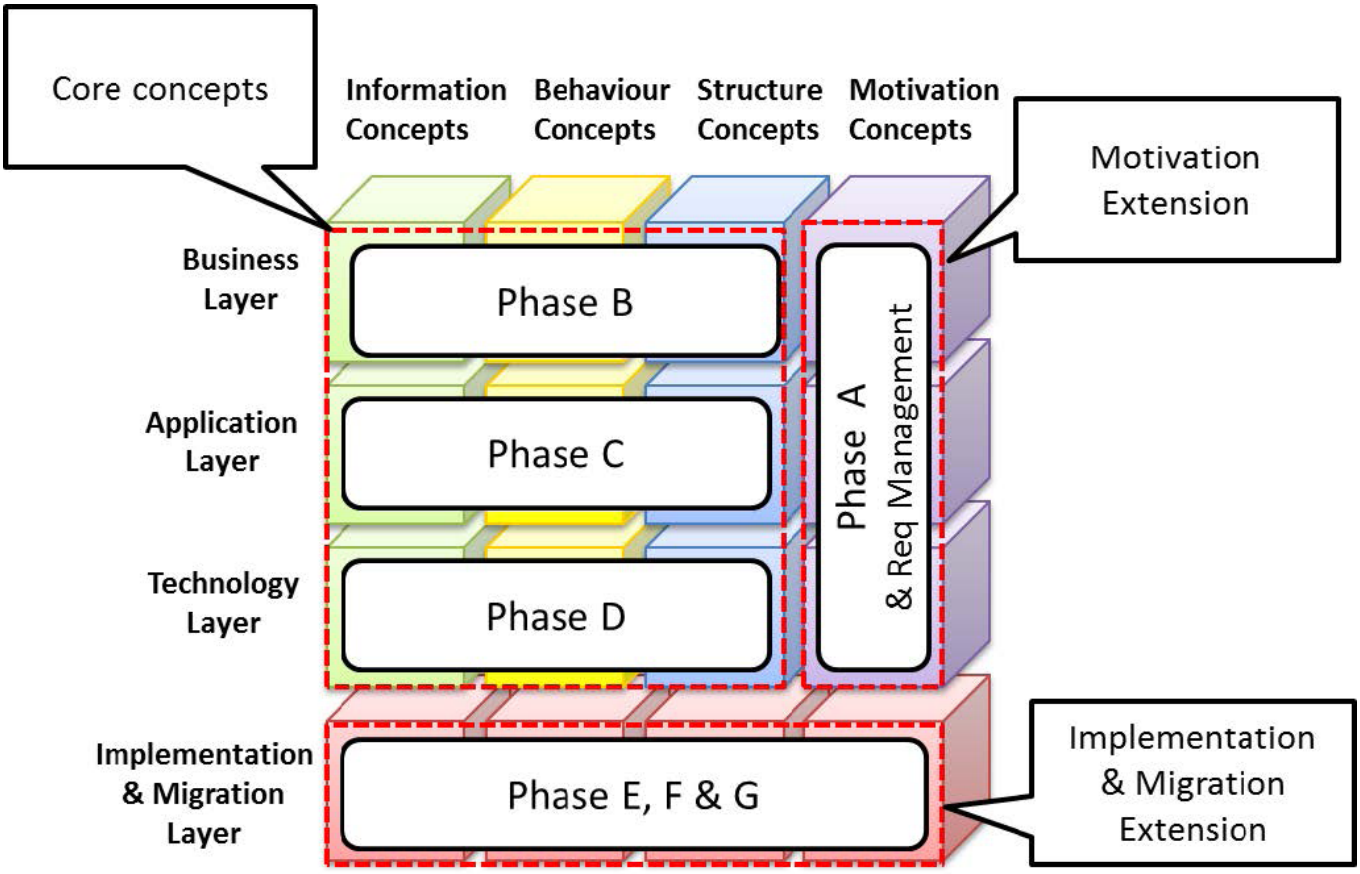

Figure 5: TOGAF ADM mapped to ArchiMate conceptual framework

The core ArchiMate language supports the traditional TOGAF Architecture domains as described in the TOGAF Architecture Development Method (ADM) phases B, C and D.

An example view that might be created is the Application Usage view, which is created during Phase C of the ADM.

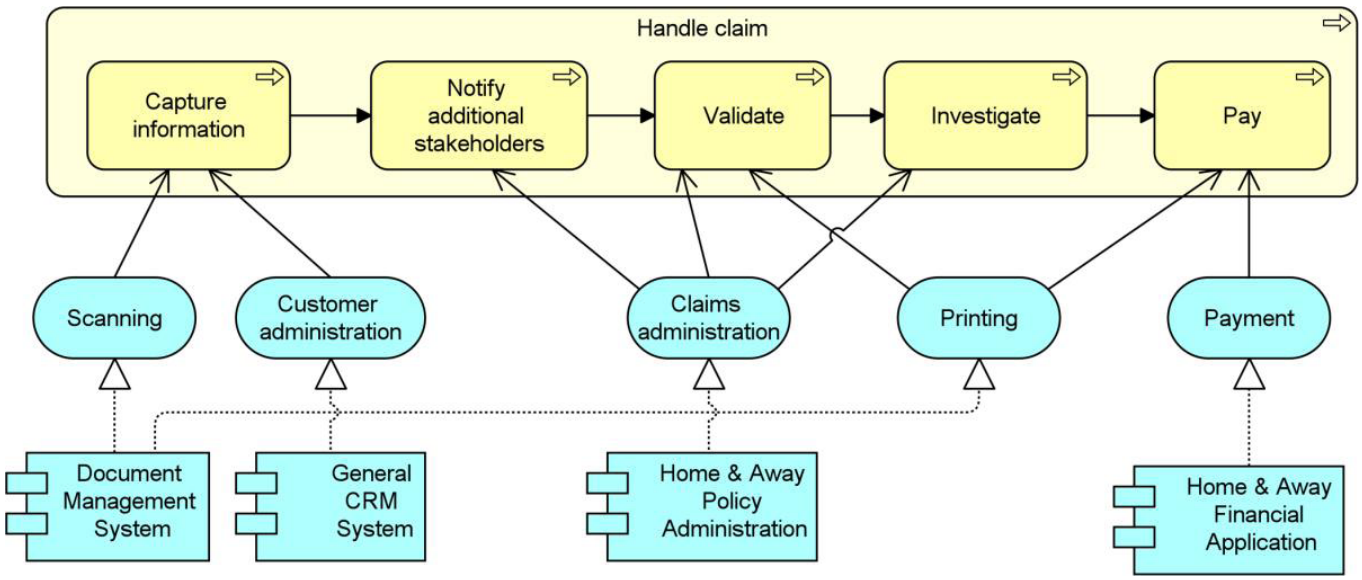

Figure 6: Application Usage View

Phase A of the Architecture Development Method is important for planning and currently there are only 2 diagrams defined with TOGAF that deal with the specific Phase A scoping and project management issues.

The example Goal Refinement View is a good example of how the use of standardized views and language notation allow for easier comprehension.

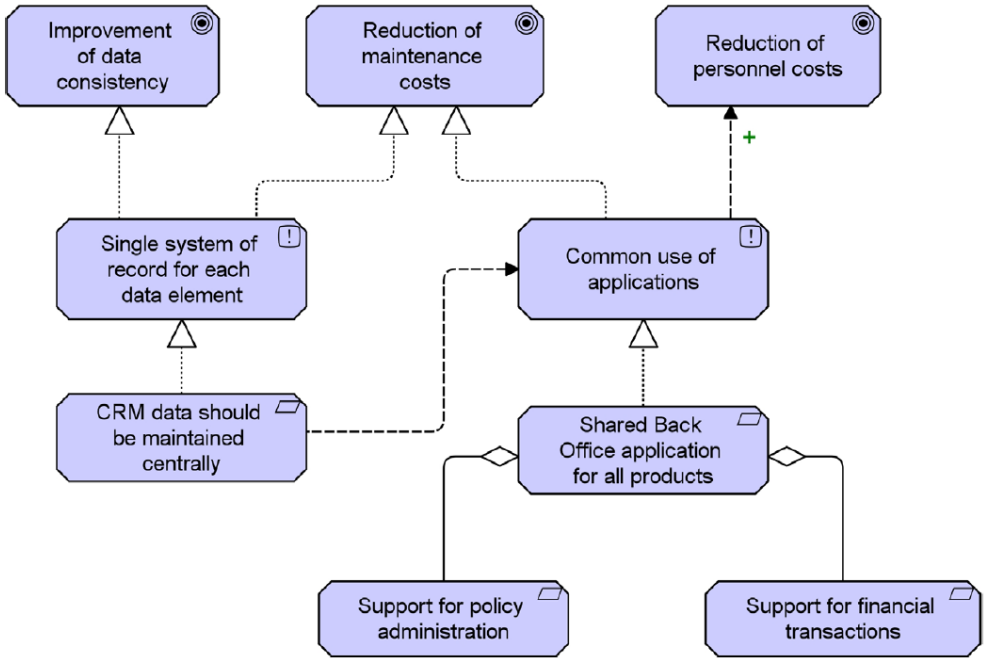

Figure 7: Goal Refinement View (Source: ArchiMate Pocket guide Open Group publication G121)

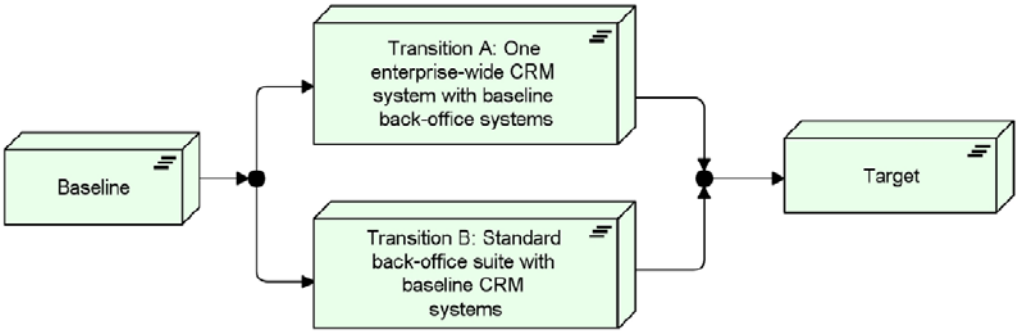

Figure 8: Migration View

Generic Enterprise Modeling Concepts (GEMCs)

GEMCs define and formalize the most generic concepts of enterprise modeling. Generic Enterprise modeling concepts may be defined in various ways. In increasing order of formality generic enterprise modeling concepts may be defined as:

- Glossaries
- Meta-models
- Semantic-meanings (Typically, built inside the engineering tools).

The TOGAF 9 meta-model is available to use to when defining views and to assist with the definition of domain specific modeling languages. This

is an important element due to the fact that you might be tested, the best approach is to ensure that the meta-model is implemented in an architecture repository.

I would suggest this is the key component where the modeling language and the architecture tool come together. Not all organizations require exactly the same concepts to be modelled or configured, but by using a standard language and core meta-model structure, the concepts can be very easily migrated between tool environments or across organizations.

ArchiMate has a smart notation extension mechanism and any of the concepts defined in the current set of meta-models/conceptual frameworks can be extended.

bloody hell. Figure 10, 11 & 12 are the core and extension meta-models/ conceptual frameworks published by the Open Group as part of the ArchiMate standard.

ArchiMate Core Meta-model:

Enables modeling of the architecture domains defined by TOGAF

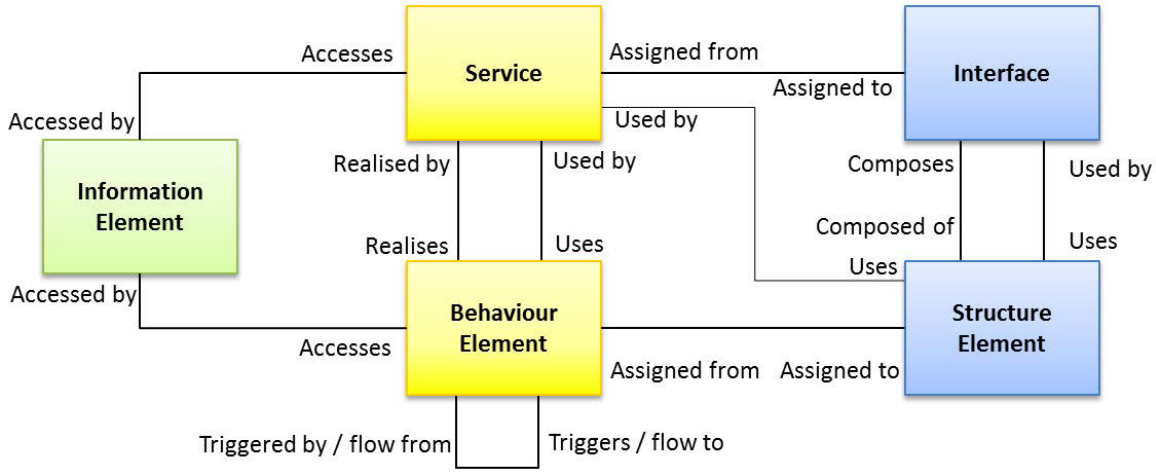

Figure 9: Core Conceptual Model

Motivation Extension Meta-model:

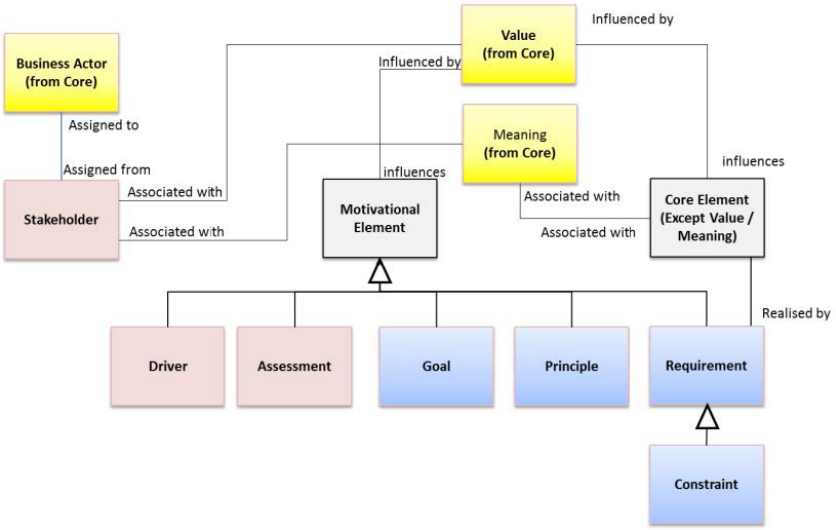

Figure 10: Motivational Extension

Implementation & Migration Layer Meta-model:

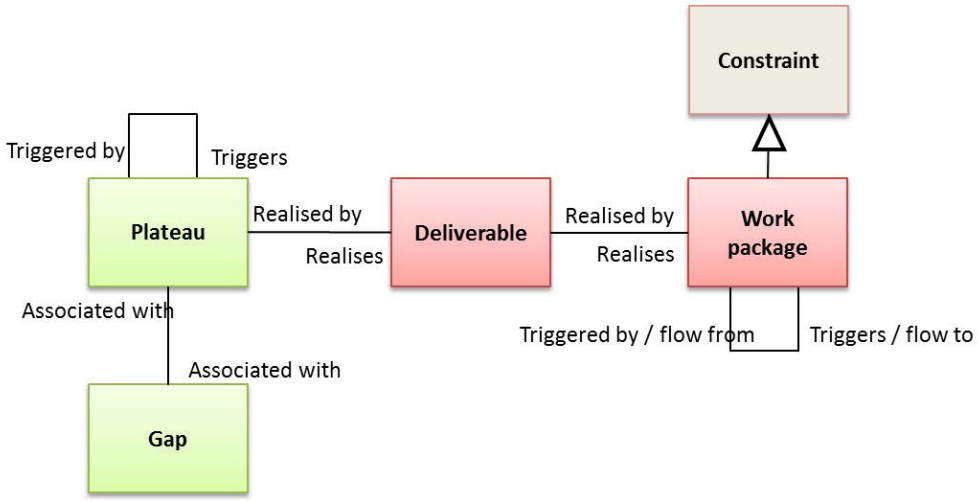

Figure 11: Implementation and Migration Extension

Enterprise Engineering Tools (EETs) EETs support the processes of enterprise engineering and integration by implementing an enterprise engineering methodology and supporting modeling languages. Engineering tools should provide for analysis, design and use of enterprise models.

TOGAF is an architecture framework and not a physical product; however Orbus Software does fully support a customized version of the TOGAF 9 implementation natively in its flagship product iServer. (See my white paper: Top 10 factors to consider when selecting a TOGAF 9 Repository).

Looking ahead I would be attracted to vendors in future that have native ArchiMate 2.0 support (in addition to TOGAF 9.1) in their roadmap because I would be able to leverage my knowledge and investment in ArchiMate 1.0, and moving between different departmental models should also be more seamless.

Conclusion

In conclusion, I believe that implementing TOGAF with ArchiMate 2.0 is making TOGAF more practical because:

1. It is standardizing concepts within organizations
2. Vendor and tool support for ArchiMate is shortening the learning curve and allows the architect to truly build an integrated repository
3. It provides a simple extension mechanism for organizations
4. The alignment of standard ArchiMate views with TOGAF ADM phases provide good guidance for organizations
5. New ArchiMate certification for people are embedding the principles and techniques on how to apply ArchiMate within an organizations – promoting standards and increasing efficiency

Finally I want to suggest that you read the white paper on Supporting Requirements Management in TOGAF and ArchiMate and especially have a look at the PRO-FIT Example . http://www.theopengroupbookshop.com/Documents/supporting_requirements_management_in_togaf_and_archimate.pdf

It is a great starting point for architects who are looking for a way to position the value of Enterprise Architecture to their organization.

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