

Experiences of Tool-Based Enterprise Modelling as Part of Architectural Change Management

Cameron Spence

Capgemini, Woking, United Kingdom
cameron.spence@capgemini.com
c.d.spence@pgr.reading.ac.uk

Vaughan Michell

University of Reading, Whiteknights, Reading, United Kingdom
vaughan.michell@reading.ac.uk

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Abstract: Enterprise Architecture is widely practised as a part of a strategic business change methodology and is often vital to successful business change. This paper examines the pragmatic use of enterprise architecture modelling (EAM) tools. A pilot survey of EAM practitioners identified that many companies abandon the use of EAM tools despite the benefits that should result from their use. Some of the reasons for lack of sustainability include (a) failures in modelling governance, (b) lack of alignment with the change method, (c) users withholding information and (d) poor perception of EA itself.

1 INTRODUCTION

Enterprise architecture is a growing field that enables the major aspects of business and IT activity to be modelled and plans made for their change (Hoogervorst, 2004). The use and application of an integrated model of the business is key to supporting change decision-making. However, a survey of the current literature identified firstly that EA modelling is often abandoned (e.g. (Meertens et al., 2011b)); secondly that business models vary greatly and do not have a clearly agreed definition (Vermolen, 2010)); and thirdly there is a gap in the existing literature regarding how enterprise architecture modelling (EAM) can be made sustainable and effective in its use as part of a principle change methodology.

This paper first summarises some relevant terminology related to the modelling of Enterprise Architecture. We then present results from a pilot survey of practitioners of enterprise architecture modelling (EAM) based around the issues identified from the literature. We then consider a number of

issues identified by the respondents in the execution of tool-based EAM as motivation for further study.

2 THE PRACTICE OF TOOL-BASED ENTERPRISE MODELLING AS PART OF CHANGE MANAGEMENT

Enterprise Architecture Modelling (EAM) is carried out in both end-user and consulting organisations (Hall and Harmon, 2005, Ganesan, 2008). This section briefly explains and grounds some terms related to tool-based EAM.

2.1 Enterprise Architecture

Rood (Rood, 1994) suggests an Enterprise Architecture comprises: people, information and technology. TOGAF (The Open Group, 2011) divides the Enterprise into four domains: Business, Data, Applications and Technology. Capgemini's IAF (Wout et al., 2010) uses four similar domains to

TOGAF, but worded slightly differently. All broadly recognise the need to cover business, information and technology.

2.2 EA Frameworks

These provide a standard structure, vocabulary and (sometimes) a process for carrying out EA work. Examples of EA frameworks include TOGAF (The Open Group, 2011), DODAF (DoD, 2010) and Zachman's Enterprise Architecture Framework (ZAAF) (Zachman, 1987). There are also reference frameworks that help position and compare the EA frameworks: the Generic Enterprise Reference Architecture and Method (GERAM) (Bernus and Nemes, 1996) which packages these within Ontological Theories; and the newer EAF2 (Franke et al., 2009).

2.3 Enterprise Architecture Model

An Enterprise Architecture Model is a miniaturisation or representation of the components making up an enterprise. These models might take a number of forms, but are likely to consist (in terms of content) mainly of representations of the entities, attributes and relationships relevant to a particular viewpoint or perspective. These may for example support decision making (e.g. "show me a view of all business services that are reliant upon obsolete infrastructure", as described in (Spence and Michell, 2011). This is helpful in governing the evolution of the enterprise IT portfolio, as discussed later.

2.4 Enterprise Architecture Modelling

EAM is the activity of producing and maintaining EA Models. The content of the models may well be created by multiple agents, and also viewed by multiple agents for a variety of reasons. These agents will need views tailored to meet their specific needs, showing different entity subsets, attributes and relationships. The selection and creation of these views and the entities and attributes in them, may or may not be specified by a particular architecture framework in use, but will typically need adapting to the specific context needed for modelling. This drives the need for EAM tool to be customisable.

2.5 Enterprise Architecture Tools

An EA Tool is an instrument used for EA Modelling. Whilst EA Models can use pen and paper, or simple

drawing tools (e.g. Microsoft Visio®), it is much more efficient using a software tool designed specifically to do the job (Hall and Harmon, 2005).

TOGAF 9.1 (The Open Group, 2011) refers to EA tools, (in chapter 42) as "automated tools". This paper focuses on tool-based EAM, as distinct from non-tool-based EAM.

Commercial research organisations (Brand, 2014, Peyret et al., 2011, Hilwa and Hendrick, 2012) divide "modelling and architecture tools" into the following categories:

- Object Modelling tools
- Business Process Modelling Tools
- Enterprise Architecture Tools
- Data Modelling Tools

EA Tools are, in terms of revenue, the fastest growing in this particular market segment [21]. When combined with a large failure rate (our survey indicated perhaps an 85% failure rate, if failure is defined as the modelling having ceased) from modelling efforts, we can see that aside from failure to gain the required benefits, the amount of spend on EAM tools that ends up being wasted might be in the region of \$230M in 2016 (if the percentage failure rate in our qualitative survey were to be representative of general EAM activities).

3 TOOL-BASED ENTERPRISE ARCHITECTURE MODELLING EXPERIENCES

To explore whether the EAM issues identified earlier in the literature (such as (Meertens et al., 2011b), discussed later) occur in practice, we carried out qualitative research. We interviewed seven consulting Enterprise Architects who responded to an email invitation sent to approximately 400 staff within an IT services company, seeking volunteers to be interviewed that had prior experience with tool-based EAM. This is not as small as percentage as it may appear, given that the majority of the staff will have had no experience with EA modelling tools, which are not used as standard within this company; and so the pool of qualified subjects available at this stage was relatively small.

A set of structured/ telephone interviews was carried out on the respondents. As our future research direction is focused on the value of the tool-based EAM, and the factors affecting its sustainability, we gathered information about the value (expected and

perceived) of the EAM effort and what lessons were learned. Some questions also related to possible activities that might lead to it being more sustainable. The key questions were:

- Who was the client, in what industry sector?
- What EA tool was used?
- How was the tool used (e.g. single/multiple users, one-off or part of lifecycle process, were multiple users able to do updates in parallel)?
- What support was given (training, coaching, documentation)?
- What was the scope of the modelling (business, information, technology)?
- Who was responsible for introducing the tool (client or supplier)?
- Who paid for the tool?
- What value did the client, and the supplier, expect to get from it?
- How was that, or how could that been, measured?
- What value did the client, and the supplier, actually get from the tool?
- What processes were in place to support and govern the use of the tool?
- What were the factors in the modelling environment (people, process or technology) that helped the EAM activity? What factors hindered it?
- Are there any features of the tool that would help, or hinder, its sustained use over the longer term?
- Is the client still using the EA tool? If not, why not?
- In hindsight, what do you wish you had known before you started using the tool, and what would you change if you did it again?

A summary of the key results is offered below. These reflect a subset of the answers to the questions posed:

Table 1: Summary of Some EA Modelling Experiences.

Expected value	Actual value	What helped	What hindered	Still in use?	Abandoned because
Quicker project lifecycle reducing costs and risks due to less ambiguity	Projects were no faster as decisions delayed anyway	Training; top-down initiative	Cultural and political issues; the need to win people over	?	
No specific expectations	Single version of truth; enabled persuasion and challenge; detect errors, saved wasted effort and time	Many ways of creating a model; not one fixed standard	Not enough people had access to tool; cultural resistance	Barely	Seen as opposed to Agile (“high ceremony”)
Supplier made it prerequisite for replatforming IT estate	Saved a month by skipping due diligence as information was already captured	Librarian role; buy-in from business; publishing results; lessons learnt; people signing off on content	Tool struggling to produce suitable diagrams; scope unclear at start; people holding onto ‘their’ information	No	Replatforming finished; client believed they no longer needed the information
Looking to save money, so required to understand the IT estate and therefore support rationalisation	Unsure but client architects seemed pleased	Having a librarian for the tool; having clear scope for modelling	Tool not easy to use; lack of training	Yes	
Traceability – impact of change – how strategy is	Understood impact of change	Tool supplier staff very helpful; easy to use;	Tool reports sometimes hard to read; some tool	No	Unknown

worked out in IT projects			features non-intuitive		
Understand IT estate as prerequisite for application rationalisation and modernisation	Complete picture of their estate to enable application rationalisation	Having core modelling team to help others; quality control	Lack of governance; reporting hard to configure	No	Tool issue (reporting) and process issue (not following proper processes)
Understand IT estate as prerequisite for application rationalisation	Ability to perform complex analysis, communicate business value	Repository management features, ease of customisation	Tool quirks; high cost of tool	No	Client felt tool was too expensive

This pilot survey clearly suggests there is an issue sustaining the use of EA tools; it confirms that the majority abandoned the use of EAM (see “Still in use” column in table). This prompts the research question: why? - In only one of the 7 case studies has the end-user organisation continued to carry out the modelling activity, in some cases despite the benefits that were being obtained.

The failure to produce benefits has been traced in some cases to issues with the way it was being used (e.g. “our main issue was caused by people not following process / guidelines, and not updating repository as designs were changed”).

In some cases the issue was with the tool itself (e.g. “the client realised that the repository couldn’t actually be generated from the tool, they believed it couldn’t deliver the expected value: format wasn’t good”).

4 DISCUSSION OF SURVEY RESULTS VS RELEVANT LITERATURE

This section sets the results in the context of the current literature.

A systematic review of business modelling carried out in 2010 (Vermolen, 2010), relating to the Business layer of Enterprise Architecture concluded that literature related to business modelling had a gap in terms of the use of theory; and that there appears to be a lack of papers in the leading IS journals on the topic of business models.

Meertens et al. (Meertens et al., 2011a) recognises that many projects involving business modelling (a subset of EA modelling) end after an initial phase and do not deliver the expected benefits;

this mirrors our experience from the limited case studies above.

The topic of business modelling is the subject of much existing research, including a proposed research framework published in 2004 (Pateli and Giaglis, 2004), which organises business model research into a number of categories including “Design Methods and Tools” and “Adoption factors”, both of which seem initially to be relevant to the topic at hand (sustainability of EA modelling). Some primary and secondary sources are organised according to these categories. In the Design Methods and Tools category, papers describing two specific modelling languages (UML (Eriksson and Penker, 2000) and eBML (Lagha et al., 2001)) are listed, but nothing that addresses the specific question of the value of Enterprise Architecture modelling using tools such as discussed above.

The motivations for EAM are to allow the visualisation and reporting on aspects of the Enterprise Architecture (part of the governance referred to below), and to provide an environment where the structure of the Enterprise can, in a simulated fashion, be altered in some way to examine the consequences of the alternation. There may be specific business scenarios that lend themselves to this kind of activity, for application rationalisation (one of the scenarios encountered in the survey), or mergers and acquisitions (Freitag and Schulz, 2012). Some of the tasks mentioned in this paper are related to expected business benefits, for example carrying out due diligence (to reduce risk and cost through better knowledge). However, the study does recognise that the literature does not confirm (or disconfirm) that using this kind of EA management technique (including modelling) improves the success rate of mergers and acquisitions.

The literature surveyed so far focuses mainly on discrete elements (for example, specific methods or

languages), rather than the activity of EAM that draws them together for a particular benefit. The value of business process modelling in particular is discussed by Indulska (Indulska et al., 2009) where three particular areas of concern are raised; two of these have potential relevance in areas wider than just business processes (standardisation of modelling approaches and the identification of the value proposition of the modelling). Standardisation of the modelling language is covered by Lankhorst (Lankhorst, 2013), as is the use of a particular modelling tool.

The value of the modelling seems to be assumed by Jonkers (Jonkers et al., 2004) to relate to “informed governance” and references (Op’t Land et al., 2008) that discusses the value of EA in terms of the governance of an enterprise and its transformation. The relationship between the acquisition and use of a tool and a major transformation initiative is illustrated in one of the cases surveyed, where a supplier insisted that the modelling had to be done as a prerequisite for a replatforming effort. The survey suggested that some, but not all, modelling was done explicitly in order to help a particular transformation exercise; and that having a clear reason for the tool is no guarantee that its use will be sustained over time.

Given the link between EA and IT governance, this suggests that one line of reasoning that may bear further research, related to IT governance and tool-based EAM, might be:

- (1) Effective IT governance requires EA
- (2) Effective (accurate and comprehensive) management of EA information requires an EA tool
- (3) Effective IT governance requires an EA tool (from (1) and (2))

Echoing a comment from one of the pieces surveyed, there is a need to do further research in a number of related areas:

- What is the value that we can actually expect to get from this activity (tool-based EAM), and in particular can the argument related to IT governance be more clearly clarified and investigated?
- What needs to be done in order to make this sustainable rather than a short-term activity?

5 CONCLUSIONS

We have identified that although widely used as a part of change management, EAM is often abandoned and that there is a lack of formal definition and understanding of the benefits of these models. We have shown in a pilot survey in section 3 that there may be an issue in practice with the sustainability of attempts to execute EAM; these include:

- Issues with the tool itself
- Poor governance of the modelling
- Perception of EAM and EA being unnecessary
- Lack of ability to tailor the tool
- Need for cultural change
- People not wanting to share their information
- Modelling scope is not always clear
- Need to maintain quality in modelling

We have also identified in section 4 a gap in the literature related to tool-based EA modelling as a discipline. There is little work done on tool-based EAM, and in particular in the business domain, a lack of common understanding about what business models should comprise. There is a recognition that business modelling efforts often fail, with little analysis of why this is so, and what should be done to improve the situation. We have also identified a possible direction for future research, related to the value that tool-based EAM adds to Enterprise Architecture and hence to IT governance.

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