The eXtreme Architecture Process: Populating the architecture framework

Phil Robinson
lonsdale@iinet.net.au

Floris Gout
floris@floris.com.au

Introduction

The Authors

Phil Robinson and Floris Gout have consulted to a number of organisations and across a range of industry sectors. They have worked together on various IT-related planning projects. This series of papers represents a major collaborative effort that organises not just the ideas of the two authors but also the many inspiring people they have worked with.

The IT Architecture Papers

IT groups have a pressing need to identify those things worthy of their attention. Many of our clients have asked us:

> *What do I need to know about and manage on behalf of my client?*

This question led us to think about how we structured and presented our work. We wanted a framework we could use in our assignments and share with our clients.

In this series of papers, we presented an Information Technology (IT) Architecture framework that encourages a minimalist approach to IT Architecture by exploring a number of *extreme* points of view.

We used the metaphors of cathedral and shanty towns to discuss the extremes of perfection and chaos in IT systems. We implied a comparison between building and town planning, activities undertaken by humankind for several millennia, and software systems development, something that has only been performed for the last few decades.

We delved into the differences between human activity systems and software systems and classified both types of system into a hierarchy of sub-systems. We noted that, although the hierarchy is a convenient way of classifying systems, the true nature of business and software systems is to be independent and overlapping.

This led to the notion of interoperability as one of the key architectural issues,

> *...the ability of a system to successfully interact with other, specified systems. [1]*

We also referred to a formal definition of IT architecture found in legislation passed by the US Congress; the *Information Technology Management Reform Act of 1996* also known as the *Clinger-Cohen Act*.

> *An integrated framework for evolving or maintaining existing information technology and acquiring new information technology to achieve the agency's strategic goals and information resource management goals.*

In the second article we then described 19 architectural elements that constitute the framework. A matrix with "system types" as rows and "architectural views" as columns was used to organise and group the architectural elements.

The complete framework uses a single, uncluttered diagram shown in Figure 1. This approach reflects our belief that the framework is simple to describe and easy to recall. However, the diagram is not trivial – it includes nineteen different elements that, taken together fully define an IT architecture.

As promised in our last article, this paper explores the relationship between the Framework and the concepts behind business planning.

Overview of the Business Motivational Model

Every time we present our architecture framework to a new audience we generally received very positive feedback. However, there is one comment that that we have learnt to anticipate, "the framework is very logical and well organised but how do I actually apply it to my work?" In this article we hope to answer that question.

In our own work, we have often been guided by a document produced by the Business Rules Group called "Organising Business Plans". This document has recently been revised and renamed to the "Business Motivational Model (BMM)"[2]. The BMM provides an extremely lucid description of the elements of a business plan and how they should be organised. We heartily recommend that you download and read the BMM.

The BMM model is based on five major concepts:

"An **End** is a statement about what the business seeks to accomplish." A vision, goals and objectives are all different ways of describing "Ends". An End is supported by Means.

	Activity	Information	Software	Data	Technology
Sector					
Enterprise	Activities Workflow	Subject Areas Information Requirements	Functional Areas	Business Objects	
Process					
Application	Use Cases	Interface Requirements	Functional Requirements Non-Functional Requirements	Storage Requirements	Networks Platforms
Component	User Interface		Architecture Code	Schemas	

Figure 1 Extreme Architecture Framework

"A **Means** is a device, capability, regime, technique, restriction, agency, instrument, or method that may be called upon, activated, or enforced to achieve Ends." A mission, strategies, and tactics are all different ways of describing "Means". A Means channels effort towards an End.

"An **Influencer** is something that has the capability of producing an effect without apparent exertion of tangible force or direct exercise of command, and often without deliberate effort or intent." There are internal and external influencers. The BMM describes the many and varied types of Influencers in some detail. We think that if you have been in the IT industry long enough, you will have come across most of these. An Influencer provides an argument for an Assessment.

"An **Assessment** is a judgement that an Influencer affects the employment of Means and/or the achievement of Ends." Assessments "express the logical connection between Influencers on Ends and Means".

The final BMM concept is particularly important to us.

A "**Potential Impact** is an evaluation that quantifies or qualifies an Assessment in specific terms, types, or dimensions." There are two types of potential impact – risks and rewards.

Risks and rewards are very significant to project sponsors, project managers, IT managers, and IT Architecture planners. These people all know (or should know) that an IT project is justified by its potential rewards. They also know that risks represent potential obstacles to the realisation of the hoped for rewards.

The Extreme Architecture Process

As we have used the BMM in our work for some time, it seemed natural to turn to it for guidance on what should motivate an IT Architecture. When we revisited the BMM in relation to our architecture framework we realised that each of the five major concepts in the model – End, Means, Assessment, Influencer and Potential Impact – suggested a discrete step in the development of an IT Architecture. The only thing missing was a step to define the scope of the architecture.

The resulting six-step eXtreme Architecture Process (XAP) shown in Figure 2 below.

In practice, the process is applied iteratively as shown below:

Agree on architectural scope:

1. Identify the architectural element and element instances.

For each architectural element or instance do the following:

2. Undertake an SWOT assessment
3. Identify influencers
4. Identify potential impacts
5. Define required outcomes
6. Plan achievement of outcomes

The steps are explained further.
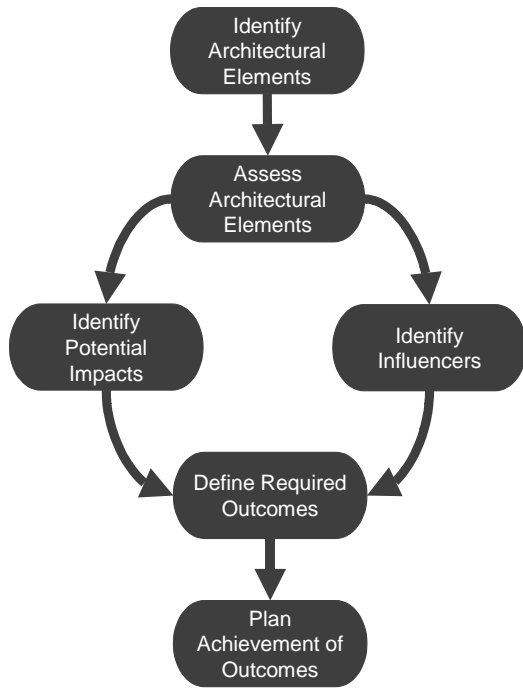
Figure 2: Extreme Architecture Process

Step 1, Identify architectural elements

Using the extreme architecture framework for guidance the first step is to identify the elements that define the scope of the architecture under investigation.

In previous articles we discussed the concept of architectural elements. While these elements provide a comprehensive checklist for architectural content, it is actually "instances" of the elements that are identified. For example:

"Functional Area" is an element while "Human Resource Management", "Procurement" and "Finance" are all element instances.

"Use Case" is an element and "Enter Time Sheet", "Book Leave" and "Adjust Weekly Pay" are all element instances.

We have also previously discussed groupings of framework elements into rows, columns and arbitrary areas. Groupings of elements can also be used as the basis for defining the scope of an architecture. For example, an architecture could be developed for the "Data" column or the "Application" row. We find that architectures based on arbitrary areas are often linked to very specific project objectives such as information systems planning or development of a business case.

An architecture could of course be based on an individual architectural element such as Platforms, or Business Objects.

Step 2, Assess architectural elements

Turning to the concepts of the BMM, the current state of each of the architectural elements is assessed by performing a SWOT (strength, weakness, opportunity and threat) analysis.

Step 3, Identify potential impacts

The assessment of architectural elements provides the basis for identifying potential impacts.

Potential rewards are synonymous with benefits. Benefits can be quantified by an associated increase in revenue, reduction in cost, or an improvement in service from the perspective of a stakeholder. Risks are frequently quantified using the probability that a risk will occur and the impact of the risk should it actually occur.

Step 4, Identify Influencers

The current state of architectural elements is likely to be influenced by a variety of factors both internal and external to the enterprise. For example, the quality of raw materials may be below par, or a critical software technology platform may no longer be supported.

Influencers provide a checklist for conducting assessments. Strengths, weaknesses, opportunities and threats will be linked to one or more of the influencers. Influencers also provide guidance for defining outcomes and planning their achievement.

Step 5, Define required outcomes

Outcomes describe the desirable, future state of an architectural element. Outcomes are described as a "Vision", "Goals", or "Objectives". The achievement of an outcome should minimise a risk, or maximise the potential for reward.

Step 6, Plan achievement of outcomes

A desirable, future state is achieved by the means of a combination of "Strategy", "Tactics", and the enforcement of appropriate "Business Rules", and "Business Policy".

Applying the process

We will use a case study to illustrate the eXtreme Architecture process in action. The case study is based on a small (fictitious) enterprise called TerraDev that acquires and develops land for resale. TerraDev also has a niche business advising other land developers. This line of business is growing but TerraDev has not aligned its architectures with this growth. TerraDev has all the components of a consultancy management system but the components are not properly integrated.

In the interests of brevity, we shall focus our discussion on just two areas of the framework. A more realistic approach would be to perform an initial scan of the entire framework in order to home in on problem areas.

Activities and Workflows Framework Elements

One of the business processes is to "Prepare consultancy profit/loss account and client relationship financial status". TerraDev thinks it important to measure the overall relationship with the client by measuring the financial relationship. When interviewed, the account manager comments that,

"We cannot demonstrate client and consultancy profitability easily. It takes me too much time to prepare a detailed report. Every month I prepare profit and loss statements for each consultancy and the client. Instead of preparing these reports I could spend time with clients getting more business to generate income. By the way, profitability should include all expenses and income for each consultancy. I need to get this information for many sources. Other senior executives have put a halt to IT expenditure but this is actually hurting the organisation financially. What we need to do is develop an automated process to report on financial relationship."

If we parse the manager's comments we get the following:

1. **Identify Architectural Elements.** The architectural component in this case is an instance of the Activity element: "Prepare consultancy profit/loss account and client relationship financial status"'.

2. **Assess Architectural Elements.** The manager's Assessment is acknowledged, "We cannot demonstrate client and consultancy profitability easily. ... It takes us too much time to prepare a detailed report". However, this is a qualitative statement that requires further clarification.

3. **Identify Potential Impacts.** The impact on the business is explored in order to identify quantifiable benefits that justify the cost of change. Pressing the enquiry further we find that the manager spends some 20 hours per month doing this work. This translates into a cost of $1000 per month or $24 000 per annum to produce the reports. This is the measurable impact that we need to know.

4. **Identify Influencers.** The Influencer is noted, Management Prerogative, "Other senior executives have put a halt to IT expenditure but this is actually hurting the organisation financially." This is a delicate political situation that will need to be addressed carefully.

5. **Define Required Outcomes.** The manager clearly stated the goal, to "spend time with clients getting more business to generate income." The aim is increased income. Again, we probe for a quantifiable impact to show how much income could be produced. So examining the timesheets of the manager in marketing and estimating the rate of turning opportunities into consultancies, we estimate that the potential income could be $480,000. This is another measurable impact to the enterprise, should the situation be rectified.

6. **Plan Achievement of Outcomes.** The manager stated that the strategy is to "develop an automated process to produce the financial relationship reports." This may or may not be the final approach, but it is the one that business staff perceives as a desirable outcome. We also note a business rule, "Profitability should include all expenses and income for each consultancy."

In this case, we actually have two impact values. The first identified was the reduction in cost of producing the reports. Should the project proceed, this saving can be directly attributed to the project; it is a primary benefit. The second, the potential $480 000 increase in revenue, can happen because of the project, but relies on the manager capitalising on the new functionality of the consultancy system.

Schemas Framework Element

An interview with the IT manager and lead developer reveals some major issues with a critical application.

"Our TERRASYS database is the source of all our core process data. There is a two way data transfer with the Financials system. The database performance is slow and we know that the referential integrity is very poor. There are numerous tables without primary and foreign keys. This means that the client server application is solely responsible for enforcing data integrity rules.

"Stakeholder data, purchase orders and payments are duplicated in the Financials database and the TERRASYS database. Our stakeholder list in TERRASYS has a lot of duplicates and thus the organisation cannot produce accurate statistics on clients even if it wanted to. The staff does their best to reconcile data each month. IT helps when resources are available.

"We have analysed the database. There are 260 tables and some 110 are no longer accessed by any functions. About 150 don't have unique keys, and 50 of the remaining tables don't have foreign keys. Data matching is done, but the code is quite complex. As a result we spend a lot of time maintaining scripts for decision support. Without a data model to guide us, a lot of assumptions are made about uniqueness and relationships.

"But we are unable to rectify this because there is a halt on IT expenditure from above. There has been a drive to reduce costs for some time and this has impacted IT. The database software has what it takes, but when it was converted the contractor didn't utilise the features. Cheap and quick was the only guidance given to the contractors - quality didn't come into it.

So from listening to the developer we can again go through the statements and perhaps probe further where necessary.

1. **Ide**ntify Architectural Elements. The architectural element was in this case the schema of the TERRASYS database.

2. Assess Architectural Elements. The lead developer made some judgements:

   • The database performance is slow.

   • There are 150 tables without primary and 50 working tables foreign keys – no referential integrity.

   • Stakeholder data, purchase order and payments are duplicated across applications – data disparity.

- Duplicated data – no logical uniqueness.

- Some 110 tables are no longer used – redundant data.

3. **Identify Potential Impacts**. The lack of a solid data foundation begins to manifest itself.

   - Data matching scripts and decision support scripts are high maintenance items. Analysis of the help desk system show that 600 hours are spent manually checking and fixing either the script or manually fixing the data. This translates to $24,000 annually.

   - The disparate stakeholder lists and lack of a unique identifier means that the account manager may be unknowingly reporting incorrect information. Decisions relating to clients that are based on incorrect data represent a serious risk to client relationships.

4. **Identify Influencers**. There is a range of influencers.

   - Problems cannot be rectified because of "a halt on IT expenditure from above". This is the influence of management prerogative again.

   - The corporate value (either stated or unstated) of just get it in for the lowest price and as quickly as possible, seems to have had an overwhelming impact on the IT group.

   - Data governance or the lack of it, probably also stemming from cost pressures, prevents the developers from producing quality work.

5. **Define Required Outcomes**. While the IT staff did not clearly state any desired outcomes, it is clear that an overriding Goal should be to improve data quality.

   - Single point of data entry, with automated and robust data interchanges

   - Reduced data redundancy

   - Automated data integrity checking

   - The Potential Rewards will be

   - Reduced software maintenance costs, releasing resources for high value development initiatives. Maximum reward is $24,000. This could be used for the construction of the process, "Prepare consultancy profit/loss account and client relationship financial status".

   - Reduced platform support costs.

   - Increased confidence (reduced risk) in the accuracy of the data leading to faster decisions. This improvement in (data) services is the primary benefit for the account manager who will need to capitalise on this and increase consultancy revenue.

6. **Plan Achievement of Outcomes**. The obvious Strategy is to institute a data quality initiative supported by the following Tactics:

   - Develop a data architecture with models and enunciated principles and standards. (This is the data administration function. The scope is the Data column of the eXtreme Architecture framework.)

   - Normalise and redesign the database (in accordance with the data architecture).

   - Impose primary and foreign keys constraints.

   - Convert the TERRASYS applications from a client server architecture to an application server (Oracle 10g of course.)

   - The following Business Policies could be instituted:

   - Database design shall follow the data architecture standards.

Conclusion

We have described by means of a case study, how the concepts of business planning can be linked to IT Architecture. The assessments, goals, strategies, and potential impacts can be directly related to elements of the architecture. The key to achieving this is a simple and easy to apply architectural framework.

Although our example is for just two of the architectural elements, the reader should be able to see how to apply the process to the remainder of the framework. Architectures that take in the entire framework result in a large amount of analysis – hence the need for a minimalist approach.

Both case studies demonstrate the importance of capturing both qualitative and quantitative planning information. This information underpins the business case for enterprise change, as we shall see in a later article.

The eXtreme Architecture Process demonstrates how two bodies of knowledge – architecture and planning can be amalgamated.

In future articles we shall be further exploring the two themes presented in this article:

   - Showing how the information gathered here can be used to develop a comprehensive business case that presents a convincing argument for change; and

   - Linking other bodies of knowledge to the eXtreme Architecture Framework.

[1] The Open Group Architecture Framework (TOGAF), Version 8, "Enterprise Edition", 2002, The Open Group Available at http://www.opengroup.org/products/publications/catalog/i9 12.htm
[2] Business Rules Group, Business Motivational Model, BMM 21 April 2005 (http://www.businessrulesgroup.org/brgactv.htm#wp2)