Enterprise Architecture 101

ABSTRACT

This article serves as an introduction to Enterprise Architecture and surveys its use in various organisations in the USA and Singapore. It also distills the Defence Science & Technology Agency's own experience in Technical Architecture, one aspect of Enterprise Architecture, using a best practice industry framework, into the "Seven Habits of Highly Effective Enterprise Architects":

1. Focus on people, not technology or techniques
2. Keep it simple
3. Work iteratively and incrementally
4. Roll up your sleeves
5. Build it before you talk about it
6. Look at the whole picture
7. Make architecture attractive to your customers

Leonard Nee Seng Kiat

Enterprise Architecture 101

The Problem

In Nicholas G. Carr's article, "IT Doesn't Matter", in the May 2003 edition of the Harvard Business Review (Carr, 2003), the basic premise is that the evolution of information technology is following a pattern similar to that of earlier technologies like railroads and electric power. As these "infrastructural technologies" are being built into the infrastructure of commerce, they open opportunities for forward-looking companies to gain strong competitive advantages. But as their availability increases and their cost decreases - as they become ubiquitous - they become commodity inputs. From a strategic standpoint, they become invisible i.e. they no longer matter.

At the same time, the bursting of the dot com bubble has resulted in:

- Many companies facing severe hangovers as they survey the damage done to their Income & Expenditure statement by a glut of IT investments made during the height of the dot com days.

- Many entrenched monopolistic suppliers of critical IT infrastructure ratcheting up the costs to their already captive market at each maintenance contract renewal in order to meet their bottomline in the absence of new revenue streams.

As a result, the Chief Information Officers (CIOs) of today face the twin problems of:

- Justifying the strategic use of IT and the return on investment for new IT investments

- Containing the rising recurrent cost of existing IT infrastructure

The Solution

To solve the CIOs' dilemma, consultants are engaged. Among the most influential in terms of mind share is the Enterprise Architecture Planning Process (EA Process) promulgated by the META Group (Buchanan and Soley, 2002) (See Figure 1).
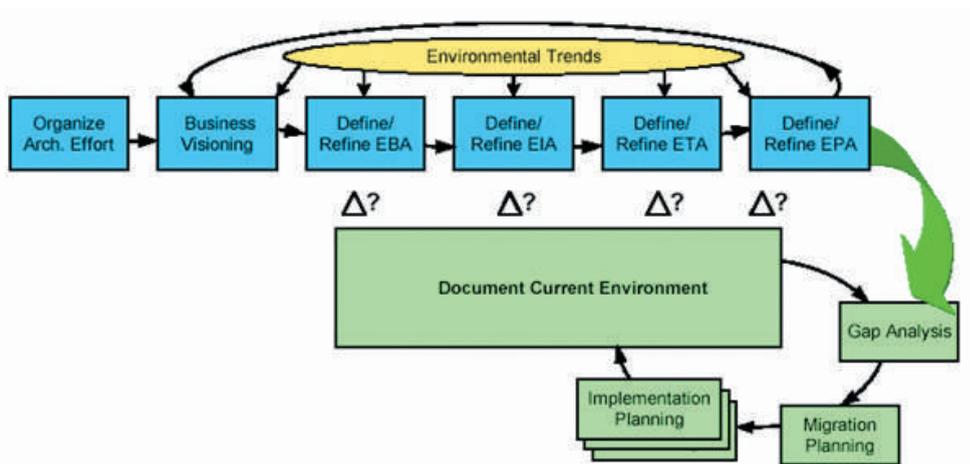

Figure 1. META Group's Enterprise Architecture Process Model (Buchanan and Soley, 2002)

The EA Process promises to provide IT organisations with a systematic approach to aligning IT projects with corporate goals and priorities. The META Group claims that implementing enterprise systems identified by the EA Process would provide organisations with a comprehensive approach to the management and development of IT environments.

WHAT IS ENTERPRISE ARCHITECTURE?

The Gap

The META Group positions the EA Process as one which will bridge the gap (See Figure 2) between the concerns of:

- Corporate strategists who deal with business strategic planning that identifies threats and opportunities emerging from the environment and recommends appropriate organisation responses and investments

- IT project managers who establish IT goals and manage the acquisition and development of new hardware and software systems.

The Components

The META Group defines Enterprise Architecture as a top-down, business strategic driven process that coordinates the parallel, internally consistent development of an Enterprise Business Architecture (EBA), an Enterprise Information Architecture (EIA), and an Enterprise-Wide Technology Architecture (EWTA), as well as the Enterprise Application Portfolio (EAP):

- The EBA refers to an organisation's business strategy.

- The EIA is driven by the EBA and describes the information required by users for rapid
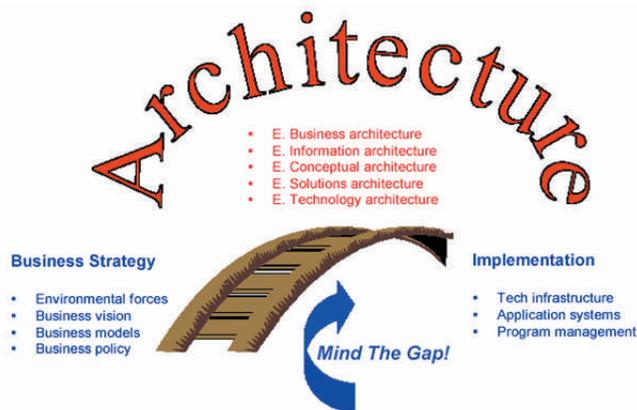

Figure 2. Enterprise Architecture serves as a bridge between business strategy and programme management (Buchanan and Soley, 2002)

business decision-making and information sharing to implement the business strategy.

- The EAP is driven by both the EBA and the EIA. It is a "town plan" of integrated application systems required to satisfy business information needs and to support information and business processes. The EAP includes both existing and planned inventory of applications and components.

- The EWTA is driven by the EBA, EIA and EAP and aims to enable rapid engineering, solutions development and technical innovation. It details the enterprise's technology strategies and current and future states of the enterprise's infrastructure and technology platforms. The EWTA guides programmes/projects in engineering the organisation's information systems and technology infrastructure.

WHY ENTERPRISE ARCHITECTURE?

The Raison D'être

In a nutshell, through developing the Enterprise Architecture, the EA Process aims to link strategic planning to software project

management. The aim is to make IT investments according to objective measures of business strategic value and priorities and in accordance with a long-term plan for infrastructure and architecture development. The CIO would then be in a position to create a set of priorities for modifications and to plan changes. In addition, when business strategies change, IT investment plans can change dynamically in response through an analysis of the gap between what already exists and what is called for by the changed strategy and the redefined Enterprise Architecture.

WHO HAS DONE ENTERPRISE ARCHITECTURE?

The Hype

In 2002, the US Government mandated the use of a Federal Enterprise Architecture (FEA). Led by the Office of Management and Budget (OMB), the purpose was to identify opportunities to simplify processes and unify work across the agencies and within the lines of business of the Federal Government. The outcome was a more citizen-centred, customer-focused government that maximised technology investments to better achieve mission outcomes.

The US Department of Defence (DoD) also got into the act with their own Enterprise Architecture called the Global Information Grid (GIG) to address issues of interoperability. In Singapore, iDA, with the Ministry of Defence (MINDEF) and DSTA participation, has launched the (Civil) Service Wide Technical Architecture (SWTA).

MINDEF, the SAF and DSTA have also not been spared from the Enterprise Architecture bug with various Enterprise Architecture initiatives being driven by the various CIO offices.

WHAT WE HAVE LEARNT THUS FAR?

The Reality

MINDEF, the SAF and DSTA are clearly not alone in embarking on this Enterprise Architecture journey. We can therefore take comfort and learn from those who have gone before us, especially the true practitioners.

The following advice comes from The Practical Guide to Enterprise Architecture (McGovern et. al. 2004) and is expanded upon at www.agiledata.org/essays/enterpriseArchitecture.html. Although it pertains mainly to what is described as EWTA above, and the examples given are from our own experience in implementing the MINDEF / SAF Corporate IT Enterprise Technical Architecture (CITTA), the lessons learnt are clearly applicable to the other Enterprise Architecture components as well.

Seven Habits Of Highly Effective Enterprise Architects

Habit 1: Focus On People, Not Technology Or Techniques

The META Group opines that Enterprise Architecture represents a process, not a thing. This process results in the creation and iterative refinement of many artifacts that collectively define a future Enterprise Architecture, and identifies the gaps between the current state and this future architecture.

This process focus misses the key enabler necessary for a successful Enterprise Architecture initiative i.e. the Architects. It takes good Architects to come up with a great architecture model. The challenge we faced in CITTA was therefore to configure a team that had enough technical depth to come up with an architecture model.

To achieve this, a central theme of the successive reorganisations within DSTA has been the progressive centralisation and rationalisation of Technical and Information Architects (Technical Architects or TAs and DataBase Administrators or DBAs) across business lines.

This has allowed us to seed, nurture and sustain a critical mass of Technical and Information Architects by offering opportunities for professional interaction, mutual learning and career progression along a technical path.

Habit 2: Keep It Simple

The simpler the architecture, the greater the chance that it will be understood and actually followed by developers. The building blocks of a successful Technical Architecture were thus progressively laid down through simple standardisation on high payoff components such as a single database (Oracle); a single development language (Java); a single application server (WebLogic); a single Enterprise Application Integration (EAI) backbone (WebMethods); a single Web Tier Development Framework (Struts); and a single Integrated Development Environment (IDE) (Eclipse).

Going forward, the high payoff areas identified can possibly include a single Enterprise Resource Planning (ERP) system, content management system, workflow engine, portal and end user reporting tool.

This standardisation also mutually supports Habit 1 by allowing us to effectively and efficiently build up a critical mass of Technical and Information Architects by concentrating our effort. It is also mutually supported by Habit 3.

Habit 3: Work Iteratively And Incrementally

Architectures evolve over time due to new requirements, new technological choices, and greater understanding by the Enterprise Architecture team. A good example is the EAI backbone where we learnt the painful lesson that replacing flat file transfers with messaging oriented middleware is not a straightforward affair. The team has since modified their approach to support a few strategies rather than a single system integration strategy to cater to the reality of our legacy systems.

Habit 4: Roll Up Your Sleeves

Developers will not respect the Enterprise Architecture team and therefore will not accept the Architecture, if the Enterprise Architecture team is not willing to get actively involved in their project efforts. We learnt this when the relationship between the Technical Architecture team and the line projects was one of mentor to student. The engagement model has since been modified to attach Enterprise Architecture team members to flagship line projects to get better acceptance and buy-in.

Habit 5: Build It Before You Talk About It

Everything works in theory. In practice however, it can often fail miserably. Technical prototyping is therefore key to validating a reference implementation of the Enterprise Architecture. This was the lesson learnt from our first few attempts to build systems on top of Java application servers based on textbook approaches that simply do not scale. The second time round, the Technical Architecture team developed a full-blown working reference implementation. This reference implementation is complete with its own set of documentation artifacts and hence has the added advantage that it can serve as a documentation standard and communication tool.

Habit 6: Look At The Whole Picture

This is a primary skill of Enterprise Architects and hence is one of the reasons why a multi-view approach is so important. This is also one of the major lessons learnt thus far as the major stakeholders have repeatedly commented on the usability of the architecture documents beyond the technical community. This has resulted in our current effort to put aside resources to prepare additional documentation targeted at critical audiences e.g. intranet website standards targeted solely at web developers and web masters. This also leads us to the next habit.

Habit 7: Make Architecture Attractive To Your Customers

If the enterprise architecture artifacts are not easy to understand, access, and work with, the customers (developers, users and managers) will very likely ignore the enterprise architecture work. Going forward, the architecture community is actively building on artwork from the iDA SWTA effort in coming up with cartoons for communication purposes and to put across facts about CITTA. As the maxim goes: Communicate, communicate, communicate.

CONCLUSION

A Final Word From The Trenches

Like any other strategy, the main problem with the Enterprise Architecture initiative is in its execution.

We have met many challenges during our Enterprise Architecture journey. Chief among them is the issue of managing expectations. By positioning the concept of an Enterprise Architecture as a process and not a product, the consultants have made it intrinsically appealing as yet another initiative that can be kicked off for a "feather in the cap" and then

left to others to do the hard work of actual implementation. The job thus falls onto the in-house staff, as the true practitioners, to make it work.

The other major challenge is one of top management involvement beyond mere support. Stripping out the fancy term, the EBA is simply a description of an organisation's business strategy. In an ideal world, EBA drives the other components i.e. EIA, EAP and EWTA. A key challenge for the overall Enterprise Architecture process therefore, is to ensure the clarity of the key strategy and performance metrics driving MINDEF/SAF business.

REFERENCES

Carr, Nicholas G. (2003) IT Doesn't Matter. Harvard Business Review, May 2003.

Buchanan, Richard D. and Soley, Richard Mark (2002) Aligning Enterprise Architecture and IT Investments with Corporate Goals. Retrieved from http://www.agiledata.org/essays/enterpriseArchitecture.html

McGovern, James, Ambler, Scott W., Stevens Michael E., Linn, James, Jo, Elias K. and Sharan Vikas. (2004) The Practical Guide to Enterprise Architecture. Prentice Hall.

BIOGRAPHY

Leonard Nee Seng Kiat is Deputy Director (Network & Infra Projects Division). He manages the Corporate IT Enterprise Architecture Programme on behalf of MINDEF, the SAF and DSTA, assisting their CIO Offices in formulating the enterprise solution and technical architecture, strategy and directions for corporate IT. A Public Service Commission Scholar, he obtained his first degree in Electrical Engineering from the National University of Singapore (NUS). He also holds an MSc in Management of Technology from Sloan Business School, Massachusetts Institute of Technology, USA, an MBA from NUS, and a Masters in Management of Technology (Software Engineering) from the Institute of Systems Science, Singapore.