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From the Editor

Leonard Fehskens

In this issue we have five articles, a book review, and the conclusion of the report on the JEA readership survey.

We start with a report by Oscar Barros and Alejandro Quezada, “Integrated Modeling of Business Architecture and Process Design with BPMN: Application to Hospitals” that addresses the important question of how we keep all our models in synch. The next paper, “An Enterprise Architecture Approach to Establishing ISCMP” by Shirley Zhao extends the application of architectural thinking into the security monitoring space.

The next three papers explore the “soft skills” aspects of enterprise architecture. Gerald R. Gray’s “Chief Enterprise Architect as Transformational and Transactional Leader” examines two different leadership styles and how they can be integrated to make an enterprise architect more effective. One part of leadership is the ability to “sell” ideas to enlist support and active participation. This is the subject of “The Architect as a Salesman within the Enterprise” by Arvin Levine. Finally, “Rediscovering Enterprise Architecture via Consensus Standards”, coauthored by Thomas Mowbray, Glenn Donaldson, Brian Keller, Chad Neal, and Vasu Rachakonda describes their experience with a kind of “living repository” that simultaneously affords access to the actual current situation and to the tacit, situationally appropriate knowledge that lives in peoples’ heads and is very difficult to write down.

The issue closes with the second part of the overview of the readership survey results, and a book review.

It may be a cliché, but it’s no less true that the JEA is *your* Journal. The AEA has almost 40,000 members, and even if only 40 to 50 (i.e., about 0.1%) of you submit material to the JEA over the course of a year, we would have a healthy pipeline for JEA content.

We’ve created a Submitters’ Guide that provides more information about what happens after you submit a paper and the criteria the editorial board uses when reviewing submitted papers. You can find a link to the downloadable Submitters’ Guide on the JEA website.

We are looking into ways to provide incentives for JEA authors. One that we are piloting with the Pennsylvania State University is a student paper program, which will award a free one-year student membership in the AEA to students whose papers are published in the JEA. Look for the announcement of this program on the JEA website.

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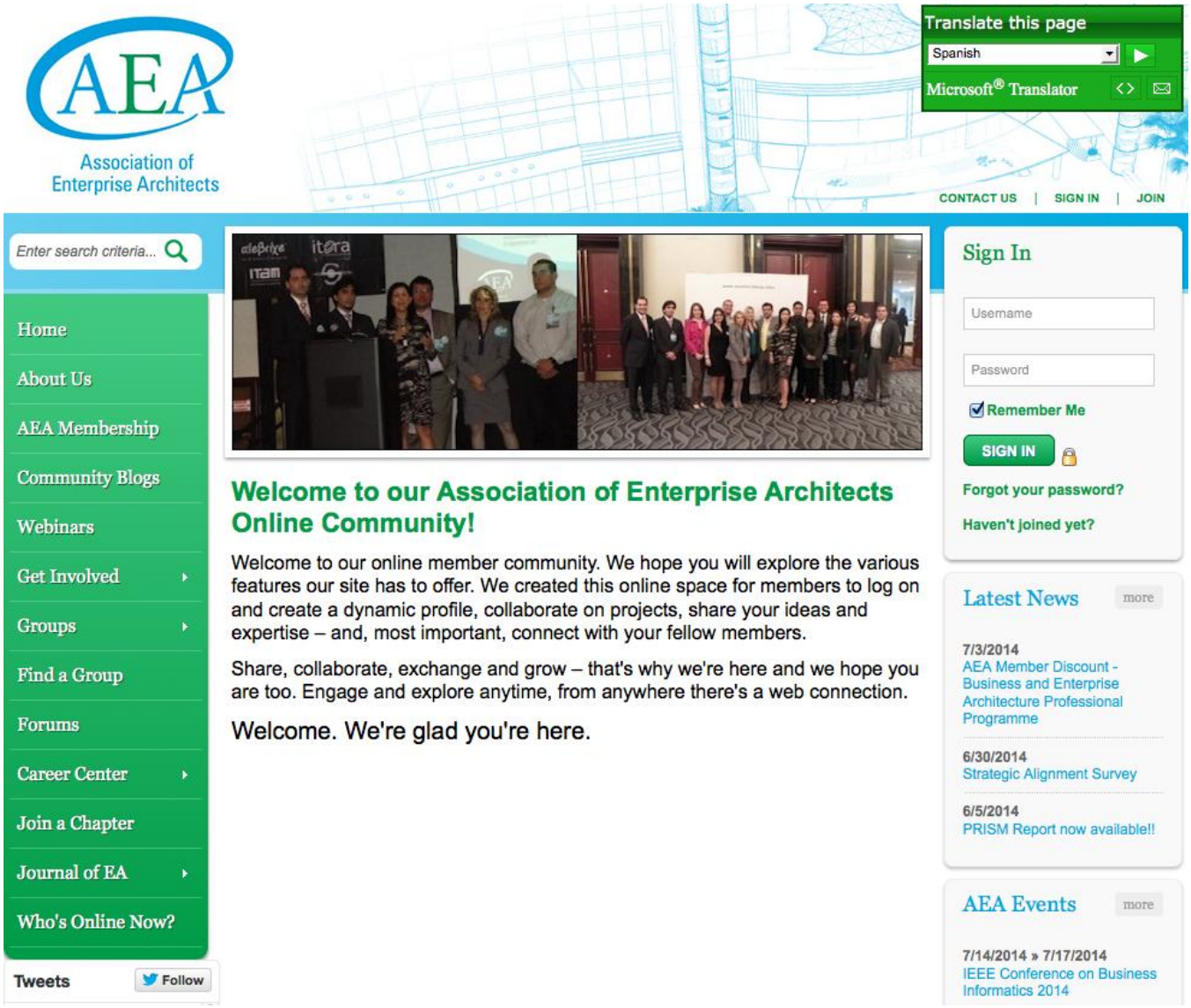

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Article

Integrated Modeling of Business Architecture and Process Design with BPMN: Application to Hospitals

Oscar Barros and Alejandro Quezada

Abstract

A Business Architecture (BA) comprises different models at different levels of abstraction. At the higher levels, the business goals and architecture are defined. At the lower levels, models become more detailed for implementing the supporting information system. So, an integrated modeling approach is key for designing such architecture. The different models must preserve the alignment to the business goals between the different levels. Since existing design approaches, e.g., Model-Driven Architecture (MDA), use Unified Modeling Language (UML) for modeling, the design of the architecture becomes complex and time-consuming. In this article we present an integrated design approach for designing the Business Process Architecture that uses a generic architecture and patterns, expressed in Business Process Model and Notation (BPMN). The approach facilitates aligning models across different levels. This has been applied in real cases in hospitals and other domains, demonstrating its feasibility and usability, reducing complexity and time for modeling. We also discuss the limitations and future work.

Keywords

Business Architecture, Business Process Architecture, Business Process Management, Business Process Pattern, BPMN

INTRODUCTION

Business Architecture (BA) captures the essentials of the business, processes, and IT (Barros 2007; Barros and Julio 2011). Many companies have been using BA for some decades (van't Wout et al. 2010). Such companies have used different frameworks developed by industry leaders from different angles: Business and IT. Well-defined processes are required for operationalizing business goals and aligning IT and people. Companies using BA as a management method have found that different representations of processes are needed according to the level of detail that managers want to know. Based on the reported experience of many companies and our own experience with hundreds of redesign projects through collaboration with industry (Barros 2007; Barros 2013) the following levels of detail can be identified:

1. Business Process Architecture, which is a high-level representation for communicating to executives.
2. Business Design based on the process representation of value chains for its presentation to process managers and business executives.
3. Process Logic that is a detailed representation of the process models for simulation and implementation for communicating to process specialists.
4. IT Process Support that is the representation of the system supporting the execution of the processes for process and IT specialists.

Different modeling schemes and tools can be used for each of these levels for process analysis and design. For example, for Level 1, we can use simple diagrams such as the ones that are part of the first level of SCOR (Supply Chain Council 2008) or eTOM (TM Forum 2008). Next, for Level 2, we can draw informal Porter Value Chain diagrams (Porter 1996) or more formal IDEF0 models (Feldmann 1998). Then, for Level 3, we can use BPMN (Freund and Rucker 2010; White and Miers 2008) or EPC (Scheer 1999) for more detailed models. For Level 4, depending on the type of implementation, we can use alternatives such as UML, Workflow diagrams, or BPMN for implementing the supporting software application into a process-aware information system. Therefore, differences and inconsistencies appear as the models are designed by using different modeling languages at the different levels.

In this article we propose an integrative approach in which all the models are designed with BPMN and the process models are implemented in a BPMN-based system. We use a real case developed in a hospital to exemplify our ideas.

Some existing frameworks for designing BA use a similar approach to the one we propose. For example,

Model-Driven Architecture (MDA) (Mellor 2004) is based on UML for modeling the complete architecture, from business requirements to software architecture for implementing the supporting system. Since UML is not broadly used at the business level, the modeling becomes complex for non-UML experts and hard to communicate to business executives. Also the TOGAF® standard is a comprehensive framework for designing an enterprise architecture, including the BA, based on an iterative lifecycle Architecture Development Method (ADM) and the ArchiMate® language (Lankhorst 2009). Although the TOGAF standard does not force the use of the ArchiMate language, other modeling languages can be used such as UML or even combining ADM with MDA (Blevins et. al. 2004). In practice, the TOGAF standard is generic and it can be used for any company in any industry. Since the TOGAF standard does not have any design pattern (Buckl et. al. 2009) for developing an architecture in a given domain, this process may become complex and slow.

In previous research (Barros 2007; Barros and Julio 2011) we have developed patterns for designing a BA and processes in different industries such as healthcare. By using the patterns, the design process becomes faster than just using a generic framework such as TOGAF or MDA. In this article we present a BA design approach which uses BPMN to model designs based on our patterns at the four levels, defined above, in an integrative way. We concentrate on the Business Process Architecture, but other architectures such as the application, data, and technical architectures are present in design Levels 3 and 4.

The remainder of this article is as follows: The next section explains the approach to solving the problem previously explained. The following section describes the approach for designing a BA with BPMN in a hospital. The final section describes the conclusions and future work.

PROBLEM SOLVING APPROACH

The problem we consider is that the use of different techniques and tools for designing the various models at the different levels of the BA introduces duplicated work, inconsistencies, and lacks traceability. So, it is convenient that the same modeling technique is used for the different levels, maintaining consistency and traceability. In this article we propose a scheme that uses BPMN as a unique technique for designing and modeling all four levels (1-4) defined above. For this, we take the best of the different methods in which we have experience: Business Process Patterns (Barros and Julio 2011) that are in line with the purpose of SCOR (Supply Chain Council 2008) or eTOM (TM Forum 2008) but valid for different industries; BPMN modeling language, and process-aware information systems for implementing BPMN models.

The key ideas of our approach are:

- In order to drive modeling at all levels of detail, predefined general process patterns are used. The patterns, which are based on what we call macroprocesses, provide templates or general structures of activities and flows about how a process should be performed. The patterns we propose have been validated in hundreds of practical projects in several domains, where they have been specialized and used as a starting point to perform architecture and process redesign (Barros 2007; Barros and Julio 2011). Each macroprocess is itself a layered normative structure of processes. A macroprocess gives, in several levels of detail, the processes, sub-processes, and activities plus the relationships that should be executed in order to produce a desired result.
- Using these patterns, *ad hoc* for different industries, the design or re-design process is accelerated.
- We adopt a simple information flow representation and hierarchical decomposition of activities for gradually giving details of the process for Levels 1 and 2.
- BPMN is taken as the modeling language for all the models at all levels of detail. This means that we use some of the simplest BPMN constructs to represent Levels 1 and 2, for flow type models.
- We keep consistency and traceability with hierarchical decomposition: all the elements of any level should be details of an element at a higher level. In particular at lower levels, details are provided that take into account the Business/IT concerns at those levels, while maintaining the aggregation and tracking capabilities across levels.

Other authors (Freund and Rücker 2010) have proposed the use of BPMN for process modeling; they only concentrate on Levels 3 and 4 of our approach. They do not consider the Business Process Architecture design of Level 1 nor the Business Design of Level 2. Therefore, their approach lacks the strategic and business alignment for designing processes.

According to the design guidelines of Hevner et al. (2004) we propose an approach that produces an artifact that can be used by practitioners to provide solutions in a given domain. Our design domain is stated above and goes from strategy-based process architectures to information systems that support such processes. This problem is very relevant since most organizations deal with process and information system design on a piecemeal basis, without considering the integration that

we propose. The evaluation of our approach has been done in hundreds of real-life projects in a mix of experimentally controlled cases and descriptive analysis in several domains (Barros 2007; Barros and Julio 2011). So, the research rigor of our approach is founded for both constructing and evaluating the resulting artifacts. The research contribution is a well-defined hierarchy of design problems with rules and methods that guide the designer going from one level to the following, and also on how to execute each level. A very brief summary of such rules is as follows:

- **Level 1**: Architecture is designed by specializing a selected pattern that has options about components and relationships; a selection of these is based on business goals and resulting selection is modeled by flow models in BPMN.
- **Level 2**: Each selected component in Level 1 is specialized starting with the macroprocess pattern that corresponds to such component; such patterns have options and also a selection should be made based on business goals and possibly an economic evaluation of alternatives, resulting in a selected set of processes modeled in BPMN.
- **Level 3**: Processes selected in Level 2 are designed in detail by means of procedural models in BPMN, having as objectives business goals, such as better management of resources, and providing simulation capabilities to evaluate performance and results.
- **Level 4**: BPMN models of Level 3 are converted to be executed on a selected process engine.

Finally, our design approach is based on the search of a proper artifact that solves a problem in a given domain, using and reusing process patterns. Also, our approach provides the effective communication of models at every level (1-4) for each different user.

In the next section, we show how Levels 1 to 4 can be modeled in an integrated way with BPMN, using examples from a real application in a hospital case developed in Chile.

DESIGNING THE BA WITH BPMN

We explain how each level defined above is modeled for the case of a hospital. We first describe the Business Process Architecture modeling (Level 1) step, using flow diagrams in BPMN. Next, we explain the modeling of the Business Design (Level 2) step, using Business Process Patterns for bringing more details of the Business Process Architecture. Next, we describe the Process Logic design (Level 3) step, using detailed BPMN process models of the business design. Finally, we show the IT Process Support (Level 4) step, using a system for enabling the execution of the process models. For simplicity, we select just one process model of the hospital case in Level 3 for its implementation in Level 4.

Business Process Architecture Modeling (Level 1)

We base the modeling of this level on general process architecture patterns reported on our previous research (Barros 2013; Barros and Julio 2011). The patterns are based on the thesis that the architecture of any enterprise can be modeled by means of four general Business Process Patterns, which we call macroprocesses. In Figure 1 we show the resulting architecture for the domain of hospitals we are working with. (Please note that Figures 1 through 7 can be found at the end of this article.)

The architecture pattern we use in Figure 1 is called shared services, because it has several value chains that share several common services. Each value chain and shared service is a macroprocess or group of processes connected by means of information flows, for which we have a general pattern. Other macroprocesses, for which there are also patterns, that are part of the general architecture are *Business Planning*, *New Capabilities Development* (such as new product development), and *Support Resource Management* (such as human resource management) (Barros 2013). Thus, Figure 1 provides a general model that establishes a structure that defines all the process groupings that are necessary to run any hospital, considering the minimal set of required services.

From the architecture we select the macroprocess that is to be designed in detail, which is *Service Lines to Patients*, since the business goal in this case is to improve the service to patients and make better use of resources, and it is considered that it can be done by designing this macroprocess. Such service lines or value chains are then detailed, by hierarchical decomposition, in Figure 2.

Both architecture and macroprocesses are modeled with BPMN, in a consistent and integrated way. This gives the components of the models, specifying their relationships by means of flow specifications. This is an innovation with respect to other approaches for designing a Business Process Architecture, which are based on reference models and frameworks that only provide hierarchies of components (Supply Chain Council 2008; TM Forum 2008; Scheer 1999).

A key point of our approach is that the most important factor in designing the architecture is the modeling of the relationships that coordinate all the components and make them perform as a system.

Business Design using Patterns (Level 2)

The basic rule that we apply for designing in this level is to take the structure of processes provided by the architecture of the previous level and design each of its components by using the process pattern corresponding to the value chain. This provides a set of sub-processes that are necessary to execute. Then the components are specialized to the particular case; i.e., to establish how every sub-process of the pattern is currently executed, if at all, and then evaluating technically and economically the feasibility of performing it according to what the pattern prescribes.

For example, in Figure 3 we show the design model of one of the processes of Figure 2: *Ambulatory Elective Care Service*. This is the result of comparing the corresponding pattern with what is currently done and deciding that sub-processes in Figure 3 are the ones needed in this case. Next, we can give further details of these sub-processes by decomposition. For our running example, we choose the sub-process *Patient Management* that we illustrate in Figure 4. In this way, we model each sub-process preserving the consistency with the models of the previous level. In the next step, we continue modeling the sub-processes with more details, using more BPMN elements.

Process Logic Design (Level 3)

Here we model with much more detail the sub-processes of the *Patient Management* process, for giving the procedural execution logic in full BPMN. For the last level of process design, a BPMN model with lanes is used, which presents the different organizational roles involved in the activities and how they are supported by the information system. The basic rule is that each of the sub-processes designed in the previous level should be detailed in terms of who is responsible for each activity of the sub-process, the business logic that will be executed by people, or the information system and the workflow that establishes the relationships among activities. This should be consistent with the previous level in that all the functionality that a sub-process provides at such level and the relationships it supports must be provided by the design.

For our running example, we detail, in Figure 4, the BPMN model for the sub-process of *Patient Management* in Figure 3. In Figure 5, we illustrate a Paramedic that interacts with the system to execute *Attendance Control* of Figure 4, to manage the attendance of the patients.

The process model of *Attendance Control* that we have designed tries to solve one important problem currently observed at the given hospital under study, which is that 20% of medical visits fail because of patient absenteeism. We aim to improve the performance of the medical booking service to reduce the waiting list of patients. This is done by introducing a logic that detects patients that are likely not to attend and calling them to check them up. This generates the possibility of assigning liberated medical hours to patients in a waiting list that otherwise will not get attention.

The *Attendance Control* process generates vacancies that are assigned to patients in the waiting list, according to the sub-process *Waiting List Management* in Figure 4, which detail is shown in Figure 6. In this process, the paramedic contacts each patient in the waiting list, and asks whether he/she wants to reserve the medical visit that is available. The patients with longer waiting time have more priority and are contacted first.

IT Process Support (Level 4)

We illustrate this level with the case in which we want to automatically generate the supporting system for the process models in BPMN. For this, we use an information system that allows the execution of the BPMN models defined in Level 3. We illustrate this with a BPMN-oriented system that provides facilities for such an execution. This implies a semi-automated step for making the BPMN process models executable in the engine, including the design details that were not specified so far, such as human interfaces and web services for accessing data in other systems and executing complex logic.

The BonitaSoft system is used to demonstrate the easy implementation of the processes from the models designed in Level 3. As an example we use the model in Figure 5 for implementing the process in the system using the designer tool of Bonitasoft, which is illustrated in Figure 7.

Discussion

All the steps performed from Level 1 to Level 4 have taken just four weeks for implementing the processes in the prototype for our running example. This means that in this period we have designed the architecture of the hospital, developed the redesign of the critical processes, implemented the redesigned processes in the supporting system, and communicated all the changes to the different stakeholders at every level (1-4). Compared to other BA design approaches such as MDA (Mellor 2004) and the TOGAF standard (Lankhorst 2009), our approach can accelerate the design process of the BA by using process patterns and BPMN as the only modeling language. So, our approach represents an integrated and lightweight design process for a BA. Although this is a preliminary result and needs more success cases, we have shown in many real cases that

indeed our approach is less complex, much easier to use, and faster than existing approaches.

CONCLUSIONS

We have considered the problem of Business Architecture (BA) that comprises different models at different levels of abstraction. An integrated modeling approach based on patterns has been proposed for designing a BA. The different models preserve the alignment to the business goals between the different levels and ensure consistency and traceability. The approach has been applied to real-life process designs in hospitals that have been implemented or are under implementation. We have presented a small sample of such applications.

The experience generated with this project supports the conclusion that it has advantages, in terms of speed and quality of design, having patterns of the type that we have proposed for designing the architecture. Moreover, the combination with BPMN process models has also shown that the process implementation and execution in the supporting system can also be accelerated. This also has the advantage of providing flexibility for changes, since this can be done by editing BPMN process models.

There are several other directions for future work. We are currently implementing the prototype with more processes in several hospitals in Chile for redesigning and automating processes, aiming the improvement for using the resources with high patient demands. Moreover, we are extending our approach to include other domains such as banking and manufacturing.

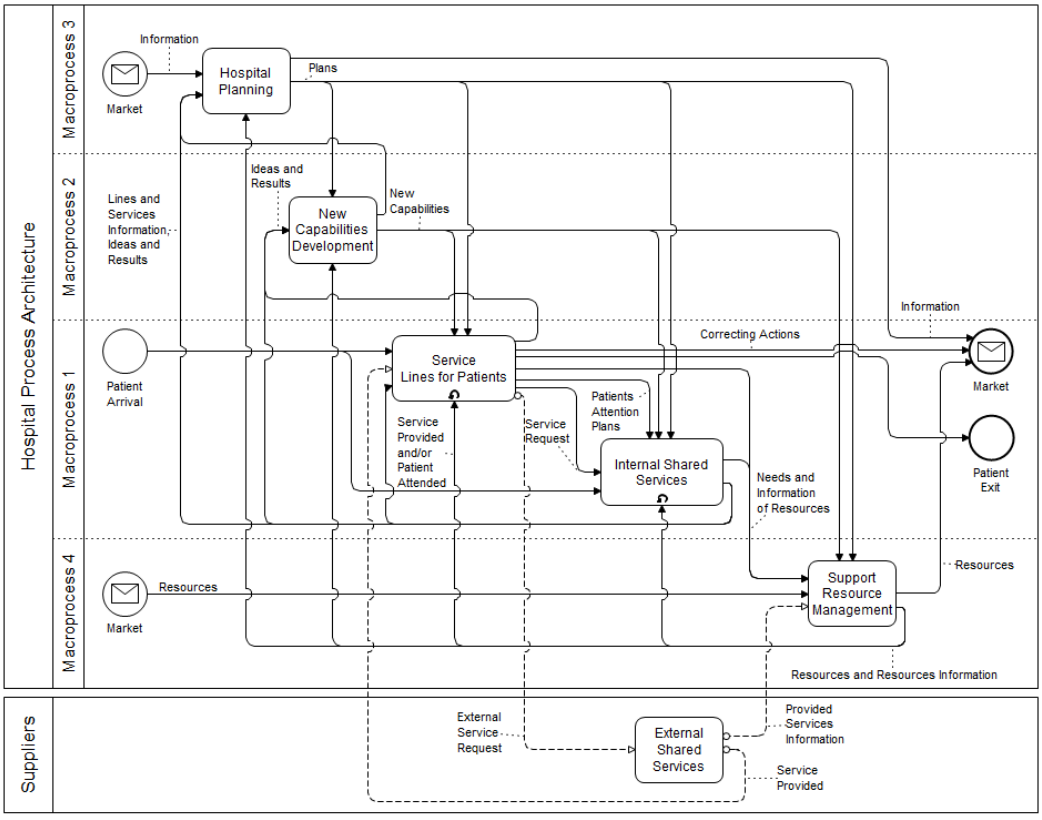

Figure 1: Process Architecture for Hospitals (Level 1)

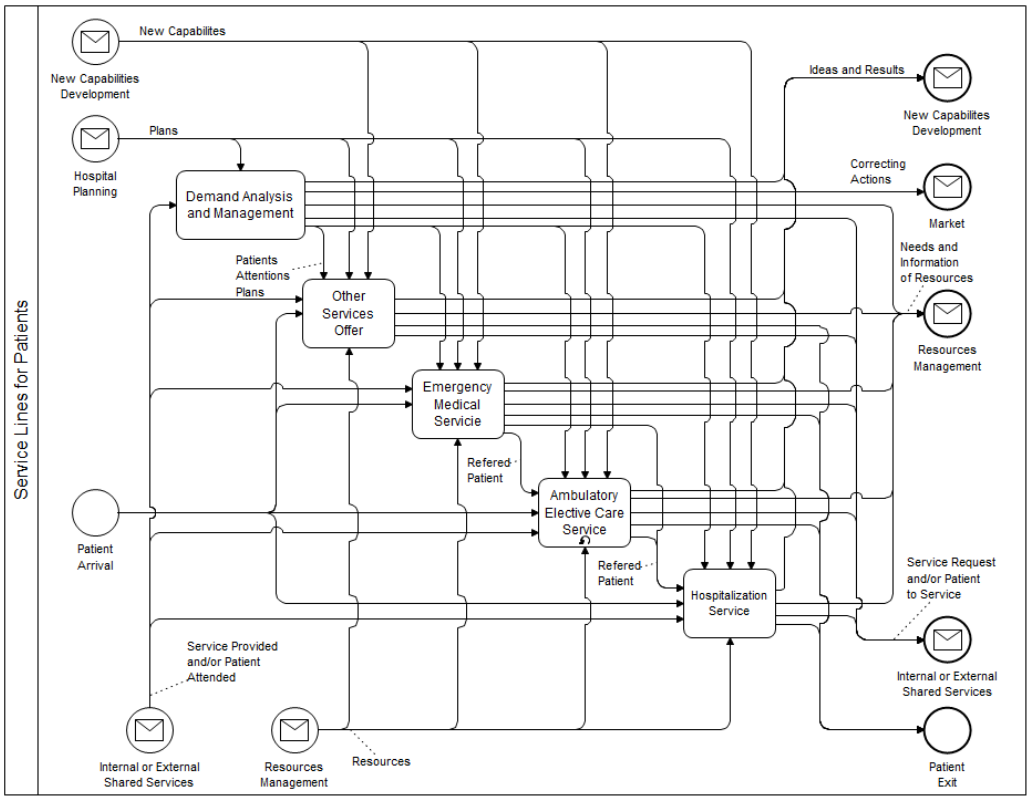

Figure 2: Detail of Service Lines to Patients (Level 1)

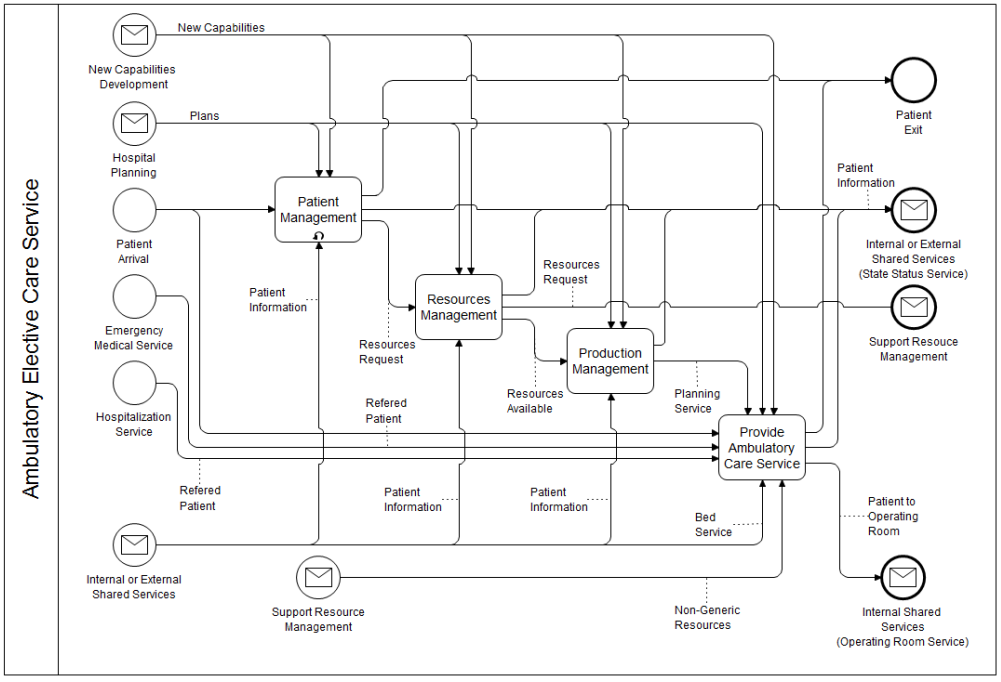

Figure 3: Design of Ambulatory Care Service (Level 2)

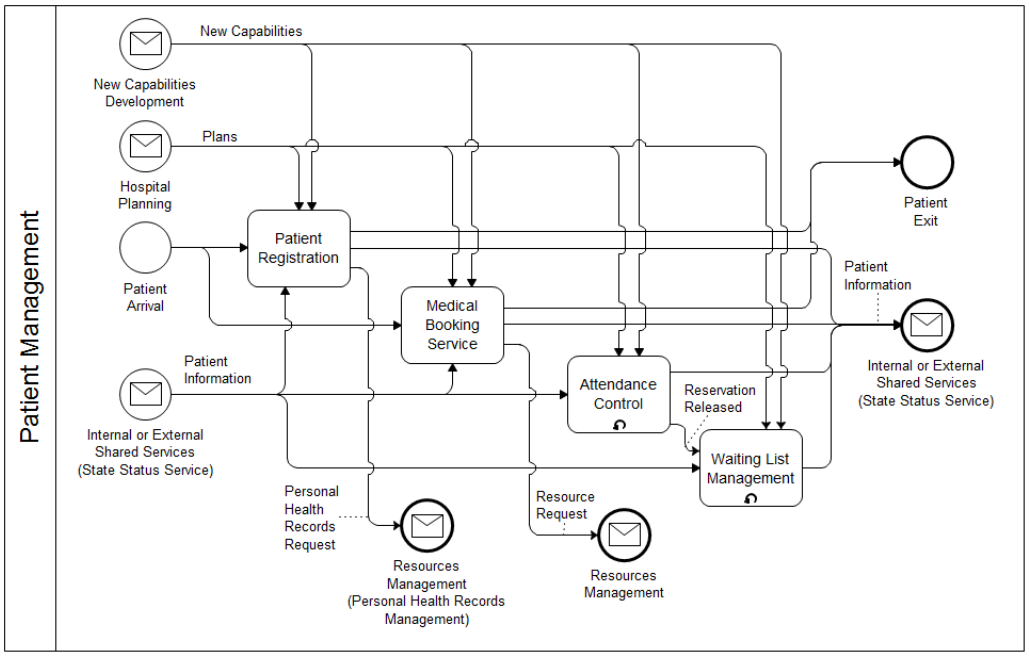

Figure 4: Detail of the Sub-Process Patient Management from Figure 3 (Level 3)

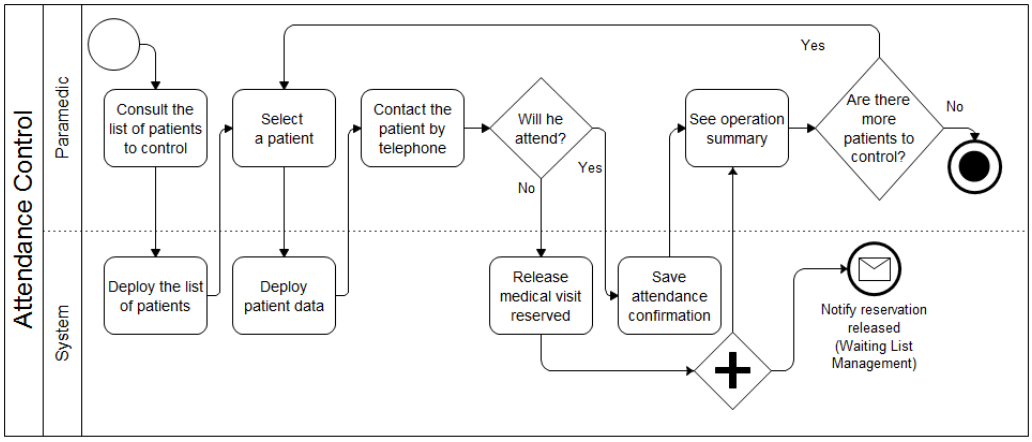

Figure 5: BPMN Diagram for Attendance Control (Level 3)

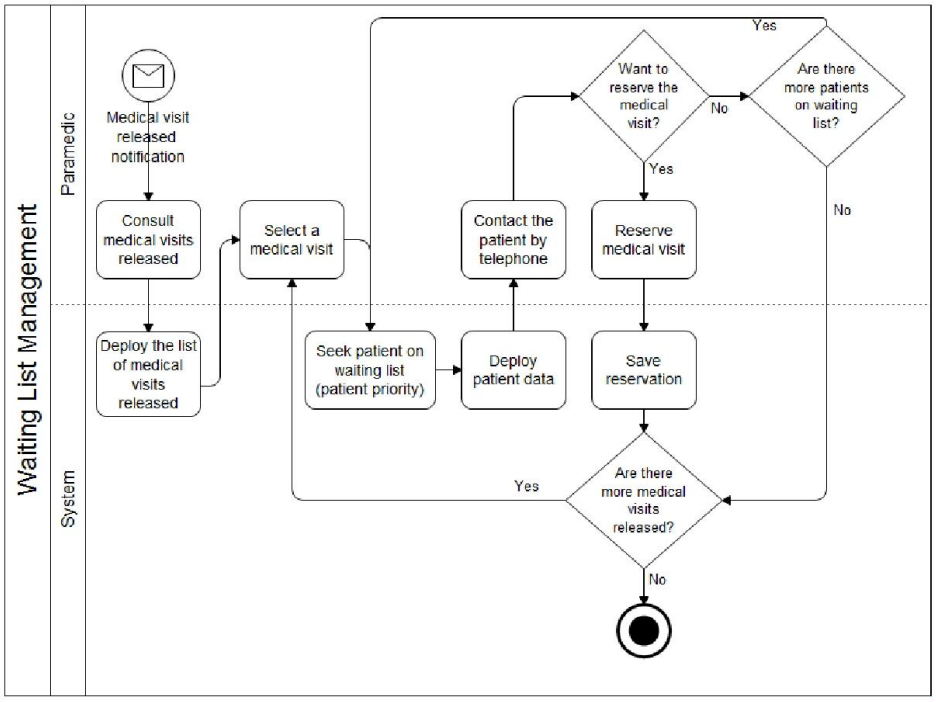

Figure 6: BPMN Diagram for Waiting List Management (Level 3)

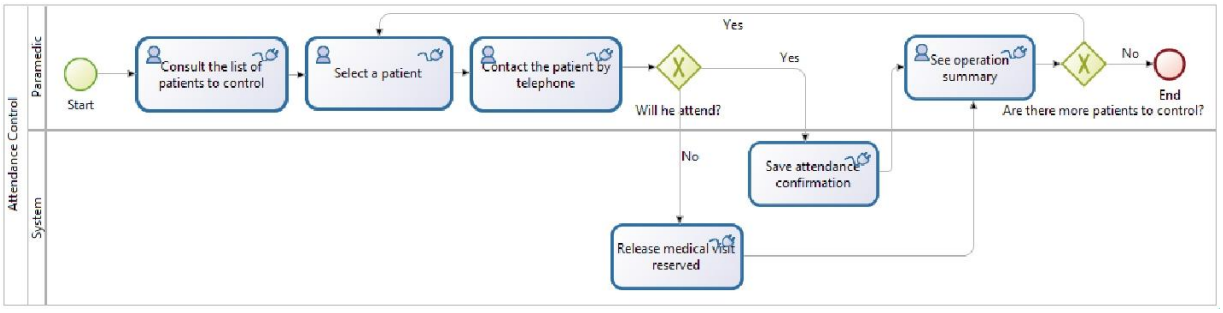

Figure 7: Attendance Control Process in BonitaSoft (Level 4)

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Article

An Enterprise Architecture Approach to Establishing ISCMP

Shirley Zhao

Abstract

Establishing an Information System Continuous Monitoring (ISCM) Program (ISCMP) is a complex effort that touches many business lines within a large enterprise. In search of a systemic approach to breaking down this complex effort, this article explores how an enterprise architecture framework and its method, the TOGAF® Architecture Development Method (ADM), can be leveraged to establish an ISCMP for large enterprises. It examines enterprise ISCMP elements and illustrates how these elements can be potentially addressed throughout a series of phases adapted from the TOGAF ADM method.

The author intends to bring out the enterprise perspectives and relationships around an ISCMP, hoping to evoke interest from researchers and practitioners in developing more solid and tangible steps. Such work should benefit a realistic adoption of the ISCMP.

Keywords

Information Security, Continuous Monitoring, Enterprise Architecture, TOGAF ADM, ISCM

INTRODUCTION

I once had an opportunity to be involved in the strategic planning of an enterprise ISCMP for a federal agency. As one of the earliest of its kind, the program took years in the planning phase, was initiated multiple times, and constantly encountered difficulties to move forward. In one snapshot of the complexities and the depth and breadth of the ISCMP, the main challenge is there seemed many touch-points but a lack of connections across the enterprise. I later moved on to work on a portfolio of security engineering and Operations & Maintenance (O&M) initiatives that allowed direct exposure with the agency's business units, IT offices, and auditing authorities. These are the stakeholders that potentially will be involved in the agency's ISCMP. It granted me great opportunities to look at a possible ISCMP and the touch-points from various angles and with an enterprise view, identifying how the enterprise perspectives relate to an ISCMP, and when they should be addressed and connected.

The concept of Continuous Monitoring (CM) can be traced back to traditional financial and information system auditing to meet compliance requirements on an "ongoing" basis such as in OMB Circular A-130 and the Sarbanes–Oxley Act (SOX). When applied in the information technology field, ISCM is an approach of maintaining ongoing awareness of information security, vulnerabilities, and threats to support organizational risk management decisions through continuous monitoring of security controls. It is gaining more grounds as both commercial and public sectors are advocating evolving security monitoring from point-in-time to ongoing monitoring. Most recently, ISCM has been defined as a critical step of the Risk Management Framework (RMF) prescribed in NIST SP 800-37 (Rev. 1, 2010). By this definition, organizations that execute under the RMF are expected to have a continuous monitoring capability in place, or one should be established to enable the RMF. NIST published SP 800-137 in 2011 to provide guidelines to establish, implement, and maintain ISCM in a six-step process (NIST SP 800-137, pp.16):

- **Step 1**: Define an ISCM strategy based on risk tolerance that maintains clear visibility into assets, awareness of vulnerabilities, up-to-date threat information, and mission/business impacts.
- **Step 2**: Establish an ISCMP determining metrics, status monitoring frequencies, control assessment frequencies, and an ISCM technical architecture.
- **Step 3**: Implement an ISCMP and collect the security-related information required for metrics, assessments, and reporting. Automate collection, analysis, and reporting of data where possible.
- **Step 4**: Analyze the data collected and report findings, determining the appropriate response. It may be necessary to collect additional information to clarify or supplement existing monitoring data.
- **Step 5**: Respond to findings with technical, management, and operational mitigating activities or acceptance, transference/sharing, or avoidance/rejection.

- **Step 6**: Review and update the monitoring program, adjusting the ISCM strategy and maturing measurement capabilities to increase visibility into assets and awareness of vulnerabilities, further enable data-driven control of the security of an organization's information infrastructure, and increase organizational resilience.

Putting the NIST defined RMF and ISCM process together, Figure 1 is an illustration of the combined view that shows their relationship.

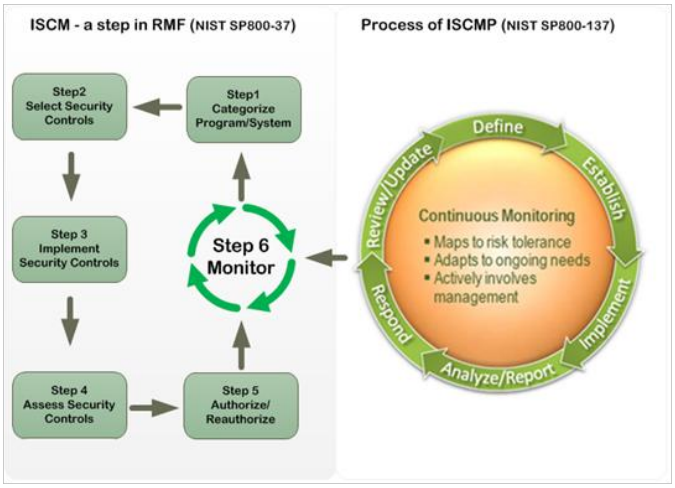

Figure 1: A Combined View of RMF and ISCM Process

The NIST-defined ISCM process focuses on the program content (such as program roles, security controls, monitoring and assessment frequencies), and lifecycle (from defining a new program to review/update of an established one). Yet, for organizations that still operate at point-in-time monitoring, Step 2: Establish an ISCMP" alone for a large enterprise is a huge effort. It involves many enterprise stakeholders, it is subject to existing constraints, and may require additional across-the-board technology implementations, to name only a few of the enterprise-wide issues that should be considered. Such issues exhibit the many touch-points at the enterprise level that are yet to be connected. Given the need for a systemic approach to break down the enterprise complexities and connect them with the ISCMP elements, enterprise architecture, a discipline that addresses the organized complexity of an enterprise, becomes a natural option.

This article adapts the TOGAF ADM into the following five steps in establishing an ISCMP:

- Initiation
- Strategic Planning
- Program Definition
- Roadmap Development
- Implementation Planning

The following sections examine these steps and illustrate how the TOGAF ADM as an enterprise architecture methodology may be approached to establish an ISCMP.

TOGAF ADM ADAPTED

The TOGAF ADM defines a series of phases around building and governing enterprise architecture. (Readers of this article are referred to the TOGAF Version 9.1 documentation for detailed information about the ADM.)

The TOGAF ADM provides nine procedural steps with guidelines and techniques, taking into account the complex enterprise factors and their relationships under broad organizational context, and describes how and when these factors and relationships should be considered and addressed.

Figure 2 illustrates the TOGAF ADM phases that are taken and adapted as the five steps in establishing an ISCMP. They are:

- Preliminary Phase adapted to ISCMP Initiation
- Phase A: Architecture Vision adapted to ISCMP Strategic Planning
- Phase B: Business Architecture, Phase C: Information System Architecture, and Phase D: Technology Architecture adapted to ISCMP Program Definition.
- Phase E: Opportunities and Solution adapted to ISCMP Roadmap Development
- Phase F: Migration Planning adapted to ISCMP Implementation Planning

The adaptation ends at the ISCMP Implementation Planning step that corresponds to ADM Migration Planning as this article is only concerned about establishing an ISCMP, not executing and governing it (even though the approach to execution and governance should be defined during the process of establishing an ISCMP, as illustrated throughout the following sections).

INITIATION

Establishing an ISCMP is to enable the organizational capability of ongoing monitoring and timely response to the security status, which requires an organizational-level sponsorship that can ensure the participation from enterprise stakeholders. As a program under a dedicated security initiative, it needs a governance framework, and to be equipped with effective tools. The program will interoperate with financial, operational, technology, and management arms so the ISCMP should accommodate other governance frameworks already in place. Activities should be initiated and be prepared to meet such needs, so as to ensure meeting the security directive through a smooth process.

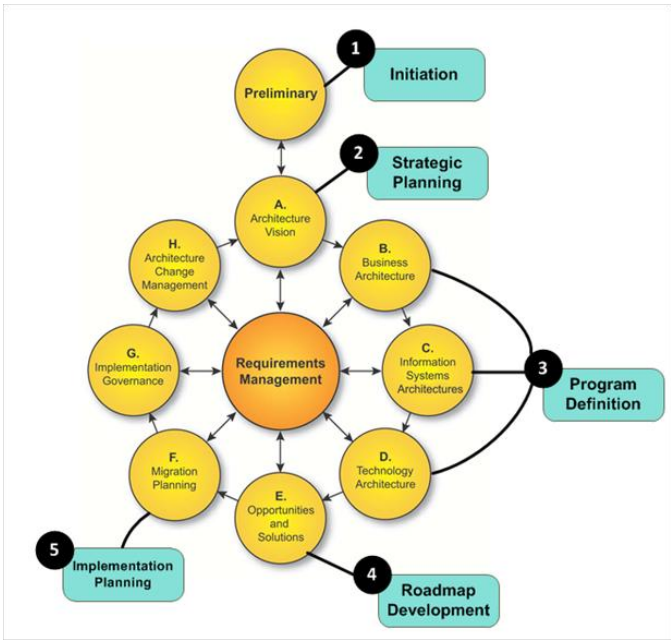

Figure 2: Adapted ADM

Corresponding to the TOGAF ADM Preliminary Phase guidelines for enterprise architecture, the Initiation phase of the ISCMP at a minimum should include the following activities.

Throughout the preparation activities, the stakeholder communities need to understand that their participation is expected and changes to the existing processes and governance frameworks they own may be forthcoming.

Appoint a Sponsor

The sponsor of the ISCMP ensures that the upcoming activities will have enough resources and enterprise support. Due to the scope of the program, the sponsor should be the executive accountable for security at the enterprise level.

Scope the Enterprise

The organization's business elements impacted by the ISCMP should be identified. The following is not an exhaustive list, but a few factors that can be considered when scoping the enterprise:

- The business characteristics (e.g., line of businesses *versus* IT providers)
- The extent of the impact (e.g., most affected *versus* least affected, directly affected *versus* indirectly affected)
- Infrastructure characteristics (e.g., some businesses may have adopted infrastructure that supports standalone business systems while the majority share resources provided by IT providers)
- Criticalities of the systems (e.g., mission-critical system *versus* support systems, and the business ownership of these systems)
- Legal compliance subjected to (e.g., business units with financial practice that is subject to domestic and/or international privacy laws)

Scoping the enterprise assists in determining strategic goals, priorities, collaboration needs, common enterprise security controls, etc. The enterprise constraints and risks will also become more visible out of the scoping process, which is critical to the overall planning in the upcoming phases and hence the success of the program.

Form an Operational Basis

This is a governance framework for ISCMP in its operational state. This can be achieved by first evaluating the existing governance and support frameworks and then identifying the changes needed to support the ISCMP.

An enterprise typically has multiple management arms and operates under a certain number of governance frameworks. Think about an organization or a business unit where its Program Management Office (PMO) follows PMBOK; its O&M unit adopts ITIL; its system development is compliant with CMMI. What ISCMP needs is a framework of its own. The framework should define things such as, what program materials (laws, policies, standards, etc.) are applied and what artifacts (monitoring reports, etc.) are generated, the ownership of the program materials and the artifacts, the process in which they are routed, and the repository where they are stored and referenced, etc. There will be touch-points with the existing governance and support frameworks that the ISCMP will leverage. In turn, the existing governance and support frameworks will be impacted by the ISCMP and may need to change to support the ISCMP.

Once the basis is formed, meetings should be conducted with the organization stakeholders to inform the touch-points, and obtain stakeholders' agreement on the ISCMP governance framework. Through communications, the stakeholders gain the understanding that while the ISCMP evolves with more program details, the frameworks they own may need to be adapted to satisfy the requirements of the ISCMP. (Consider a business unit that follows an existing C&A process may need to increase the frequency of certain reports or to change some manual reports to automatic, in which case the business may need to accommodate new reporting tools made available from the ISCMP.)

Assemble a Governance Team

The governance team will establish and govern the ISCMP. The key roles and responsibilities defined should allow them to interact and collaborate with enterprise stakeholders. Though overlap may occur, the governance team roles are not the ones that directly carry out CM at the enterprise or business unit levels. Roles of carrying out CM will be identified in the Program Definition phase when the operational CM requirements are more clearly defined.

Implement Tools to Support the ISCMP Governance

Tools may include, though may not be limited to:

- Program file repository where policies, standards, guidelines, program requirements, etc. are to be stored and referenced by the business units
- A centralized reporting interface to display ISCM reporting metrics
- Templates that are standardized and reusable

The governance tools are different from the security tools employed to conduct the actual continuous monitoring. Examples of security tools are Intrusion Detection System (IDS), Network Packet Analyzer, Security Information and Event Management (SIEM) tool, or a customized dashboard that dynamically aggregates the information generated from multiple tools. The need for security tools can be analyzed when the security parameters are defined in the Program Definition phase.

STRATEGIC PLANNING

The TOGAF ADM Architecture Vision phase is characterized by the development of a high-level aspirational vision of the enterprise capabilities and business value. Similarly, the ISCMP through its Strategic Planning phase defines its CM scope and a high-level vision of the CM capabilities. The scope and vision deliver a value proposition to the business community and gain momentum for conducting ISCM with enterprise stakeholders' participation.

- **Formally Establish the Project**: The effort of establishing an ISCMP can be considered as a project, for which the preparation activities have been conducted in the Initiation phase. To secure the recognition for the project, the organization's standard Project Management (PM) practice should be followed. Leveraging standard PM practice is one of the touch-points with the existing governance frameworks (previously identified in the Initiation phase). Formally establishing the project ensures long-term support and commitment for the ISCMP from the enterprise community.
- **Scope the ISCMP Boundary**: Once the project is initiated and there is recognition of the effort at organization level, it is time to scope the program and develop high-level strategy. Scoping the program is different from scoping the organization, in which business units and stakeholders affected by the ISCMP are identified. Scoping the ISCMP is about delineating the program boundary, what is inside and outside of the ISCMP, the current state of the enterprise security posture, and the target state that the ISCMP will achieve.

NIST publications SP 800-37, SP 800-137, and SP 800-39 all describe organization-wide risk management through a three-tiered approach where tier 1 addresses risks from an organizational perspective, tier 2 from mission and business process perspectives, and tier 3 from an information system perspective (Figure 3). The strategic planning should focus on the scope around the organization view across all tiers, leaving the detailed requirements for each tier to be defined in the Program Definition phase.

Let's take a look at these scenarios across all tiers:

- **Breadth of Coverage**: This is especially important for enterprises with a broad line of business and a complex infrastructure landscape; for instance, an enterprise with a significant number of business units who are silo'ed from the master infrastructure, or an enterprise having one or a few business units that are big enough to be an enterprise in their own right thus should be considered independently to avoid complicating the overall effort.
- **Depth of Coverage**: In the security domain, it has been a common strategy and practice for organizations to apply defense-in-depth, thus a wide range of technologies and tools at various layers of their network may already exist. However, effectiveness may need improvement, new threats may have surfaced that require new tools, and inefficient tools may become a burden of the system and need to be decommissioned, etc. Therefore, existing security measures, new technologies, and tools should be evaluated to help determine for the organization as a whole.
- **Infrastructure Characteristics of the ISCM**: One large enterprise does not necessarily have all of their information systems in one spot, either physically or logically. There are networks that are federated or silo'ed, and assets that are shared. All such information needs to be pulled together, as a baseline, in consideration of the ISCMP coverage.
- **Impact to and from Other Strategic Goals**: If the organization has other strategic security initiatives; for instance, for an enterprise set to adopt the CAESAR model (DHS, 2010), there is a need to

evaluate where the initiative stands across all tiers, and how the ISCMP should be aligned with it to achieve the common business directive.

- **Security-related Information that will be Reused**: Examples are the assets from the existing C&A processes, and a change control process for one system that can be adapted and refined as one overarching change management process for the ISCMP.

Strategic timelines are associated with many of the above scenarios and should be considered where applicable.

- **Assess Constraints and Risks**: While drawing out the program boundary, breadth, depth, and timelines, it is important to identify stakeholder concerns, evaluate business capability and business readiness, and the associated constraints and risks. Consider a scenario when potentially a security sensor tool is to be installed to automate the monitoring of some controls. If the sensor is placed on the network boundary of a business system, some rules of the sensor may become constraints adversely affecting the business thus causing the business' unwillingness to participate in the program. Business-level constraints and risks need be fully considered, resolved, or mitigated at the program level before the actual program implementation.
- **Formulate an ISCMP Vision, Strategy, and Value Proposition**: All of the information gathered so far makes up the foundation of a high-level enterprise baseline and target, which will inform more granular planning. At the conclusion of the Strategic Planning phase, it would be beneficial to create a document that consolidates all findings into a program vision, strategy, and a value proposition. This document can be used to seek the sponsor's official approval to proceed, ensuring the understanding of the ISCMP visionary goals from the business community and their continuing support of the program.

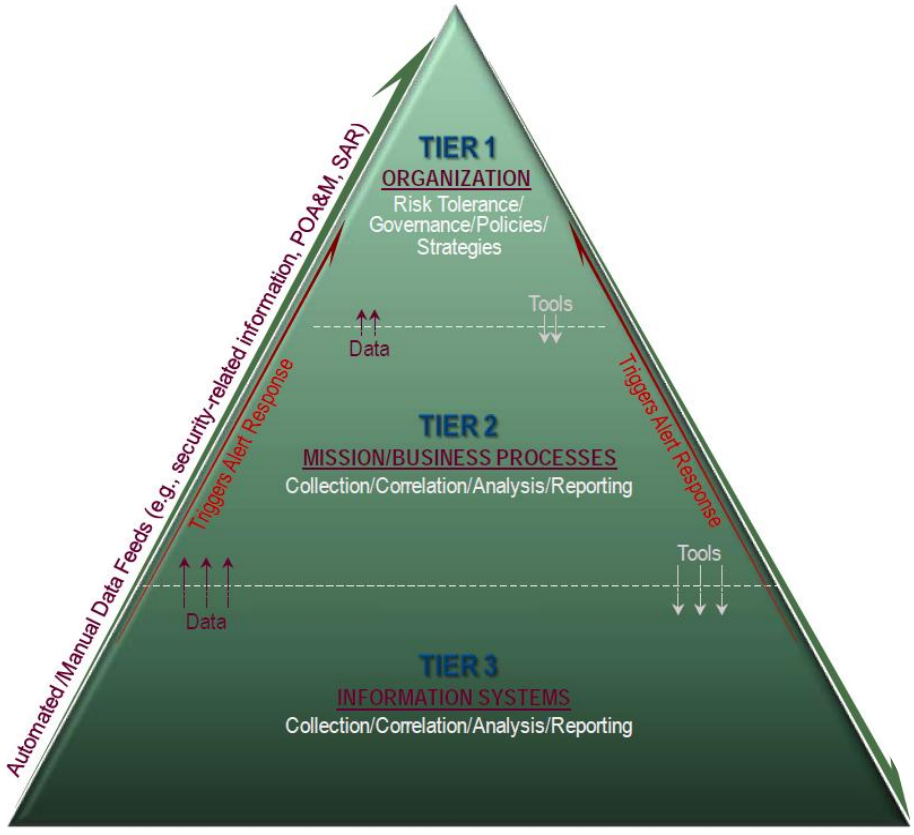

Figure 3: Organization-Wide ISCM 3-Tier View [NIST SP 800-137]

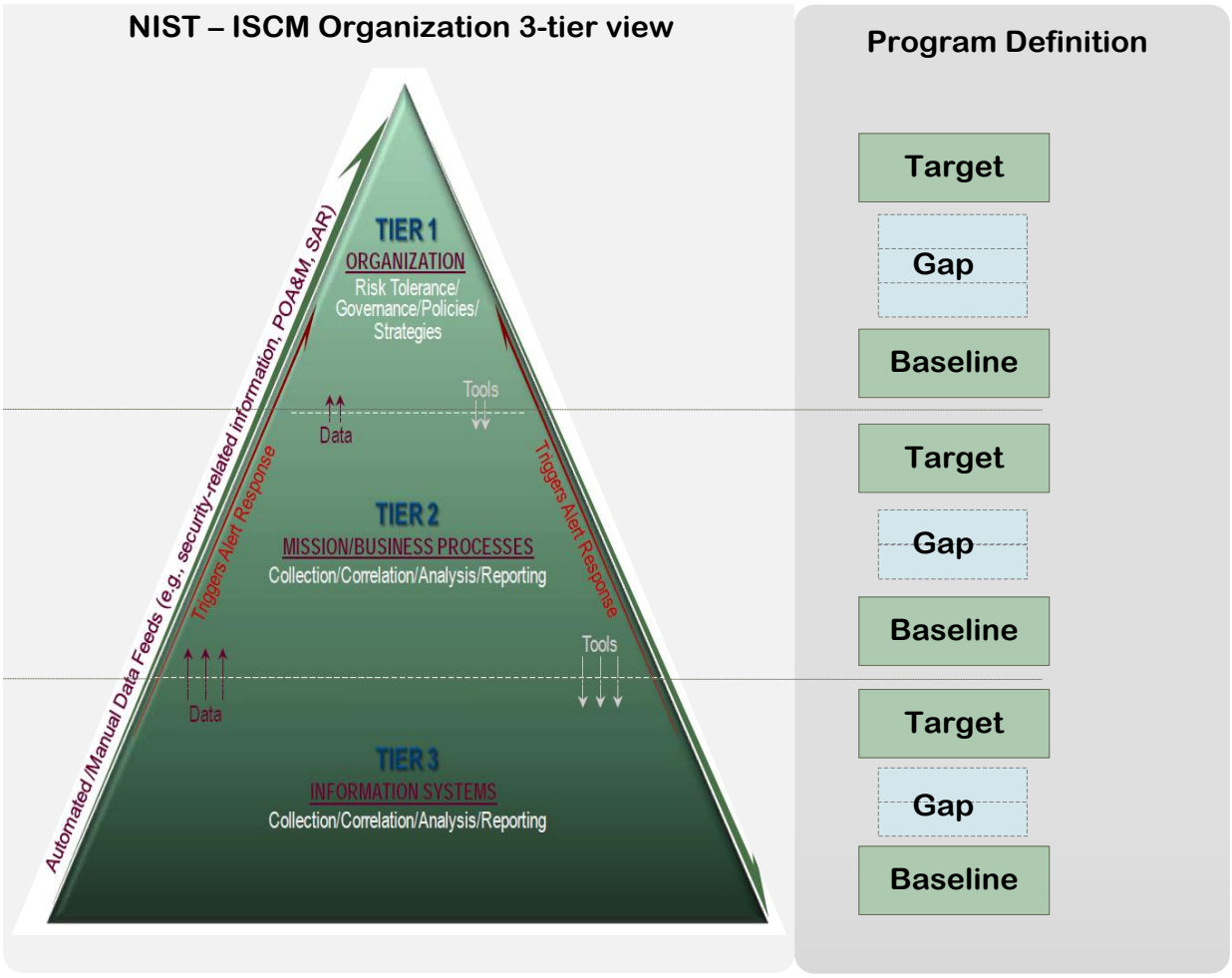

Figure 4: Program Definition Around the ISCM Three Tiers

PROGRAM DEFINITION

The objective of the Program Definition phase is to transform the high-level scope, vision, and strategy obtained from the Strategic Planning phase into detailed requirements; i.e., the security and risk parameters surrounding the continuous monitoring. Many technical guidelines can be found in NIST publications SP 800-37, SP 800-39, SP 800-137, and SP 800-53. The baseline and target analysis at a strategic level across all three ISCM tiers (output from last phase) can then be further conducted for each tier. A few scenarios for analysis of each tier are listed below:

1. The executing CM roles and responsibilities, with regards to
    - Input they receive
    - Output they generate
    - Events that they respond to
    - Processes that they own
    - Regulations, policy for which they are held accountable
2. Catalog of the business systems, common and shared controls. and the risk ownership
3. Risks, constraints, tolerance levels
4. Security metrics, assessment and monitoring frequency
5. Selection of the controls for automatic *versus* manual monitoring
6. New policies and procedures needed, or existing ones that should be updated

Worthy of note is the Risk-Framing defined in NIST SP 800-39 as a key step in managing information security. If not done yet, Risk-Framing should be fully conducted to produce a risk management strategy at each tier; i.e., "how the organization intends to assess risk, respond to risk, and monitor risk" (NIST SP 800-39). The recommended security controls in NIST SP 800-53 shall

be examined, especially with regards to what and where they are at each tier, how they are or should be handled, what controls are shared, what controls can be automated, and how frequently are the controls being monitored and assessed, etc.

Program Definition requires breaking down the boundaries of each tier (i.e., answering the question: "who" is "who" and doing "what") so that the baseline for each tier can be clearly compared to the target, and a gap analysis for each tier can be conducted with potential solutions/activities identified to fill in the gap.

In large organizations, Program Definition could be an extremely complex step. The organization may have multiple networks. For example, some business agencies may have their own independent cloud service providers, some services may be operated in a silo'ed enclave different from most others, or common mission support systems are in place but may not have been shared broadly as intended. In this complex picture, a tiered approach and a breaking down of the boundaries provide a way to draw out the program elements, to streamline the information flow between the tiers, and to identify the coherent relationship among the tiers. Tier-based program definition contributes to a consolidated gap analysis in the next phase (Roadmap Development), resulting in a clear roadmap of the ISCM implementation.

Figure 4 illustrates the program definition conducted around each tier.

ROADMAP DEVELOPMENT

Through the Program Definition phase, the baselines, targets, gaps, and potential solutions to fill in the gaps have been drawn out at each of the ISCM tiers. When these findings are put together for a collective solution, the options of combinations throughout all tiers, the solution components, and the transitional steps could be many, each of which could be drastically different. However, there is only one best-fit route to achieve the target state. The next phase concentrates on the best-fit route; i.e., exactly "how" to deliver the ISCM.

The Roadmap Development phase is carried out through consolidating the gap analyses previously conducted at each tier. Results from the tiered gap analyses are logically grouped and integrated, taking into account the enterprise factors such as business readiness, constraints, risks, financial, and resources information. Organizational-level ISCMP inevitably brings in organizational changes, thus business resistance to changes as a cultural issue should be fully considered.

The outcome of the consolidated gap analysis is the ISCMP roadmap, which will describe a definitive set of technologies and tools, organizational changes, business activities, and transitional states (if any), with major timelines expected for these changes to occur. The roadmap provides answers to a collective solution and its components as well as the strategic decisions at enterprise level. To name a few, strategic decisions towards:

- Taking on whole organization changes all at once *versus* pilot programs on selected business units and gradually expanding to all, and the business participation level and collaboration effort expected as a result of this decision
- Achieving full maturity of the ISCM iteratively through multiple years *versus* targeting at the full maturity in one multi-year plan
- Mainly adopting a new set of tools *versus* maximizing the existing tools

And specifics around a collective solution:

- What are the new tools to be acquired, what kind of coverage will we get from their adoption, and when should they be implemented and take effect?
- If taking an iterative strategic plan, what ISCM maturity level are we targeting to achieve at one, two, and three year's timelines?
- Common technology and tool utilization at the business level; e.g., vulnerability scanner adoption in the cases of all business participating or only some participating

In the end, the outcome should represent a best-fit route leading to the establishment of the ISCMP in a most efficient and effective way.

Figure 5 is an illustration of the Roadmap Development as a result of the consolidated gap analysis based on the tiered gap analyses.

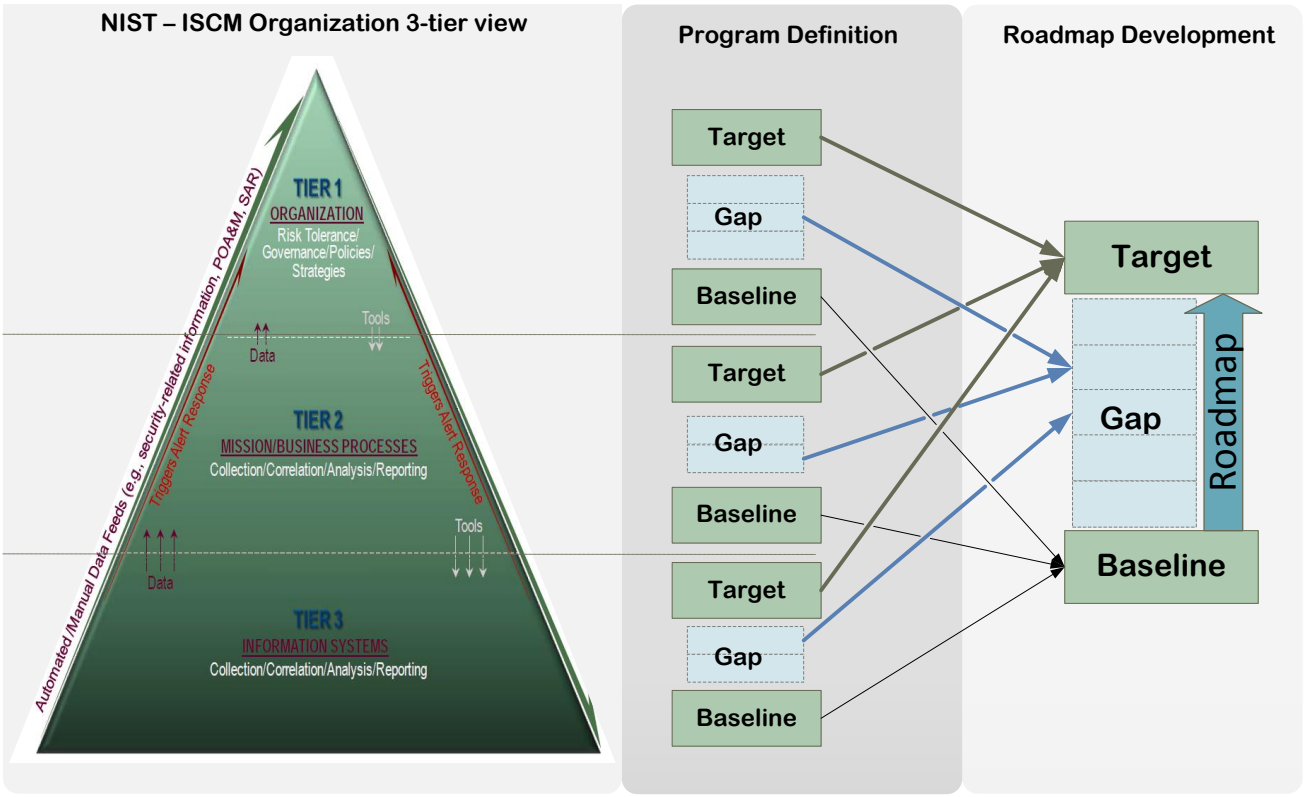

Figure 5: Program Definition (Tiered) *versus* Roadmap Development (Consolidated)

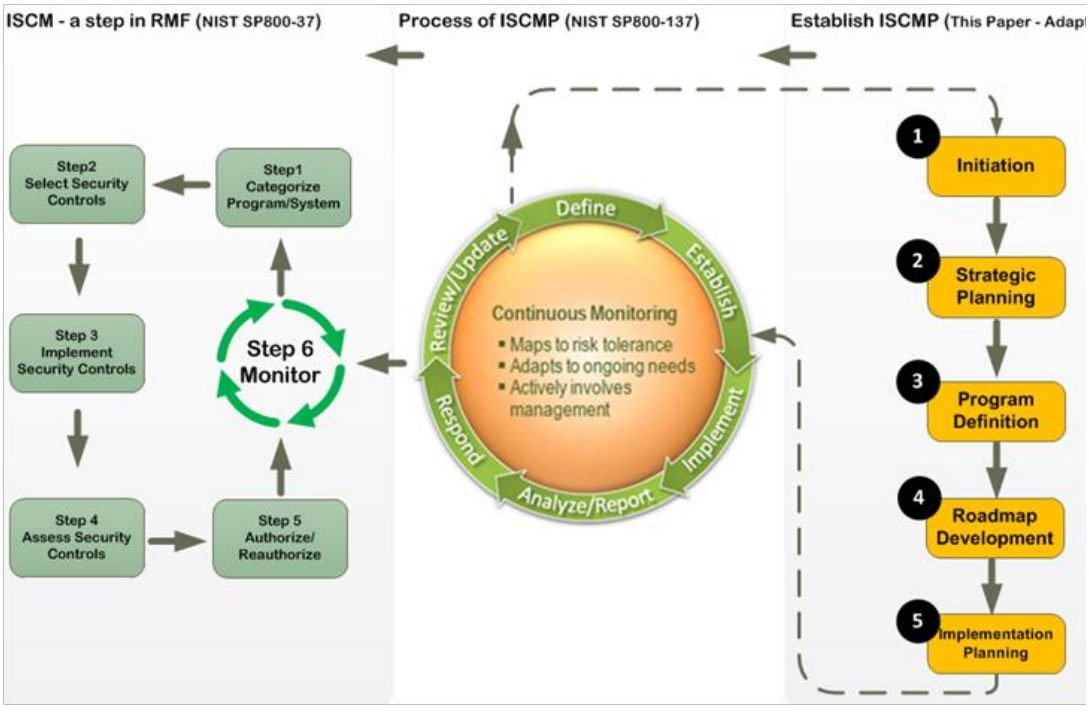

Figure 6: Adapted ADM Related to ISCM and RMF

IMPLEMENTATION PLANNING

Eventually, the effort of establishing an ISCMP comes to a point where sufficient information has been obtained so that an executable plan can be created. In this phase, the ISCMP roadmap is expanded with activities and schedules that take into consideration organization-wide information including governance frameworks, budget, and more specific risks, constraints, and resources, etc. that are obtained throughout all previous phases. Examining activities under the organizational context allows activities to be correlated, which results in a realistic schedule with proper dependencies and constraints. The activity's granularity level at this phase also allows costs and benefits to be fully considered, thus benefits and value to the business will become more measurable.

As ISCMP is a program sponsored at the enterprise level with participating business units, the implementation plan should address not only the tasks to be executed or coordinated by the sponsoring authority but also the activities that need to be conducted or contributed to by the participating business units. The plan should reflect that ISCMP activities are coordinated with other frameworks (identified in the Initiation phase), and how they interact with each other around the ISCMP governance framework (defined in the Initiation phase as well), especially concerning the deliverables created from these activities. There might very well be a need for a business unit to develop a more granular plan. The ISCMP implementation plan should provide direction, guidance, and level of detail for business units to follow so that the business when developing a more granular plan and/or ensuring that the ISCMP is consistent and aligned with the enterprise initiative.

The process of developing the implementation plan is an opportunity to review the roadmap, and adjust it if needed. The ISCMP roadmap is confirmed or finalized when the implementation plan is completed.

Finally, the roadmap, implementation plan, and supporting artifacts, especially the artifacts that are related to the collaboration and governance frameworks, should be made available and communicated to the business. Once this is done and well received, the enterprise should be at a position of executing the ISCMP that has been established, getting closer towards achieving the end business goal of leveraging the ISCMP to enhance security posture.

SUMMARY

Depending on where an organization is, an ISCMP could be a tremendous effort that takes months or years to establish. This article proposes adapting the TOGAF ADM as a systemic approach to establishing an enterprise-level ISCMP. The five steps of this adapted approach are an expansion of the first two steps of the NIST-defined ISCM process, a critical step of the six-step RMF. How the adapted approach proposed in this article relates to the NIST-defined RMF and ISCM process is illustrated in Figure 6.

The article's focus is an adapted approach to establishing an ISCMP, rather than the actual security and risk parameters for an operational ISCMP, for which one can find abundant coverage in NIST publications SP 800-37, SP 800-137, SP 800-39, and SP 800-53, FedRAMP Office Continuous Monitoring Strategic Guide (2012), or resources from other industry authorities such as SANS.

While some TOGAF ADM concepts and guidelines are applied (for example, the three-tier based ISCM Program Definition corresponds to the TOGAF domain-based enterprise architecture definition), this article is not intended to cover every possible way that the TOGAF ADM can be adapted as step-by-step guidance for an ISCMP. Rather it examines the complexities of an ISCMP that is comparable to an enterprise architecture effort, and seeks the possibility of a systemic approach based on a well-established enterprise architecture framework, the TOGAF ADM. Those who find value in this article may explore the TOGAF standard in-depth and use the additional guidelines and techniques to assist in establishing their organization's ISCMP. Specifically, to address the security architecture of an ISCMP, the author recommends the TOGAF standard detailed coverage on security considerations around the ADM (Chapter 21 of TOGAF 2011).

The author would like to note that there are also other enterprise architecture methodologies (Roger Sessions 2007) which might be complementary and also provide valuable resources to establishing an ISCMP, but they are beyond the discussion presented in this article.

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Shirley Zhao is an IT Consultant who has worked in both the federal and commercial sectors for more than 15 years. She has practiced in a broad spectrum of IT domains, having led software, architecture, and infrastructure implementations with lifecycle Information Assurance. Currently working as a program governance consultant for the USDA's enterprise Security Operation Center, she also conducts independent research, with an interest in applying analytical and systemic thinking in security management and enterprise IT governance.

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Article

Chief Enterprise Architect as Transformational and Transactional Leader

Dr. Gerald R. Gray

Abstract

Probably as much or more than any other role in the enterprise, the Chief Enterprise Architect role requires the use of influence – influence with peer leaders, influence among teams that do not report to the enterprise architecture function, and influence with the upper levels of organizational management as architecture is developed to meet business capability needs. This level of influence requires the Chief Enterprise Architect to have superior leadership skills. There are two archetypes of leadership: transactional and transformational. Leadership literature often suggests that one archetype is better than another. This article suggests that there are times when the Chief Enterprise Architect will need to employ both archetypes. Some well established leadership frameworks that use these archetypes will be examined and synergized into a holistic leadership model which the Chief Enterprise Architect can apply to their leadership activities.

Keywords

Enterprise Architecture, Transactional Leadership, Transformational Leadership, Structural Frameworks, Situational Model

INTRODUCTION

With any enterprise architecture effort it has been clear that it is important for the Chief Enterprise Architect to be a visionary leader. The Chief Enterprise Architect sets vision by being able to identify the gaps in the enterprise architecture, develop an architecture proposal, and then sell those changes to the architecture that address the required business capability needs. In this "sales" role the Chief Enterprise Architect has to wear many hats; he or she must be a technologist, as well as be able to speak the language of Return on Investment (ROI) to business people. Aligned with this "many hats" paradigm, TOGAF®, an Open Group standard (TOGAF 2011), provides a skills framework that suggests skill sets and proficiency levels within these skill sets required for enterprise architecture practitioners. In addition to having all of the requisite modeling and architecture skills, enterprise architecture managers according to the TOGAF standard are expected to show high proficiencies in what are deemed "Generic Skills" and "Business Skills & Methods". While this skills framework provides a useful baseline, considering the depth and breadth of a subject such as leadership, this framework leaves something to be desired. For example, there is no discussion on leadership styles and what style might be most applicable to the enterprise architecture discipline.

In addition to leadership, the Chief Enterprise Architect must be accomplished in the ways of risk and stakeholder management, visioning, and strategic planning that applies to this vision. This sounds much like the description of the "great man" (Popper 2004) scenario, but the great man (or women) can only take an organization so far. For a Chief Enterprise Architect to be truly successful they must also be a transformational leader. This article will examine some applicable leadership frameworks, synergize those frameworks, and then show how this holistic leadership framework can be applied by Chief Enterprise Architects to help them lead change in just about any type of organization.

THE ENTERPRISE ARCHITECTURE LEADERSHIP CHALLENGE

"Everything rises and falls on leadership." (John Maxwell)

While enterprise architecture practitioners understand the value that enterprise architecture brings to an organization, getting that message across to the rest of the organization can be a challenge. Even in the best conditions it can be difficult to create or maintain a practice (Gray 2013). Some challenges include:

- A lack of governance (the inability to enforce architecture compliance)
- The inability to communicate or "sell" enterprise architecture value
- Architects being pulled inappropriately into projects (architects provide guidance but should not be engaged on every project)
- A lack of resources to accomplish all that the enterprise function is charged with
- Developing the interpersonal skills required to communicate effectively with both business and IT

For enterprise architecture success it is critical for the person leading the enterprise architecture function to establish the value of enterprise architecture and get buy-in from their peers. The ramifications of not being able to do so are clear. The enterprise architecture function might have resources pulled from the team, or be downsized, if not outright disbanded. If governance is not established – e.g., if any VP has their "own" money and can acquire resources without regard for the enterprise architecture – the enterprise architecture function loses one of the primary values that it provides to the organization. Because of the difficulty in leading across the organization as well as leading down into his or her own team, the leadership bar for the Chief Enterprise Architect is a bit higher than for many functions in an organization.

	Enterprise Architecture Manager
Generic Skills	
Leadership	4
Teamwork	4
Inter-personal	4
Oral Communications	4
Written Communications	4
Logical Analysis	4
Stakeholder Management	4
Risk Management	4
Business Skills & Methods	
Business Case	4
Business Scenario	4
Organization	4
Business Process	4
Strategic Planning	3
Budget Management	3
Visioning	4
Business Metrics	4
Business Culture	4
Legacy Investments	3
Business Functions	3

Figure 1: Base Skill Set and Proficiency Levels for Enterprise Architecture Managers [Adapted from TOGAF (2011)]

To be successful then, enterprise architects that aspire to leading their own team should equip themselves with leadership knowledge and experience. While management and leadership theories abound, the exploration of the entire leadership domain is beyond the scope of this article. However, many of the leadership discussions do fit broadly into a transactional or transformational view. It is this view that will be explored further and how this view can be applied to the practice of enterprise architecture.

TRANSACTIONAL AND TRANSFORMATIONAL LEADERSHIP REVIEW

A transformational leader is that leader who garners superior performance by transforming followers' values, motives, and attitudes and raising these attributes to higher levels. This leader is made up of four factors (Bass 1985):

- Charismatic leadership
- Inspirational leadership
- Intellectual stimulation
- Individualized consideration

Leaders might have charisma and attempt to lead via their "idealized influence" and, while charisma can be a beneficial trait, charisma alone may not be enough to be effective as the effect may diminish with familiarity. The inspirational leader attempts to get followers to take personal responsibility for their work and motivate followers to work towards common goals. Leaders that focus on intellectual stimulation attempt to provide situations that will challenge their followers mentally. The practice of individual consideration is the extent to which the leader may coach, mentor, or otherwise attempt to meet the individual needs of their charges.

One way to identify transformational leaders may be by considering their value systems. Krishnan (2001) found that the value systems of effective transformational leaders differ somewhat from less effective transformational leaders in that it appears that transformational leaders value collective welfare above their personal welfare. This may explain why transformational leaders encourage followers to work towards goals that benefit the group. Krishnan also noted that transformational leaders tend to emphasize moral values over competence values and this may indicate there may be some alignment between moral leadership and transformational leadership.

The transactional leadership archetype, on the other hand, is based on the idea that the leader influences follower behaviors by bargaining or making exchanges with them. Transactional leadership can be effective, but ignores the long-term development of followers. Transactional leadership has three dimensions referred to by Lievens et al. (1997) as:

- Contingent reward (rewarding contractually) and punishing undesired actions (giving extra feedback)
- Active management by exception (leaders try to anticipate issues)
- Passive leadership (the leader only acts after an event has occurred)

A transactional leader may be successful initially, but because transactional leaders do not work from getting buy-in or building consensus they may eventually build resentment and resistance. Lievens et al. (1997) also noted that transactional and transformational leadership were not to be viewed as being on two ends of a continuum, but that a single leader may exhibit both transactional and transformational leadership qualities, as seen in Figure 2.

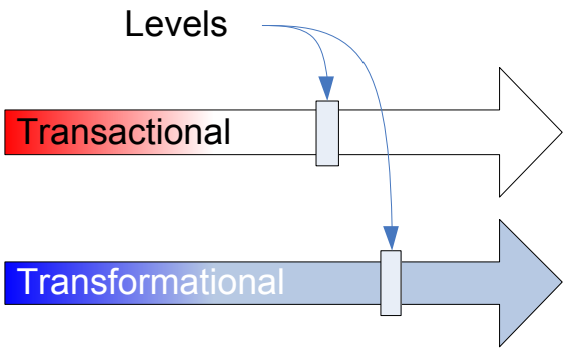

Figure 2: Transactional-Transformational Leadership Continuum

In looking for leadership qualities that are beneficial for the Chief Enterprise Architect two primary models were considered. These two models reflect both transactional and transformational aspects. The first is the situational leadership model developed by Hersey, Blanchard, and Johnson (2000), the other is the framework model (Bolman, Deal 1997). The situational leadership model is based on three high-level variables:

- Guidance and direction
- Socio-emotional support from the leader
- The readiness level of followers (see Figure 4)

In a nutshell the four quadrants of the situational model are determined by the relationship and task behavior maturity. The relationship access goes from low (the leader does not have or rely on the relationship aspects) to high (the leader is highly engaged with followers), while the task axis goes from low (the leader is involved but the group makes the decision) to high (specifically instructing followers). Each is marked by a style of leadership that fits a given situation:

- Delegating style (turn over decisions) – followers are able, willing, confident
- Telling style (give instructions) – followers are unable, unwilling, lack confidence
- Participating style (share ideas) – followers are able, but lack confidence and willingness
- Selling style (explain decisions) – followers are unable, but are willing and confident

In comparing transactional and transformational leadership, Hersey, Blanchard, and Johnson note that:

"It became clear that it wasn't just one style that was effective. Each style was appropriate, depending on the situation."

Bass and Avolio (1994) also make a case for the powerful effects of the transformational leader but recognize that some aspects of both leadership styles may be needed to be an effective leader. This view aligns with Collins (2003) who indicated that the best leaders (referred to as Level 5 leaders in Collin's study) had some aspects of both transactional and transformational leadership. The pinnacle of Collin's model exhibited:

"enduring greatness through a paradoxical blend of personal humility and professional will"

In practice many people will profess a desire to be a transformational leader; one who not only meets the needs of the organization, but also grows the people that they lead.

Figure 3: Level 5 Leadership [Adapted from Collins (2003)]

However, this aspiration may at times be sacrificed on the altar of expediency, especially when the Chief Enterprise Architect is facing a critical deadline (something that would likely show up in the "telling" quadrant of Figure 3). Hopefully the Chief Enterprise Architect has established an environment of trust with peers and subordinates. If they do need to withdraw from their "trust account" when a short-term transactional need arises, their colleagues will be more likely to understand the urgency of a given situation and understand that this is not a longer-term pattern of behavior.

When considering the readiness of followers, a transformational leader should consider how to increase employees' capability and willingness. One way to

accomplish this is through empowerment. Empowerment depends on three core activities:

- The empowered receive the authority to take action.
- They have accountability for their decisions.
- They receive the requisite reward for this authority and accountability.

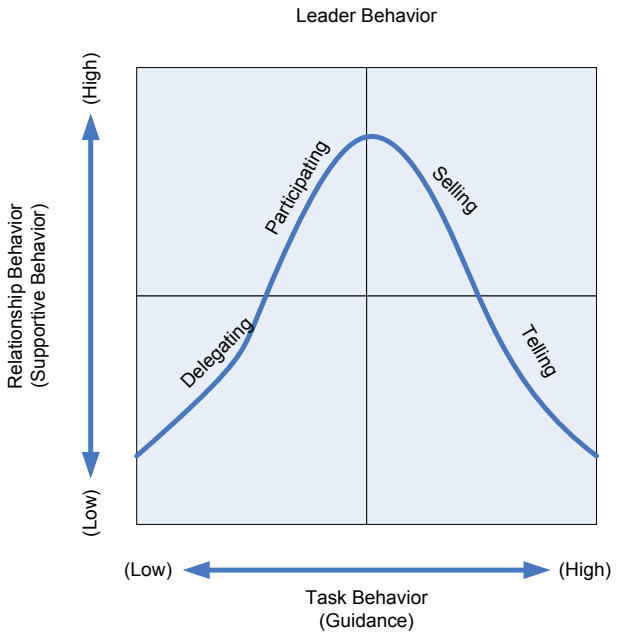

Figure 4: Situational Leadership Model
[Adapted from Hersey, Blanchard, and Johnson (2000)]

Empowerment is the idea that as the leader removes the causes of feelings that make one feel powerless, then "employees would perform at their productive and creative best" (Ozaralli 2003, p.336). However, empowerment is not without its challenges. Khan (1997) noted that empowerment fails for several reasons:

- Lack of sustained management support
- Empowerment used as manipulation
- Having empowerment be deployed selectively creating empowerment have's and have not's
- Empowerment as an excuse not to invest in training and development
- Failure of managers to provide feedback or to recognize achievements

Baker (1994) noted that there was a paradox associated with empowerment; that leaders had to at once take control by letting go. Baker used the "leader as coach" analogy that worked to grow employees while referring to leaders with a more transactional approach as meddlers. Baker noted that leader as coach believed in the underlying potential of human nature, but that leader and followers both needed to believe in "superordinate goals" (p.64), and shared values to facilitate successful empowerment.

These ideals align with the ideas of transformational leadership. If the leader can successfully grow subordinates through empowerment they should be able to increase both their capability and willingness, moving capability from its original level to some new state T2, as shown in Figure 5. The unfortunate negative associated with empowerment is that it is often used as a means to shift blame. This can occur when the employee is given only two of the three attributes – e.g., accountability – and a token reward for success, but no real authority. This is empowerment by half measures and when the employee is not successful the manager can throw up their hands and say: "well, they were empowered".

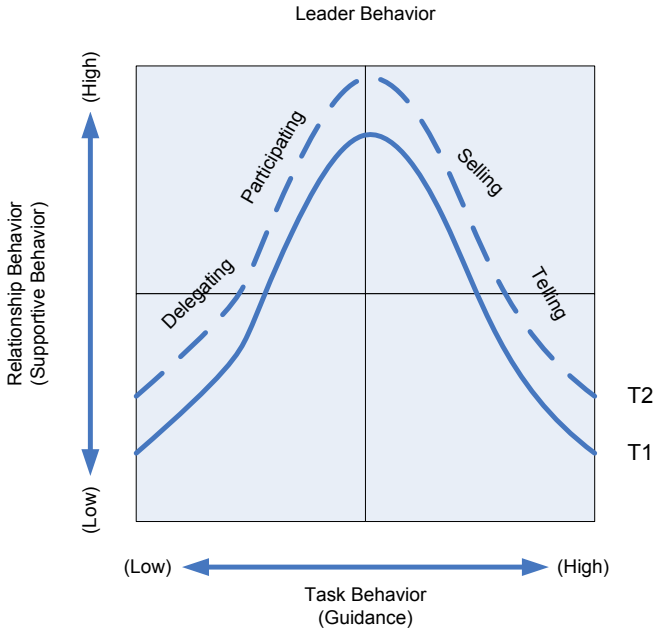

Figure 5: Modified Situational Leadership Model

This model indicates how activities such as empowerment can have a positive impact in all quadrants of the situational leadership model developed by Hersey, Blanchard, and Johnson (2000).

Supportive leadership models are not the only concern of the Chief Enterprise Architect. When leading people he/she needs to also keep in mind the structural framework of the organization.

The other model that is important to this leadership conversation is the leadership framework (Bolman, Deal 1997). This model defines four leadership frameworks that are a lens with which to view leadership:

- Structural
- Human Resource
- Political

- Symbolic (Figure 6)

Bolman and Deal note that rather than focusing on a single framework:

"Ideally managers combine multiple frames into a comprehensive approach to leadership."

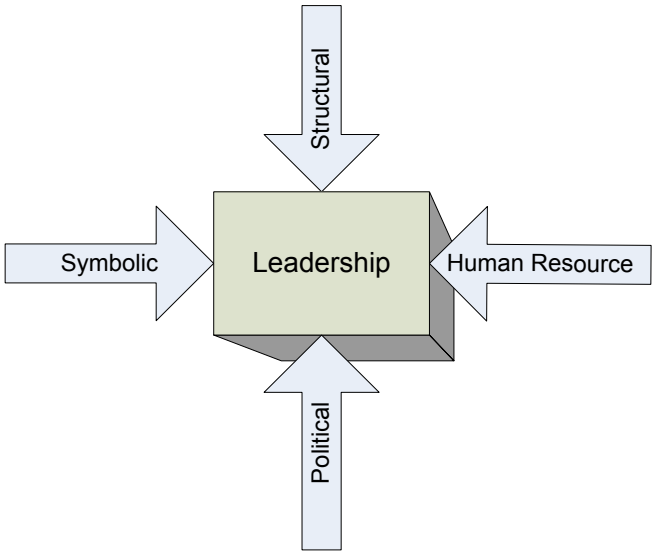

Figure 6: Leadership Frameworks (Adapted from Bolman and Deal (1997))]

Structural frameworks are primarily concerned with how the organization is designed and where the leadership determines which organizational design is most effective for corporate performance. Structural frameworks are important because the business environment may change, creating a need to reorganize to best meet organizational needs. For example, as part of Proctor and Gamble's Organization 2005, P&G shed business units and reorganized into seven global business units based on global product lines to put responsibility for strategy and profit on brands instead of geographic regions (MacKenzie 2002). With the reorganization, P&G were able to spur greater innovation and speed in meeting the demands of the marketplace.

The human resource framework is important to consider as this aspect is more often reflected in an organization's corporate culture. Peters and Waterman (1982) illustrated that there are important lessons in how the corporate culture must align with the strategic vision of the company. However, focusing only on cultural aspects of leadership may cause problems if the strategic environment is not also monitored. This was illustrated by Chapman (2006) as companies that were held up as examples to be emulated in Peters and Waterman's book, such as Lanier, Data General, Wang, DEC, NCR, and Atari who were either bankrupt or purchased, and Xerox, which survived but went into a period of decline. This does not detract from the importance of Peters and Waterman's message; in some instances they simply picked some poor examples – firms that had good corporate culture but did not adapt quickly enough to technological change.

Exploring political frameworks Bolman and Deal (1997) used the example of Iacocca's leadership of Chrysler. They noted that Iacocca's leadership style was in some ways akin to the leadership of Churchill during World War II in that both of these leaders were successful early, but then struggled later in their careers. Both of these leaders were great in war (Iacocca in a metaphorical war for the survival of the company), but struggled in peace. Politics can be an important tool to ensure alignment with the corporate vision and to reduce resistance. Therefore, a political leader would be wise to follow Kotter's (1996) eight-step model for change to facilitate successful organizational change. As a leader attempting to force a change you may in turn build resentment towards your leadership style. To reduce resentment a proper mix of transformational and transactional leadership will be required (Kotter 1996):

- Establish a sense of urgency.
- Form a powerful guiding coalition.
- Create a vision to help direct the change effort.
- Communicate the vision.
- Empower others to act on the vision.
- Plan for and creating short-term wins.
- Consolidate improvements and produce more change.
- Institutionalize new approaches.

The symbolic framework deals with creating a compelling vision of the future. A compelling vision can inspire an organization. The compelling vision seems too often to be associated with charismatic leaders and certainly being charismatic helps sell the vision. However, Collins (2001) demonstrated that charisma is not required for outstanding transformational leadership. In what Collins referred to as Level 5 leaders, Collins found that these types of leaders were often not charismatic but were focused on their vision, covered the bases of the other leadership frameworks, and did not focus solely on symbolic frameworks.

SYNTHESIZING THE MODELS

While the leadership framework (Bolman, Deal 1997) provides a lens through which to view leadership in an organization, when a leader is working within the framework they must also keep in mind the situational leadership model (Hersey, Blanchard, Johnson 2000). The synthesis provides a holistic, 360 degree lens from which to view an organization. First, the framework provides the overarching context of the organization. The leader can get clues as to the leadership norms and

expectation based on the framework. Then, within the framework, the leader needs to understand the appropriate leadership style (delegating, participating, telling, and selling) which at times may, depending on the situation and team capability, lead to a greater or lesser amount of transactional or transformational leadership. Finally, the leader needs to invest in his or her team so that their capabilities grow over time. These activities are very transformationally-focused, and may include strategies such as empowerment.

These models were chosen because they reflect a belief that while transformational leadership might be considered the ideal, at times a situation may dictate a more tactical or transactional response. These two models were chosen because it helps the leader define the scope of an area they are working in, while keeping in mind that too much focus in any one framework may cause the leader to overlook some key aspect of the organization that could cause it to fail. While the leader may ideally like to work as a transformational leader, he or she may have to work as a more transactional leader if that is what is required based on the capabilities and willingness of the subordinates. Combining the models reveals this more holistic approach. It illustrates the synergy between the frameworks and the situational as well as the potential to grow subordinate capability and willingness through empowerment or transformational leadership.

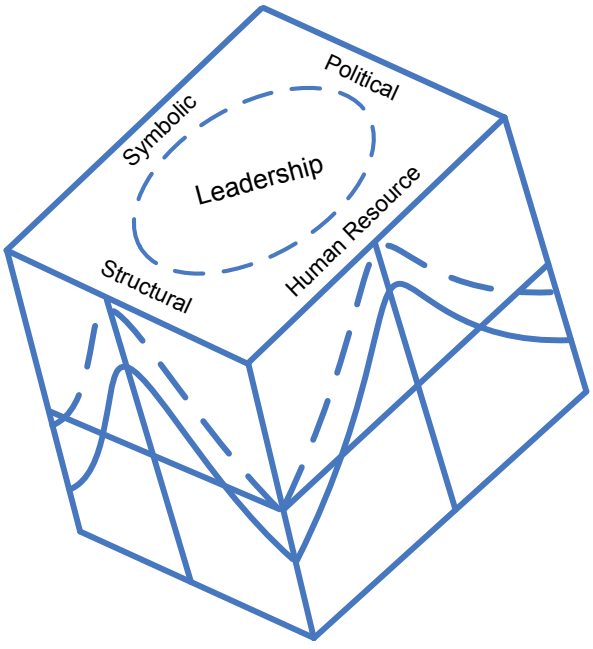

Figure 7: Synergized Framework-Situational Leadership Model

In this figure, the framework provides the context, the sides indicate the situation, and the dashed line indicates growth.

APPLYING THE MODEL TO THE CHIEF ENTERPRISE ARCHITECT ROLE

These two leadership models have been combined to form a holistic view of the organization and have important implications for the Chief Enterprise Architect (Figure 7). This is because Chief Enterprise Architects must primarily work through others, peer managers, business and architecture review boards, etc. For example, enterprise architecture starts with the ability to cast vision; the ability to articulate the aspirational organization. If the Chief Enterprise Architect cannot rely on the power of their position (a tenuous position to be in at best), they have to rely on the fact that the vision has created a compelling vision of change for the future. As change agents, the Chief Enterprise Architects may have to advocate for a change in the organizational structural frameworks, or recognizing when an organizational culture needs to change to support a desired business capability, be adept politicians, or be able to create the compelling vision of the future by effectively using symbols. In addition to these framework views, the Chief Enterprise Architect will need to understand the capabilities of the people that they will work with or through to enable the changes required in the organization to turn a roadmap into reality. Some capabilities of followers may need to be grown (transformational leadership), while some capabilities may need to be bargained for (transactional leadership). However, to ensure sustained success any leader must recognize that an immediate goal should be weighed against long-term implications; i.e., “winning a battle but losing a war”. This would occur when the leader imposes their will to gain an immediate win but at the cost of creating longer-term resentment against a strategic direction. However, it is this holistic, synthesized view of the organization that will facilitate the Chief Enterprise Architect being able to navigate the uncharted waters of change to realize their vision of the future for the organization.

CONCLUSION

The Chief Enterprise Architect as a leader in the organization has many hats to wear and needs to understand many situational, social, political, human resource, and structural aspects of the organization. It can be helpful if the Chief Enterprise Architect has charisma and is good at selling a vision. However, for managing the long grind and winning the many small victories, he or she will need to be able to work through others, build consensus, empower the organization and individuals, and develop the future leaders of the organization to enable long-term success. The synthesized framework model that was developed in Figure 7 serves three purposes:

- It serves as a model for the Chief Enterprise Architect to consider the frameworks of the organization and capabilities of its people within the context of change.
- For people that need to choose a Chief Enterprise Architect, it becomes a framework for judging whether the candidate has this broader perspective of the organization or if the prospective candidate is more focused on a subset of frameworks; i.e., do they work more in the political framework without considering the structural framework.
- Consider what mix of transformational and transactional leadership skills the Chief Enterprise Architect brings to the table that will facilitate their success in the context of this synthesized framework.

The well-rounded Chief Enterprise Architect will have this holistic view of the organization and a mix of transformational and transactional leadership skills.

NEXT STEPS AND SUGGESTIONS FOR FUTURE RESEARCH

This synthesized leadership model has suggested a framework for considering both the transactional and transformational aspects of leadership that the Chief Enterprise Architect may want to consider. However, it is just that: a framework. More work will need to be accomplished to fill out the detail, create development plans that correspond to the framework, and metrics that might be used to track progress against these goals. It might also be helpful to develop a strategy matrix or decision tree to give guidance as to when a given situation might be best served transactionally *versus* transformationally.

Another avenue of investigation might be matching personality type to architecture role to determine whether any patterns emerge. For example, Dilchert (2007) found that extroverts tended to be more interested in leadership and management positions than the general population. However, interest is not a predictor of success. It would be useful to determine whether there is a personality type that might predispose someone to interest or success in an architecture role (or sub-domains; e.g., business or solution architecture) perhaps utilizing the Myers-Briggs or DiSC profile taxonomies for classification. Then, take these findings and see if correlations could be made with a particular personality type and enterprise architecture leadership success.

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Article

The Architect as a Salesman within the Enterprise

Arvin Levine, PhD

Abstract

The job requirements for the enterprise architect are easily stated: to analyze, organize, and synthesize technical, organizational, and process information in order to plan and guide development, adoption, and operations over a long arc of time. The architect must be able not only to understand a (technical) concept, but also to convey that understanding to the people who will decide and execute on it. An important metaphor for the architect function is as a salesman – for ideas! A good salesman takes a long-view of his customer's (possibly unspoken) needs and becomes a partner in the realization. When an architect behaves like a salesman (in the best sense of the term), he can have deep impact and successfully introduce and "sell" concepts to an organization. In order to be successful, the architect must consider himself or herself as a salesman for the concepts and understanding that they have developed. Four steps to follow in the salesman's approach are spelled out and illustrated in this article. Being a salesman is not necessarily the ungentlemanly occupation eschewed by our profession. We should embrace, not shun it!

Keywords

Enterprise Architect, Sales Strategy

INTRODUCTION

In enterprise organizations, many different roles contribute to the success of the organization. While most of the roles contribute directly to an easily identified end result, Enterprise architects make contributions that are not easy to identify. Engineers build products; operators run products; managers direct the people doing work. What is the contribution of an architect?

The job requirements for the architect are easily stated: to analyze, organize, and synthesize technical, organizational, and process information in order to plan and guide development, adoption, and operations over a long arc of time. The architect must be able not only to understand a (technical) concept, but also to convey that understanding to the people who will decide and execute on it. An important metaphor for the architect function is as a salesman – for ideas! In order to be successful, the architect must consider himself or herself as a salesman for the concepts and understanding that they have developed.

A salesman performs the seemingly useless, but actually vital, job of getting the right product (technology, process, or organization) into the customer's hands. An (enterprise IT) architect is responsible for getting the right concept incorporated (implemented) into the organization's portfolio. Seems simple, but organizations need more than just a well-built or well-operated product (application, system, procedure); they also need the right understanding of what they are doing with that product, why they have acquired or developed it, and how it will fit into their overall IT universe. Without that understanding, they are likely to eventually paint themselves into a corner that may be very expensive to get out of.

The term "salesman" often carries with it a connotation of low moral status, but this is not characteristic of the best and most successful salesmen. A good salesman hears his customer's (possibly unspoken) needs and tries to bring them to fulfillment. So should it be with a good architect.

Most of the examples in this article will be drawn from enterprise IT architecture, reflecting the bulk of the author's experience and expertise. The concepts equally apply to other "flavors" of enterprise architecture; e.g., process or organizational. Equally useful is the concept of architectural salesmanship, when external constraints require a readjustment or re-understanding of existing structures and technology rather than the introduction of new items.

To be successful, the architect embraces the salesman's approach as well. There are four steps to follow in this approach:

- Love (and understand) the product – reaching a point of view
- Sell the product – presenting a clear and consistent message
- Close the sale – achieving agreement across the organization
- Deliver the product – planning the next steps and ensuring the implementation

Note that these steps go beyond simply good communications skills and the ability to articulate business value. Enterprise architects add value in many dimensions, but the ability to "sell" the concept enables these values to be absorbed or adopted by the enterprise. Being a salesman is not necessarily the ungentlemanly occupation eschewed by serious professionals and should be embraced, not shunned.

After covering a few preliminaries, we will go into more depth on these steps.

There are additional aspects of the role of an architect, whether as visionary designer or transformation expert. These are also valid, but they still require the architect to act as a salesman to be successful.

"An architect is someone who can make such places for meager meals show a little more humanity, make them a little more beautiful, a little more comfortable."

Toyo Ito: Forces of Nature
Edited by Jessie Turnbull (Princeton Architectural Press)

Figure 1: What is an Architect?

PRELIMINARIES: DEFINITION OF ARCHITECTURE

Architecture, in its most general sense, is the description of the structure of an object. Leveraging analysis and design techniques, architecture provides a roadmap for the construction and evolution of an object pursuant to a long-term, strategic view of its purpose, function, appearance, and impact. The term "architecture" applies in many different domains, building construction and Information Technology (IT) being familiar examples. Architecture is not engineering, which is concerned with the construction of objects (no matter how complex) rather than the strategic, structural view. The two activities are complementary. Without engineering, the architectural structures would remain unfulfilled, but without architecture, the built object might become a mess and not fulfill its purpose or be usable!

"Enterprise architects work with stakeholders, both leadership and Subject Matter Experts (SMEs), to build a holistic view of the organization's strategy, processes, information, and Information Technology assets. The role of the enterprise architect is to take this knowledge and ensure that the business and IT are in alignment. The enterprise architect links the business mission, strategy, and processes of an organization to its IT strategy, and documents this using multiple architectural models or views that show how the current and future needs of an organization will be met in an efficient, sustainable, agile, and adaptable manner."

Source: Wikipedia

Figure 2: Role of Enterprise Architects

Within enterprise IT, there are many varieties of architecture, with solution (application) architecture, data (information) architecture, and enterprise (strategic) architecture being prominent. While there are differences in the specific techniques of analysis and design applied, all provide the long-term context and construction guidelines for moving projects forward, often covering multiple independent or inter-dependent activities into a common strategic architecture. Regardless of the technical focus, architects provide the concepts and structures that their technical partner organizations (their customers) and management require. Therefore, no matter which kind of architecture they do, architects are still most effective when acting as salesmen.

We have described architecture as being about the structure of objects (technologies, applications); even more critically, however, architects are vitally concerned with the people who will implement the guidelines: developers, users and operators, technical management, and business stakeholders. No set of principles, standards, or visionary approaches can be useful if they are not made relevant to those who must live with them in getting their jobs done successfully. In this respect, the key contribution of the "salesman" is to get "buy in" from the relevant stakeholders.

By the way, this version of architecture agrees nicely with IEEE Std 1471: Recommended Practice for Architecture Description of Software-Intensive Systems (see appendix). Per IEEE, the architect's role combines structures and people (just like a salesman).

FOUR STEPS OF THE ARCHITECT/SALESMAN

The architect's approach can be modeled on the salesman following the four steps outlined above (love, sell, close, deliver). These four steps build on each other, but underlying them all is the need to listen to your "customers". To reach a point of view, you need to know what the stakeholders (customers) are thinking and what their needs are. When presenting (selling) your message, you have to be aware of how the customer "hears" your presentation. To guide customers in understanding and agreeing with your position (closing the sale) an architect has to listen and respond with benefits and risks. Finally, when implementation starts, the architect is best positioned to provide the continuity (delivery) of the content to ensure that the stakeholders and (technology or process) providers are working on the same plan.

In one Monty Python episode, an architect designs a building that includes rotating knives and a system for blood removal. When told that the owners wanted an apartment building, not a slaughterhouse, he exclaimed: "I hadn't correctly divined your attitude toward your tenants."

Figure 3: Listen to your Customer

LOVE (AND UNDERSTAND) THE PRODUCT: REACHING A POINT OF VIEW

As we have been saying, the architect's product is usually a concept or idea. This concept may express itself as a guideline, plan, strategy, standard, or model. The architect's job is to take this concept and ultimately "sell" it to the organization. Before he can do that, he has to develop a strong point of view on the issue – often deciding between potentially polar opposite choices.

In the 1986 comedy science fiction film, Short Circuit, an intelligent military robot malfunctions and develops a craving for "input" so that it can reach a point of view about the world around it. The robot subsequently gains a respect for life, rejecting the destructive nature of its military programming.

Figure 4: Polar Opposites

Reaching a point of view is not a simple task for an architect. The entire concept could be off the mark. Your evidence may not be conclusive, because each side has "evidence" to support its conclusions. You may have "confirmation bias", making it difficult to find out the truth. What can you do?

First, gather data, then display the data in a simple form. But, don't just throw the data onto a chart. Simply plotting a large amount of data will generally increase the confusion rather than enhance understanding. Here, we can differentiate an architect/salesman from an engineer. The engineer (appropriately so) needs complete control of every detail on the topic, while the architect needs to organize the details into a simpler message that can be "bought" or understood and accepted by a customer/stakeholder. Yes, the details are critical, but the point of view is the right level to forge agreements and "make the sale".

An architect needs to understand when "good enough is good enough". While an engineering approach demands total definition and detail, an architectural concept, by its nature, can never be complete. When a reasonable degree of assurance is reached, it is time to start selling. Socialization and syndication can avoid surprises, without requiring the depth of analysis required to actually build the "product". Of course, socialization and syndication require listening to the customers as well as presenting to them, but that is what the job is about!

Many tools and formats are available for visually organizing information. Technical charts are useful in relating different subsets of data. To express a data relationship, charts, tables, and checklists may help to clarify the point of view expressed and show both the strength and weakness of the concept. For process statements, the appropriate vehicles may be trees or timelines or even entity-relationship diagrams. Some ideas are best expressed with pictures or with humorous cartoons.

The labels on data charts (or other diagrams, including cartoons) define the underlying concept and need to be carefully selected. It is well known that by defining the parameters of a discussion, you strongly influence the outcome. Labels outline the discussion parameters – therefore they need to be carefully considered. Sometimes, the labels may end up being more important and lasting longer than the concept presented through them.

SELL THE PRODUCT: PRESENTING A CLEAR AND CONSISTENT MESSAGE

One of the key steps in selling is presenting the message to the potential buyer, often in a formal presentation format. The important questions to be answered when formulating a presentation are: "What are you selling?" and "Who are you selling to?".

It was once said of a well-known database product, that it ran best on a slide projector. This approach may have been justified (even critical) in the early years of the company, when conceptual agreement was more critical than performance.

Figure 5: Clear and Consistent Messaging

Let's look at an example. Consider a five-year strategy proposal presentation. A typical strategy includes projects and goals. In fact, the goals may not correlate one-to-one with the projects! This is natural. The world is complex and parts of different projects may contribute to elements of different goals. Recall that architecture is not engineering! Still, the value of the architect is to ensure that all the projects are guided by the overall goals which depend on the execution of the projects. Moreover, the audience needs to buy into the concept.

What are you selling?

In a five-year strategy proposal, you could be selling the goals and noting that specific projects need to be included to implement those goals. Alternatively, you could be selling the projects (e.g., for budget allocation) and noting that the desired or agreed goals will get accomplished through them. You would present these different concepts in substantially different charts, as below.

The first chart emphasizes the importance of the projects; the second emphasizes the goals, while noting the projects that support them. Size and visual/spatial highlights make it clear what is important to consider and agree upon in each chart. Significant, but less critical elements have less visually significant representation and could even be demoted to a secondary (or appendix) chart.

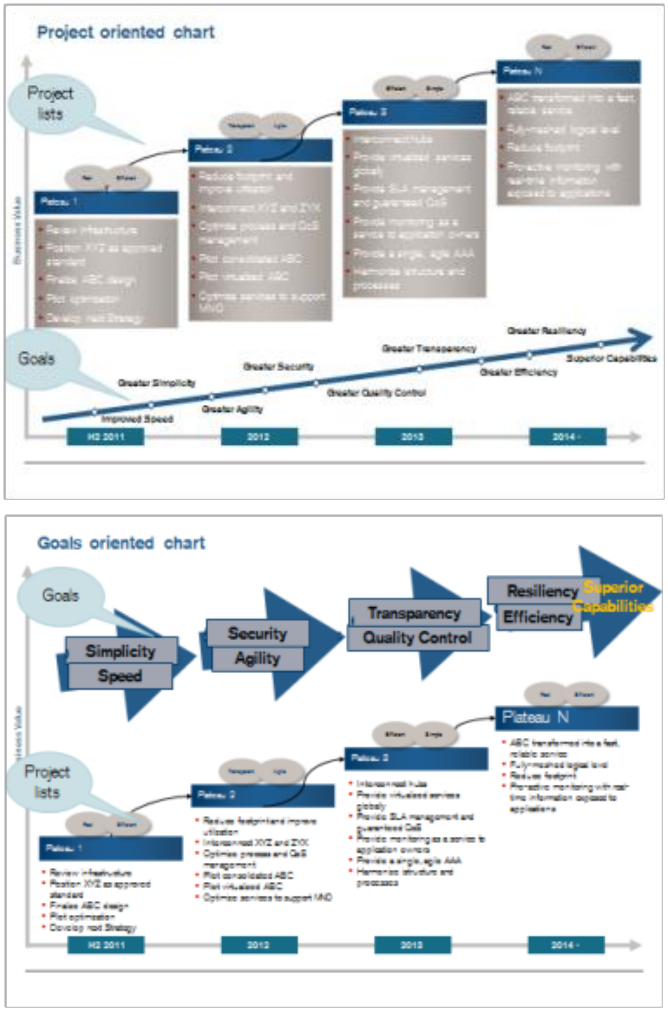

Figure 6: Know what you are Selling

Who are you selling to?

From the customer perspective, you could be talking to engineers, who are project-oriented, to other architects who are goals-oriented, or to management who are results-oriented. You would want to change the format of the presentation to suit the message and audience intended.

Let's look at a different example. Consider the following alternative project statements:

Table 1: Alternative Project Statements

A: Engineering-Oriented	B: Architecture-Oriented	C: Business-Oriented
The purpose of this project is to ensure that systems are correctly identified; to have a coherent classification that includes technical points a,b,c; to ensure that technical targets x,y,z are met by the underlying technology; to reduce the complexity driven by the diversity of implementations; to optimize the cost of IT by tailoring the underlying implementations to fit the required service levels.	The purpose of this project is to save the company money by unifying definitions and standards across the enterprise. It is necessary to take a holistic approach: only if all pieces and building blocks of the architecture are designed from the beginning to fit to each other, will the entire system achieve such high service levels.	The purpose of this project is to analyze and approve a new scheme regarding x,y,z of IT systems. These schemes look at the qualities of systems from a business point-of-view and introduce a risk-based view towards inherent qualities that these systems must portray. Introducing these schemes impacts the way IT will design, implement, test, and operate IT systems.

Each of these introductions summarizes the same project. Each of them would appeal to a different audience and would make a different point. What was it you wanted to say? Who did you want to say it to?

CLOSE THE SALE: ACHIEVING AGREEMENT ACROSS THE ORGANIZATION

In order to close the sale, it is not enough to convince (sell) top management. You must also engage (sell to) middle management and implementers. Unless you are in a military-like structure where the chain of command is considered absolute, the decision has to be made relevant and reasonable to the key levels that will be responsible for carrying it out. Even in highly structured organizations, middle management and implementers may have *de facto* influence and need to be sold to, as well. An architectural proposal, to encompass as many points of agreement as possible, may require syndicating the recommendation in advance to achieve understanding and acceptance. Only the final agreement need be presented.

Preparing and formatting a recommendation and its supporting material requires care. There is a fine line between selecting key points and hiding the truth. Disagreements and side issues can and should be noted, but often the prominence of these points can be

reduced to an appendix for completeness to avoid distracting from the thrust of the recommendation.

"Never ask a question when you are not willing to hear the answer."

Figure 8: Lesson from a Senior Executive

For example, consider a typical proposal agenda, with a "Proposal Background" section. If this was an updated proposal, it would be reasonable to add a sub-section "Changes since last review". But you would not want to include a "Developer complaints" sub-section, even when many of the changes since the last review focused on developer complaints. That could change the entire focus of the discussion and lead it into a direction that would prevent arriving at the decisions that need to be made.

DELIVER THE PRODUCT: NEXT STEPS AND IMPLEMENTATION

Salesmen are often branded as being uninterested in their customers after the sale is made. While this may be true for used cars and mass market chain stores (or Internet ordering), it is not the case for building the long-term relationships that enable high-level salesmen and architects to be successful. Ongoing relationships are based on mutual respect and trust.

Requirements for this Job

Employer: "In this job we need someone who is responsible."

Applicant: "I'm the one you want. On my last job, every time anything went wrong, they said I was responsible."

Figure 8: Responsibility

The architect builds mutual respect with his customers in two ways:

- By demonstrating expertise in the area of discussion
- By engaging with stakeholders and experts; i.e., Subject Matter Experts (SMEs) to adopt and incorporate their understandings

The architect should not expect to match an SME in technical depth or overwhelm them with technical expertise. Similarly, stakeholders understand their own issues intricately. The architect is not in a competition with technical or issue depth of understanding. By respecting the stakeholder and SME and being able to understand their points of view, the architect begins to earn their respect.

The architect brings a neutral analytic approach with a wide-scale view of issues and technologies in formulating strategic solutions. These qualities are often difficult for the stakeholders and SMEs to attain, and can be quite valuable. These same qualities become even more important as projects are implemented. Even if the architect is initially the expert, the SMEs and stakeholders are the focus for the solution and will eventually become even more expert in the solution than the architect who first proposed it! By continuing to engage, the architect builds up the working relationship that will be needed for future projects, while at the same time continuing to guide the current project in accordance with the architecture that he is responsible for.

Trust is built similarly. Ongoing involvement creates situations where the voice of the architect can focus the issues at stake or forge a level of agreement between parties. Success in these situations both builds and leverages the trust that stakeholders have for the architect. For most of a project's lifecycle, of course, the architect, like the salesman, should not be the key figure in making decisions – that would be a bottleneck for the project and would limit the architect's ability to influence multiple projects. But the architect should be aware of decisions made and directions taken; i.e., he must know what his customer is doing. He must be prepared to step in when needed, and therefore needs to earn and continue to maintain the trust and respect of his customers.

CONCLUSION

Now, we are ready to answer our original question: What is the contribution of the architect? When an architect behaves like a salesman (in the best sense of the term), he can have deep impact and successfully introduce and sell concepts to an organization. Like a salesman, the architect must express a strong point of view while listening to the many opinions on the topic; must present the message in a clear and consistent fashion, leveraging his point of view and being aware of the constituency addressed; must achieve agreement by walking the fine line between detail side-tracks and hiding the truth; and must be involved with his customers for the long term to build trust and respect to ensure success of the concept in the practical realization.

When the architect sells his concept/product, he enables all the other contributors to understand and successfully achieve their desired results. That is a successful sale by an architect/salesman!

APPENDIX: IEEE STD 1471

The contributions of IEEE Std 1471 (Recommended Practice for Architecture Description of Software-Intensive Systems) can be summarized as follows.

In this list, items in *italics* are terms defined by and used in the standard. Bracketed notes indicate the corresponding step from the salesman's approach.

- It provides definitions and a meta-model for the description of architecture. [Love (and understand) the product]
- It states that an *architecture* should address a system's *stakeholder* concerns. [Sell the product]
- It asserts that *architecture descriptions* are inherently multi-view; no single view adequately captures all stakeholder concerns. [Sell the product]
- It establishes content requirements for architecture descriptions and the idea that a *conforming architecture description* has a one-to-one correspondence between its *viewpoints* and its *views*. [Close the sale]
- It provides guidance for capturing *architecture rationale* and identifying inconsistencies/unresolved issues between the *views* within an *architecture description.* [Close the sale]
- It separates the notion of *view* from *viewpoint*, where a *viewpoint* identifies the set of *concerns* and the *representations/modeling techniques*, etc. used to describe the *architecture* to address those *concerns* and a *view* is the result of applying a viewpoint to a particular system. [Deliver the product]

ABOUT THE AUTHOR

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Article

Rediscovering Enterprise Architecture via Consensus Standards

Thomas Mowbray, Glenn Donaldson, Brian Keller, Chad Neal, and Vasu Rachakonda

Abstract

A key goal of enterprise architecture entails maturing organizations from making locally optimal decisions to making globally optimal decisions. Rather than gathering enterprise architecture information to create enterprise views, an alternative approach is to gather internal experts to directly participate in global decision-making. With sufficient critical mass of expertise, the necessary enterprise knowledge will be present, as well as the ability to negotiate consensus standards that will be implemented, because the implementers participate in the standards decisions and own the outcomes.

Keywords

Enterprise Architecture, Standards, Governance, Acquisition, Enterprise Licensing

INTRODUCTION

This article begins by reviewing traditional enterprise architecture approaches, which depend upon data collection. The benefits of the methods are explained so that the benefits can be compared to the standards-driven approach to enterprise architecture.

Traditional approaches to enterprise architecture begin with data collection; the enterprise architecture data is used to generate enterprise views. In approaches inspired by the Zachman Framework, primitive enterprise objects are identified and defined (Spewak 1993). A primary rationale for enterprise buy-in to Spewak's architecture was the enterprise's sweat equity in the architecture process. Spewak's method was exhaustive in the sense that it recommended that all primitives be captured for the highest-level rows of the Zachman Framework.

Substantial progress in enterprise architecture maturity has been achieved in the 20 years since Spewak's method was published. For example, some of the key enterprise architect certification organizations teach enhanced data-driven approaches.

The FEAC Institute teaches a problem-driven method for data collection and modeling that originates from the Department of Defense Architecture Framework (Rao 2011). The key steps include:

- Determine the intended use of the architecture
- Determine the scope of the architecture
- Determine the data required to support the architecture development
- Collect, organize, correlate, and store architecture data
- Conduct analysis in support of architecture objectives
- Present results in the way that the decision-maker needs

Typically, enterprise architecture information is collected by interviews, surveys, and modeling exercises. Since the architecture is generated specifically to solve known problems, it comprises the appropriate data and views that decision-makers need.

The Enterprise Architecture Center of Excellence (EACOE) teaches the collection of Zachman primitives via document mining (eacoe.com). Primitives correspond to the columns of the Zachman Framework which each capture a basic question, including material (what?), process (how?), location (where?), role (who?), event (when?), and goal (why?). The enterprise architecture modelers put the primitives in hierarchies and define the primitives in tabular dictionaries. Subject matter experts from the enterprise validate and complete the models in a facilitated workshop forum. Later, interactions between the primitives are represented using matrices.

The hierarchies and matrices make implicit knowledge in the enterprise visible to decision-makers. Typically, a specific problem is being solved with an EACOE style architecture. From class examples, WalMart® wanted to see how its processes were distributed across its locations, and Microsoft® wanted to discover and rationalize all of its personnel positions.

Another data-driven approach to enterprise architecture relies on business intelligence (Mowbray 2013). Data is collected annually about major Information Technology (IT) systems through an extensive survey instrument. That information includes knowledge of business functions, data categories, software products, system

locations, points-of-contact, data interchanges, and other details. Interactions between systems are mined from these data interchanges. Separately, business processes are modeled in Joint Application Design (JAD) sessions using Business Process Model and Notation (BPMN). The information in the BPMN models is extracted, including modeling labels and relationships. The BPMN data is combined with the systems data in a database, along with the system interactions and software products. Business Intelligence (BI) tools along with some manual processing generates enterprise views.

The BI approach to enterprise architecture entails proactive information gathering that can be rapidly adapted to the business/IT decision at hand. For example, if the enterprise wants to consolidate data warehouses or helpdesks, all of the relevant systems and processes can be rapidly identified and reported with ample attributes and process details. This gives the organization agility. The BI approach reduces a typical one-off survey (i.e., 6 to 9 months) to less than a week.

RELATIONSHIP TO THE TOGAF® STANDARD

This article makes a distinction between traditional enterprise architecture, as described previously, and what the TOGAF standard achieves. The authors are TOGAF 9 Foundation certified practitioners.

Traditional enterprise architecture is focused primarily upon as-is models and involves an enterprise-wide scope, crossing many segments. A segment is a functional and IT domain of an enterprise such as human resources or finance.

The authors view the TOGAF standard as best applied at a segment or IT system level, and focused on the to-be. We would apply the TOGAF framework to define to-be models for new systems or re-engineered segments. We would apply traditional enterprise architecture to visualize an enterprise context for decisions such as building new systems, then the TOGAF framework to define the architecture of the system.

STANDARDS-DRIVEN ENTERPRISE ARCHITECTURE COLLECTS PEOPLE AND THEIR KNOWLEDGE, NOT DATA

Data-driven approaches to enterprise architecture rely ultimately on people's expertise. Enterprise experts generate the data through interviews, surveys, modeling sessions, and documentation. The collected information supports enhanced decision-making. What if we could assemble the appropriate experts, with all their knowledge, and apply their expertise directly to decision-making. This is precisely what the standards-driven approach to enterprise architecture performs.

In order to understand how standards processes work in enterprises, it is important to examine their cultures.

THREE ENTERPRISE CULTURES

The authors have implemented standards processes in three large enterprises. All three cultures were highly different, but the standards processes were highly successful in each. These cultures include:

1. An industry standards organization
2. A state and local government
3. A large university

In the first case, the culture was an industry standards organization with a large group of self-selected experts. We started in one room full of experts from different industries. During the first year, we defined an architecture that modeled our industry domains. We used that architecture to then branch out into domain-specific standards rooms. Everyone had their own specifications, and we shared common wisdom, including within each industry domain. Over the course of four years, we were about to grow the organization from 50 companies to over 800, starting with three rooms to several dozen.

The first culture succeeded for several key reasons. The experts in the multi-industry room shared a common architectural vision that was much greater than the operating-system-level experts in the first two rooms could imagine. We jointly knew that there were additional levels of architecture beyond middleware and dozens assembled to invent and document our vision. The other factor was that architects truly enjoy the company of other architects: we think alike and revel in solving problems together with our peers. We generalized this discovery in our third culture to mean: IT experts (whether architects or not) enjoy the company of their peers.

The second culture was a 60 agency state and local government (Mowbray 2005). Although the organization was complex, IT spending authority was governed centrally. The Office of the Chief Technology Officer had centralized their authority over the course of six years to the extent that all IT purchases of any size from any funding source were visible and could be controlled; e.g., stopped or reconsidered.

In this second culture, we organized the architects and program managers from both central IT and the agencies to meet regularly as the Architecture Review Board (ARB), a chartered organization. 20 to 30 of us would meet each time – IT subject experts involved in the programs and agencies with the largest IT spends.

The chair of the ARB, the Consulting Chief Architect, was given three objectives for the first 90 days:

1. Generate a set of IT standards

2. Create the first enterprise architecture models
3. Revamp and update the enterprise IT strategy

All three were accomplished with the collaboration of nearly 100 IT and government domain experts.

An important key to success in all three cultures is professional meeting facilitation. Facilitation skills are essential for coordinating large groups of people to be highly productive in short timeframes; e.g., a workshop or series of meetings. Time and again, when the facilitator made the meeting outcomes clear, the meeting contributors would exceed expectations.

An interesting discovery in the second culture is that IT programs tend to redundantly make the same decisions at roughly the same time. For example, with a simple round-robin "go around the room and tell us what you are up to" exercise, the ARB was able to discover half a dozen opportunities for enterprise licensing. In each case, three large IT programs were evaluating the same type of software product, such as business intelligence or enterprise search. By consensus, we were able to consolidate those product evaluations into a single IT program with requirements from all of the other programs and agencies. With funding budgeted for three separate buys, the combined funds were negotiated into a new standard; enterprise licenses for all 60 agencies and their IT programs. This is a dramatic example of the economic benefits of standardization.

The third culture is IT in higher education. Through benchmarking interviews, we discovered that most higher education IT shops evolved through similar stages of IT maturity and governance. The starting point is decentralized IT governance. In other words, our university has about 80 separate IT organizations, and all are independently funded and controlled. Central IT manages about a third of the IT, including the shared systems for human resources, finance, student information, and about half of email, wireless networking, and telephony. The other half of email, wireless, and phones is managed by our large affiliated medical center, which is actually a larger institution than the rest of the university.

Key cultural factors in our higher education enterprise include relationships and collegiality. People with decades of service at the university have deep relationship roots with their peer long-timers. People with short service records (e.g., less than three years) are often engaged with differently by long-timers. This can take the form of lack of inclusiveness in communications and decision-making. Luckily, senior IT leadership can overcome the relationship limitation for themselves if they focus on building rapport with key stakeholders; e.g., conduct numerous one-on-one "get to know each other" meetings.

The collegiality factor means that in our culture people want to be part of decisions affecting them. A noticeable level of mistrust had built up over years between central IT and the colleges and departments. Central IT was viewed as making decisions unilaterally and dictating mandates, such as security standards.

A NEW STANDARDS PROCESS IN HIGHER EDUCATION

In the third culture, the standards process the authors inherited had produced only one standard in more than a year. The standard produced is decidedly a difficult one: classroom technology. Classrooms here serve diverse needs, and classroom usage is rapidly evolving due to innovations in eLearning. For example, the flipped classroom model means that the lectures are viewed online outside of class time. The flipped classroom is used for student engagement with the faculty, such as through group exercises and discussion forums.

Due to its unsatisfying performance, the standards process was in need of re-engineering. The new process had to address easier, simpler standards, and it had to converge and produce value sooner.

Based upon lessons learned from culture one and culture two, plus many discussions with stakeholders, a new standards approach was devised involving a Standards Forum, a Standards Board, and multiple working groups.

The Standards Forum is an informational group with a large email list, with over 600 recipients. The Forum gets the word out to all stakeholders. The Standards Forum meets face-to-face infrequently to deliver standards process updates and encourage participation. The first Standards Forum meeting attracted more than 80 attendees with enthusiastic presentations and discussion.

The Standards Forum and working groups are open forums; membership is open to anyone in the university community who is interested. The Standards Board has a closed membership (about 20) with CIO-level IT leaders from across our largest colleges and departments, as well as a sampling of our diverse business units.

The working groups comprise technical experts in a domain of standardization. Working groups are lead by typically three co-chairs: a chair from central IT, a chair from the medical center, and a chair representing academics and research.

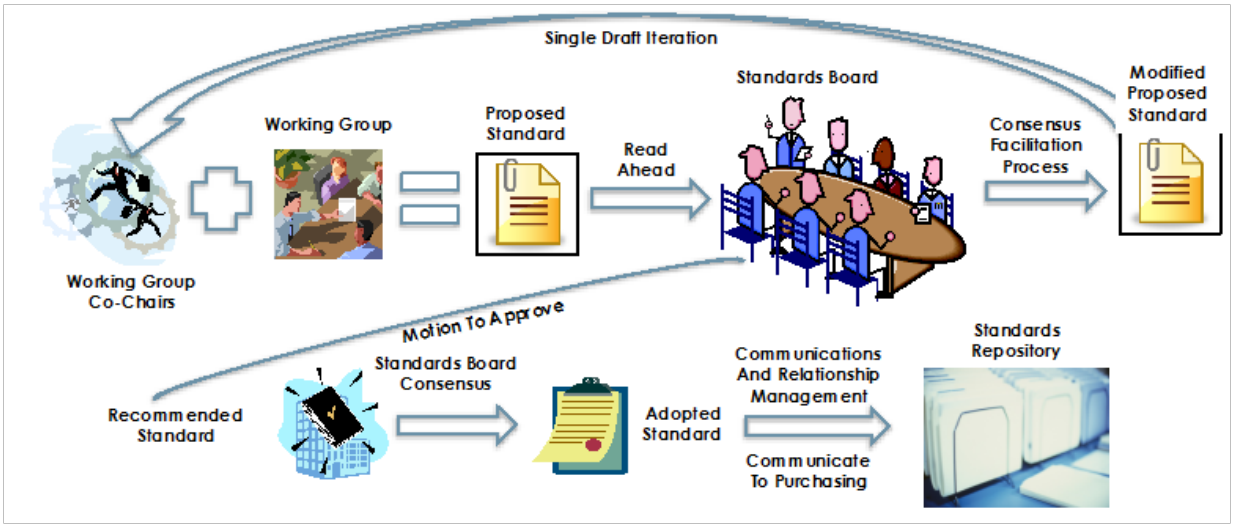


Figure 1: Standards Board Process

Currently, several active working groups are producing standards with additional groups soon to launch.

The Standards Board process is shown in Figure 1. A working group generates a standard for review and approval. The proposed standard is briefed to the Standards Board, and concerns are surfaced. The proposed standard is returned to the working group for additional improvements. The process iterates until the Board is satisfied and approves the standard by consensus.

The following sections summarize some of our successes with IT standards in higher education and how enterprise architecture benefits are realized.

CLIENT COMPUTING WORKING GROUP

The Client Computing Working Group (CCWG) began as a group of a dozen as its first meeting. The chairs used the Standards Forum mailing list to increase the group's visibility. The second meeting attracted four dozen, including about a third joining remotely through Adobe® Connect™. The assembled group comprised technical experts in client computing support and purchasing, with good representation from the biggest IT shops in the university. Any standard that this group agreed to would become *de facto* practice overnight because they are the implementers.

The CCWG chose Apple® Computer standards as its first objective. Within four meetings they had the Apple standard complete (Figure 2). Without the standard, IT shops were buying arbitrary configurations, some very expensive. There was no guidance as to what to buy.

One of the key reasons the CCWG was so effective is that all the experts that were needed to make decisions were already in the meeting. Technical questions could be resolved immediately by knowledgeable staff already present. Peers could debate alternatives and surface lessons learned and best practices straightaway.

Since completing the Apple standard, the reputation of the CCWG has grown, and university IT leaders have come to depend upon them. For example, the CCWG was able to resolve university best practice for Windows 8 deployment in only one meeting. It turns out that our central IT applications have very specific Internet browser requirements that Windows 8 does not support. The group is also working with state government to standardize tablet computers, and to simplify the state standards for laptops and desktops.

NETWORK STANDARDS WORKING GROUP

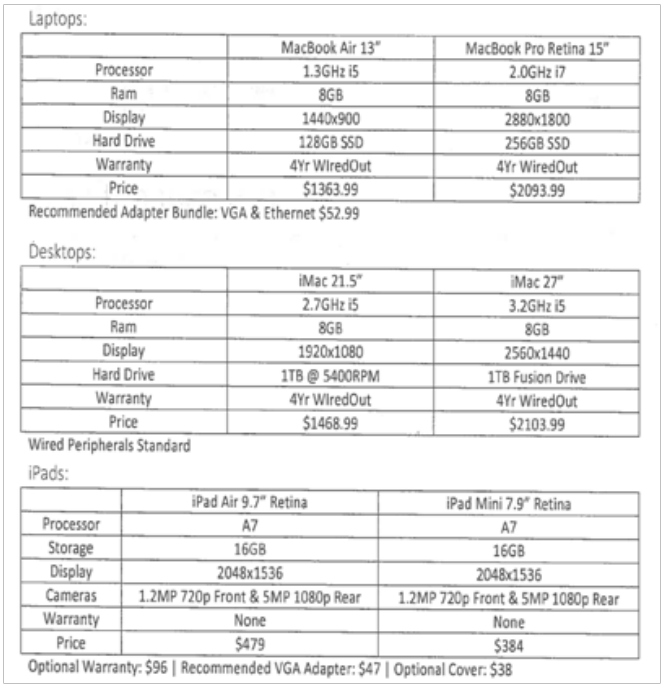
As with client computing, there are numerous groups at the university managing networks. Significant funding is spent on network refresh and extension, but it is spent in small increments by decentralized IT shops.

The university has more than 400 buildings; the networks in each building are managed by the 40+ IT groups, leading to highly diverse vendor, device, and configuration choices.

The Network Standards Working Group (NSWG) is a self-selected group of senior networking specialists and network managers. The NSWG chose network access layer devices as their first standards objective. Network access devices are the ones closest to the end users, and are the most numerous type of network device at the university. This is an ideal first standard that will have significant benefits in cost avoidance and infrastructure simplifications.

Altogether, the university has networking expertise in at least four vendor product lines. It was considered to standardize on all four, but that would not have generated the desired enterprise architecture benefits. It would be very unlikely for the group to reach consensus on a single vendor, even though, this is a desirable long-term goal. The NSWG decided that standardizing on two vendors was sufficient, and would migrate the deployed devices to the two standards. Meanwhile, certain IT shops wanted to continue with their non-standard options.

It was decided, with input from the Standard Board, that the university should not have more bureaucracy in its purchasing processes. That meant that a standards exception process was unacceptable. This fit the NSWG's plans well; it could have two standards without burdening IT shops that had chosen differently.



Laptops:

	MacBook Air 13"	MacBook Pro Retina 15"
Processor	1.3GHz i5	2.0GHz i7
Ram	8GB	8GB
Display	1440x900	2880x1800
Hard Drive	128GB SSD	256GB SSD
Warranty	4Yr WIredOut	4Yr WiredOut
Price	$1363.99	$2093.99

Recommended Adapter Bundle: VGA & Ethernet $52.99

Desktops:

	iMac 21.5"	iMac 27"
Processor	2.7GHz i5	3.2GHz i5
Ram	8GB	8GB
Display	1920x1080	2560x1440
Hard Drive	1TB @ 5400RPM	1TB Fusion Drive
Warranty	4Yr WIredOut	4Yr WiredOut
Price	$1468.99	$2103.99

Wired Peripherals Standard

iPads:

	iPad Air 9.7" Retina	iPad Mini 7.9" Retina
Processor	A7	A7
Storage	16GB	16GB
Display	2048x1536	2048x1536
Cameras	1.2MP 720p Front & 5MP 1080p Rear	1.2MP 720p Front & 5MP 1080p Rear
Warranty	None	None
Price	$479	$384

Optional Warranty: $96 | Recommended VGA Adapter: $47 | Optional Cover: $38

Figure 2: The Apple Standard

INTEGRATION ARCHITECTURE STANDARDS

The Integration Architecture Technical Working Group (IA TWG) preceded the new standards process; it had generated standards but had nowhere to send them for adoption. The Standards Board established the governance for the IA TWG to adopt standards for the university.

The Integration Method – Web Services standard identifies formal and industry standards for web services development projects. Examples include: HTTP/S, SOAP, WS-*, REST, and JSON.

By working with project teams, the IA TWG has promoted the use of web services and other efficient integration methods over the legacy practice of exchanging batch files. For generations of university IT, batch files were disseminated into shadow systems across the university. This resulted in a great deal of restricted data stored redundantly. Web services allow the data to be shared incrementally and on-demand in real time. Web services will also simplify the university's integration architecture; instead of numerous point-to-point batch file connections, web services will be one service to many information consumers.

MANY INCENTIVES FOR COMPLIANCE

Some of the key stakeholders in the standards process are supplier and purchasing managers. Without standards, supplier managers do not know what their customers want, and so do not know what to negotiate.

Supplier managers use the standards to identify deals to negotiate, and obtain the best prices for the university. Purchasing agents reorganize the online buying pages to put the standards right on top of the page. Given a sufficiently small range of products, central purchasing can maintain an inventory and provision equipment and software immediately upon request.

The Standards Forum and other communication channels inform the university's IT staff about the standards. The IT staff also communicate the standards to end users. For example, an end user wanting an Apple product would be given the Apple standard as the options.

The State Terms Contracts defined the standards for Windows products. Purchasing noted compliance with these standards was only 40%. One of the buyers made some phone calls to groups not using the standard, and found that they were unaware a standard even existed. Compliance rose to 80% just through this word-of-mouth campaign.

With standards we are migrating the university to a simplified IT environment. This allows us to standardize configurations, standardize security solutions, standardize IT training, and introduce a clear IT career path. To date, IT skills were not particularly transferrable between our organizations; resulting in low mobility of IT talent.

CONCLUSION

In enterprise architecture, one of our key goals is to help our enterprises to make better decisions. It is potentially catastrophic to make enterprise decisions if one does not know the architecture of the enterprise. Historically, architects have laboriously gathered information to construct enterprise perspectives that allow decision-makers to see the context of their choices. In this article's approach to enterprise architecture, we gather

experts in key domains to bring their institutional and technical knowledge to make informed decisions by consensus. The result is highly effective because the implementers of the decisions are also the decision-makers.

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Article

Journal of Enterprise Architecture Readership Survey Results – Part 2

Leonard Fehskens, Chief Editor

Abstract

The Journal of Enterprise Architecture (JEA) conducted a survey of its readership during the Autumn of 2013. The results of the survey were uniformly positive – overall, survey participants find the JEA interesting, readable, useful, and providing them with value they do not find elsewhere. This article summarizes the results of the demographic questions and the open-ended comments.

Keywords

JEA, Readership, Survey

INTRODUCTION

From mid-September 2013 to the end of October 2013 the Journal of Enterprise Architecture (JEA) conducted a survey of its readership. The survey comprised 43 questions. 248 Association of Enterprise Architects (AEA) members participated in the survey. This represents about 0.75% of the AEA membership at the time. With approximately 4,000 downloads of an issue, this would imply a participation rate of about 6% of presumed JEA readers.

This article summarizes the answers to the three questions about the participant (current job title, years in current position, and years practicing architecture in some form), and the one open-ended "anything else you'd like to add" question.

READERSHIP DEMOGRAPHICS

Job Titles

The 248 survey participants provided 250 job titles, which comprised 143 distinct job titles. The job titles generally conformed to a pattern that included a discipline (for example, architect) a domain (and sometimes sub-domain) within the discipline (for example, solution), a scope within the organization (for example, business unit) and a level of expertise or responsibility (for example, senior). Typically the job title was structured as level, scope, specialization, discipline; in this example, Senior Business Unit Solution Architect. Many job titles omitted one or two elements of the complete four element model, most often scope or level, and less often specialization, so job titles like Senior Architect, Solution Architect, and Senior Solution Architect were common. Some elements of the job title were ambiguous; for example, Enterprise – did it mean scope or specialization?

Table 1 summarizes the 24 disciplines inferred from the job titles reported. By far the most frequent discipline was "Architect" (135 of 250 or 54%), followed at considerable distance by "Consultant" (31 of 250 or 12.4%) and "Manager" (24 of 250 or 9.6%).

Table 1: Job Disciplines Reported

Discipline	Occurrences	Distinct Titles
Advisor	3	3
Analyst	5	4
Architect	135	52
Chief	1	1
Consultant	31	19
Designer	2	2
Developer	1	1
Director	13	13
Engineer	3	3
Entrepreneur	1	1
Executive	1	1
Head	2	2
Lead	2	2
Leader	2	2
Manager	24	20
Officer	7	3
Owner	1	1

Discipline	Occurrences	Distinct Titles
Partner	1	1
President	2	1
Program Manager	2	2
Project Manager	4	2
Researcher	2	2
Specialist	4	4
Vice President	1	1
Total	**250**	**143**

Table 2 summarizes the 12 job levels inferred from the job titles reported. Of the 250 job titles reported, fully 178 (71.2%) did not include a level qualifier.

Table 2: Job Levels Reported

Level	Occurrences
Associate	1
Chief	17
Consulting	1
Deputy	4
Deputy General	1
Distinguished	1
Executive	2
Fellow	1
Lead	4
Managing	2
Principal	7
Senior	37
Total	**78**
(none)	172
Total	**250**

Within the Architecture discipline, 21 domains or sub-disciplines were reported. They are enumerated in Table 3.

Table 3: Architecture Domains

Architecture Domain	Number	Percentage (%)
(none specified)	14	10.3
Advisory	1	0.7
Agile	1	0.7
Application	4	3.0
Business	3	2.2
Data	3	2.2
Enterprise	42	31.1
Functional	1	0.7
Information	3	2.2
ICT	2	1.5
IS	1	0.7
IT	16	11.9
Infrastructure	4	3.0
Security	1	0.7
Software	1	0.7
Software Development	1	0.7
Solution(s)	30	22.2
Strategy and Innovation	1	0.7
Strategy	1	0.7
Systems	3	2.2
Technology	2	1.5

The approximate conformance of most of the reported job titles to this four (or five) element model suggests that a recommended practice for job titles in the enterprise architecture community might be possible with relatively little disruption of local naming conventions.

Tables 4 at the end of this article provides a complete summary of the job title data from the survey.

Years in Current Position

247 survey participants provided responses to the question about how long they had been in their current job. Table 5 summarizes the data.

Table 5: Years in Current Job Summary

Metric	Years
Least	0.2
Most	31.0
Mean	5.1
Standard Deviation	4.5

Years Practicing Architecture

247 survey participants provided responses to the question about how long they had practiced as an architect. Table 6 summarizes the data.

Table 6: Years as Architect Summary

Metric	Years
Least	0.0
Most	40.0
Mean	11.6
Standard Deviation	7.6

The distribution of all responses is shown in Figure 1, and the distributions for those responses with a job title of Solution Architect or Enterprise Architect are compared in Figure 2 (see the end of this article). Figure 2 supports the widely accepted perception that Enterprise Architects tend to have more experience than Solution Architects, but the difference in the medians is at most ten years, and the two distributions overlap considerably.

Figure 1: Years as Architect

OPEN-ENDED RESPONSES

78 survey participants responded to the question: "Is there anything else you would like to tell us?".

The responses fell into nine general categories, as follows:

- Access – Requests for an online, commentable version of the JEA, rather than a downloadable PDF.
- Approval – positive comments about the JEA.
- Awareness – comments about readers' awareness of the existence of the JEA and the availability of a new issue.
- Comment – general comments about the discipline of enterprise architecture, or about the survey.
- Complaint – observations made in an overtly disapproving manner.
- Content – suggestions for article subjects.
- eReader – requests for an eReader-compatible version of the JEA.
- Frequency – comments about the JEA's publication schedule.
- Hardcopy – requests for a hardcopy version.

Some responses addressed multiple categories, so the total number of effective responses was 87.

Table 7 summarizes the distribution of responses:

Table 7: Open-Ended Response Categories

Category	Number	Percentage (%)
Access	4	4.6
Approval	21	24.1
Awareness	13	14.9
Comment	7	8.0
Complaint	5	5.7
Content	28	32.2
eReader	4	4.6
Frequency	4	4.6
Hardcopy	1	1.1

There were a few surprises in the comments. The most surprising were in the "Awareness" category. Nine of the responses in this category amounted to the commenter not knowing of the existence of the JEA, or not reading it. Three implied the commenter was not receiving the email announcements of the availability of a new issue, and one requested that we summarize the content of the issue in the announcement. We do now summarize the content of a forthcoming issue on the AEA website, but we can certainly move that summary into the announcement email.

Among the "Content" comments was a request for something like a "Letters to the Editor" section. We considered this some time ago, and decided instead to create discussion Forums for each article and for the issue in general. These Forums have been largely unused by the JEA readership, but we will continue to provide them.

It was clear from both the survey question specifically about an eReader edition of the JEA and these open-ended comments that there is enough interest in this format that we will look into providing it.

CONCLUSION

As was true of the agree/disagree questions discussed in Part 1 of this article, the demographics data provided some useful insights, especially a possible "recommended practice" for structuring job names, while also confirming that the JEA readership is largely happy with the JEA.

ABOUT THE AUTHOR

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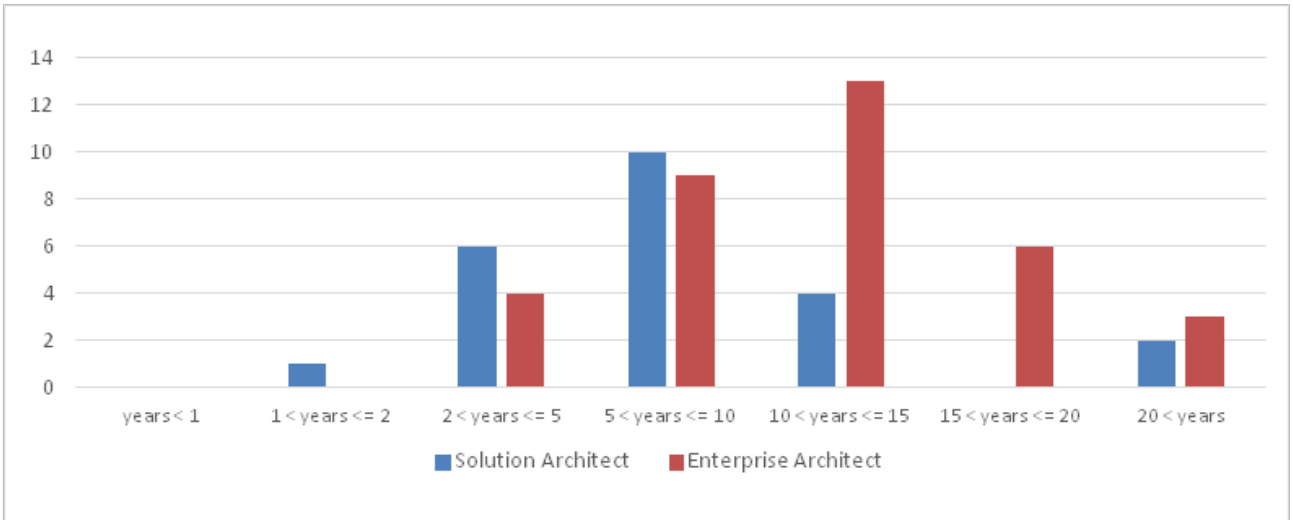

Figure 2: Years as Architect: Solution Architects *versus* Enterprise Architects

Table 4: Job Titles

Discipline	No.	Domain	No.	Sub-domain	No.	Scope	No.	Level	No.
Advisor	3		1					Senior	1
		ICT	1					Senior	1
		Technical	1			Client	1		1
Analyst	5	Business	3						2
								Senior	1
		Systems	2						1
								Senior	1
Architect	135		14						7
								Chief	3
								Lead	1

Discipline	No.	Domain	No.	Sub-domain	No.	Scope	No.	Level	No.
								Managing	1
								Principal	1
								Senior	3
						Segment	1		1
		Advisory	1						1
		Agile	1						1
		Application	4						3
								Lead	1
		Business	3						2
						Enterprise	1		1
		Data	3						1
								Senior	1
						Enterprise	1		1
		Enterprise	42						33
								Chief	3
								Fellow	1
								Principal	1
								Senior	4
						Group	1		1
		Functional	1						1
		Information	3						2
						Enterprise	1		1
		ICT	2						1
								Senior	1
		IS	1						1
		IT	16						10
								Chief	1
								Executive	1
								Senior	3
				Solutions	1				1
		Infrastructure	4						3
				IT	1				1
		Security	1					Chief	1
		Software	1						1

Discipline	No.	Domain	No.	Sub-domain	No.	Scope	No.	Level	No.
		Software Development	1						1
		Solution(s)	30						17
								Managing	1
								Principal	1
								Senior	4
						Enterprise	2		2
						Regional	1		1
				Business	1				1
				Domain	1				1
				Integration and Data	1				1
				IM/Analytics	1				1
		Strategy and Innovation	1						1
		Strategy	1			Enterprise	1		1
		Systems	3						3
		Technology	2						2
Chief	1					Architecture Department	1		1
Consultant	31		13						6
								Principal	3
								Senior	4
		Architecture	2						1
				Business	1				1
		Design	1						1
		ICT and GIS	1					Senior	1
		Infrastructure	1						1
		IT	3					Senior	3
		IT Management	1					Senior	1
		Management	2					Senior	1
				Integrated IT	1				1
		Modeling	1	Data	1				1
		Performance and Capacity Management	1						1

Discipline	No.	Domain	No.	Sub-domain	No.	Scope	No.	Level	No.
		Presales and Delivery	1						1
		SOA	1						1
		Solution	1					Lead	1
		Strategy	1	IT	1				1
		Systems	1	Business	1				1
Designer	2	Product	1					Lead	1
		System	1						1
Developer	1	Business	1						1
Director	13		3						1
								Associate	1
								Deputy	1
		Academic	1						1
		Architecture	1	Business	1			Deputy	1
		Architecture and Emerging Technologies	1						1
		ICT	1					Deputy	1
		Information Technologies	1						1
		Financial Management Transformation	1					Executive	1
		Operations	1	Enterprise Architecture	1				1
		Platform	1	Infrastructure Architecture	1				1
		Software Development	1						1
		Technology Architecture and Planning	1						1
Engineer	3		2					Distinguished	1
								Principal	1
		ATM	1						1
Entrepreneur	1								1
Executive	1	Program	1					Deputy	1
Head	2	Development	1	IT	1				1

Discipline	No.	Domain	No.	Sub-domain	No.	Scope	No.	Level	No.
		Enterprise Architecture and IT Compliance	1						1
Lead	2	Interoperability Team	1						1
		Tax Domain	1						1
Leader	2	IT	1			Business Unit	1		1
		Technical	1	Telecom	1	GBS	1		1
Manager	24		5						3
								Senior	1
						Business Unit	1		1
		Alliance	1					Senior	1
		Architecture	1	Technology	1				1
		Architecture and Solutions	1					Deputy General	1
		Bid	1						1
		Enterprise Architecture	1						1
		IT (Consulting)	1					(Consulting)	1
		Planning and Architecture	1					Senior	1
		Process	1						1
		Quality	1						1
		Service Delivery	1						1
		Solution	2	Technical	2				2
		Solutions	1						1
		Solution Architecture	1						1
		Systems	1	Business	1				1
		Team	1	Solution Architect	1				1
		Technical	2					Senior	2
		Technical Services	1	Infrastructure Design and Planning	1				1
Officer	7	Digitization	1						1
		Executive	5					Chief	5
		Technology	1					Chief	1

Discipline	No.	Domain	No.	Sub-domain	No.	Scope	No.	Level	No.
Owner	1	Product	1						1
Partner	1		2						2
President	2		2						2
Program Manager	2		1						1
			1					Senior	1
Project Manager	4		3						3
		IT	1						1
Researcher	2		1						1
			1					Senior	1
Specialist	4		1						1
		Data Center	1						1
		Health Insurance	1						1
		Support	1						1
Vice President	1	Strategy	1	Business and Technology	1				1

Book Review

"How Designers Think: The Design Process Demystified" by Bryan Lawson

Routledge/Architectural Press, 4th Edition 2005, ISBN: 978-0-7506-6077-8

Reviewed by Leonard Fehskens

Keywords

Architecture, Design, Design Process, Designers

INTRODUCTION

Since the early 1970s, Bryan Lawson has been studying how designers, especially architects, design.

Forgive me for repeating myself, but when talking or writing about design, especially for audiences with an IT background, I often find it necessary to make clear what I mean by "design", by drawing a distinction between what I call "Upper Case D Design" and "lower case d design".

We use the word "design" as a noun to mean an activity (as in "Lawson studies design") or a representation of the outcome of that activity (as in "this is my design for a three-pronged blivet"), and as a verb to mean the performance of that activity (as in "I need to design a three-pronged blivet").

Adopting the first of these usages, by "Upper Case D Design" I mean the general activity of intent-driven and coordinated decision-making as a prelude to implementation to achieve some desired outcome, and by "lower case d design" I mean (as apparently do most people with an IT background) a specific phase of a System Development Lifecycle (SDLC) model that immediately precedes an "implementation phase". As such, "lower case d design" is a special case of "Upper Case D Design".

This is a book about "Upper Case D Design". Lawson does not explicitly address the issue of the relationship between (building) architecture and design, though he clearly takes it for granted that (building) architecture is a design discipline. Thus, it will probably not be very helpful in answering the IT architecture community's recurring questions of "how does architecture differ from (lower case d) design?" or "where does architecture end and (lower case d) design begin?".

While most of the examples in this book are drawn from civil architecture and product design, Lawson's conclusions about design, which he admits are a work-in-progress, are no less relevant to the design aspects of enterprise architecture.

PARTICULARS

"How Designers Think" (4th Edition) comprises 321 pages, and includes a table of contents, a preface, acknowledgements, 16 chapters with chapter references, organized in three parts, a bibliography, and an index.

The chapters of the book are:

Part One: What is Design?

1. Introduction
2. The changing role of the designer
3. Route maps of the design process

Part Two: Problems and Solutions

4. The components of design problems
5. Measurement, criteria, and judgment in design
6. A model of design problems
7. Problems, solutions, and the design process

Part Three: Design Thinking

8. Types and styles of thinking
9. Creative thinking
10. Guiding principles
11. Design strategies
12. Design tactics
13. Design traps
14. Designing with others
15. Design as conversation and perception
16. Towards a model of designing

INTERESTING QUOTES

There are many thought-provoking observations also relevant to the practice of enterprise architecture scattered throughout the book. Some examples:

"Design situations vary not just because the problems are dissimilar, but also because designers habitually adopt different approaches." (p.12)

"One of the difficulties and fascinations of designing is the need to embrace so many different kinds of thought and knowledge." (p.13)

"The drawings which a designer chooses to make whilst designing tend to be highly codified and rarely connect with our direct experience of the final design." (p.27)

"Do we really need a simple definition of design, or should we accept that design is too complex a matter to be summarized in less than a book? The answer is probably that we shall never really find a single satisfactory definition but that the searching is probably much more important than the finding." (p.33)

"Clients often seem to find it easier to communicate their wishes by reacting to and criticizing a proposed design, than by trying to draw up an abstract comprehensive performance specification." (p.48)

"Often the problem may not be fully understood without some acceptable solution to illustrate it." (p.48)

"There is no way of deciding beyond doubt when a design problem has been solved. Designers simply stop designing when they run out of time or when, in their judgment, it is not worth pursuing the matter further. In design, rather like art, one of the skills is in knowing when to stop. Unfortunately, there seems to be no real substitute for experience in developing this judgment." (p.55)

"Design action, like medicine, is only needed when the current situation is in some way unsatisfactory, but which is better, to treat the symptoms or look for the cause?" (p.57)

"We return to this notion of design as a 'fix' again later where we shall briefly explore the argument that designing technology to fix a symptom only makes more secure the cause of that symptom." (p.58)

"The central theme of this chapter, however, is that a significant part of a design problem often lies in relating to what already exists. The definition of such problems then is a matter of deciding just how much of what already exists can be called into question." (p.58)

"Thus it is the case that good design is usually an integrated response to a whole series of issues. If there was one single characteristic which could be used to identify good designers, it is the ability to integrate and combine. A piece of good design is rather like a hologram; the whole picture is in each fragment. It is often not possible to say which bit of the problem is solved by which bit of the solution. They simply do not map onto each other that way." (p.62)

"Legislation continues to be drawn up in such a way as to suit those whose job it is to check rather than whose job it is to design." (p.75)

"Designers and those who make design-like decisions which profoundly affect the lives of many people can no longer expect their value judgments to be made in private." (p.81)

"We also need to make a careful distinction between those who present problems to designers and the ultimate users of the outcome." (p.84)

"This increasing remoteness of designers from those for whom they design has created the need for user requirement studies. Almost in desperation designers have turned to social and human scientists from ergonomists to urban sociologists to tell them what their users actually need." (p.86)

"Just as a design is a product of the designer's approach, so it is also a reflection of the particular pattern of constraints which make up the problem." (p.106)

"Recognizing the nature of the problem and responding with an appropriate design process seems to be one of the most important skills in design. It is very easy to neglect a set of constraints." (p.108)

"In the end a good design is one which respects all the constraints to some degree in a balance which is thought acceptable." (p.109)

"The designer has a prescriptive rather than descriptive job. Unlike scientists who describe how the world is, designers suggest how it might be." (p.112)

As I don't want this review to be entirely quotations from the book, these from roughly the first third of the book should be enough to whet a potential reader's appetite for Lawson's insights.

OBSERVATIONS AND IMPRESSIONS

I was struck by the absence of both the word, and the concept of, "system" in this book. Similarly, Lawson never refers to the "thing being designed" as an artifact (in its most general sense as a created thing, not the common enterprise architecture usage to mean some representation of some aspect of an architecture), but more obliquely refers to the "design problem".

Another surprise is Lawson's dismissal (pp.75 et seq.) of Christopher Alexander's "Notes on the Synthesis of Form" and its design methodology, in contrast to its near-sacred status in the software architecture community.

Chapter 3 on "route maps" has particular relevance to the frameworks and methods of enterprise architecture. Lawson returns throughout the book to this idea of some formulation of the steps of the design process and their ordering, and in particular to the roles of analysis and synthesis. His conclusion is two-fold: that both analysis and synthesis are inherent in successful design, and that the "steps" of the design "process" are intimately commingled throughout a design effort. This seems to me to be an inevitable conclusion that any successful practicing designer comes to.

This in turn has led me to a perhaps more radical conclusion – that a "design process diagram" is not a representation of a sequence of process steps, but rather a representation of an information structure expressing the relationships amongst a set of views of the final design that depict the evolving rationale for the design. The "dead ends" in this evolution are typically pruned from the information structure and replaced by information (i.e., additional constraints) that prevent these dead ends from being (re)pursued. I owe this idea to David Parnas; it's derived from a paper of his that I frequently cite: Parnas and Clements: "A Rational

Design Process: How and Why to Fake It", IEEE Transactions on Software Engineering, Vol. SE-12, No. 2, February 1986, pp.252-257.

What's typically missing from a representation of this information structure is a set of heuristics for generating its elements. These heuristics are applied on an "as needed" basis, to flesh out the information structure in an organic fashion, driven by the continuous interactions amongst the evolving set of constraints that constitute a design. This is why even the addition of feedback loops or iterative paths in a "sequence of steps" fails to accurately depict what happens when designers actually design.

The core of the book is Chapter 7: "Problems, solutions, and the design process", especially the last pages (pp.121-125), where Lawson enumerates his thinking about each of these, as follows:

Design problems:

1. Design problems cannot be comprehensibly stated.
2. Design problems require subjective interpretation.
3. Design problems tend to be organized hierarchically.

Design solutions:

1. There are an inexhaustible number of different solutions.
2. There are no optimal solutions to design problems.
3. Design solutions are often holistic responses.
4. Design solutions are a contribution to knowledge.
5. Design solutions are parts of other design problems.

The design process:

1. The process is endless.
2. There is no infallibly correct process.
3. The process involves finding as well as solving problems.
4. Design inevitably involves subjective value judgment.
5. Design is a prescriptive activity.
6. Designers work in the context of a need for action.

Lawson provides a paragraph elaborating each of these ideas.

Another useful model Lawson proposes is that the practice of design can be considered from three different perspectives – what is intended (i.e., what designers are supposed to do), what is practiced (i.e., what designers actually do), and what is aspired to (i.e., what designers want to do). If all three perspectives are not aligned, this misalignment will create at least friction and frustration if not ineffectiveness or failure. This model can be straightforwardly applied to any team undertaking where standard, best, or recommended practices have been agreed to.

In Chapter 15, Lawson addresses a subject that is currently very much in fashion within the enterprise architecture community – the idea of narrative "stories" as a means of developing and expressing an architecture. I find Lawson's idea of "conversations" more appealing; unlike a story, a conversation is bidirectional, and Lawson's conversations are not just with stakeholders, but include imaginary conversations with elements of the design problem and its solution as well.

THE 3RD VERSUS 4TH EDITIONS

The 4th Edition is mostly an extension of the 3rd Edition, originally published in 1997 and most recently reprinted in 2002.

Lawson writes (p.266):

"In the second and third editions of this book I included chapters on designing with drawings and designing with computers. In this edition both those chapters are replaced by this one [Chapter15]. Since the third edition of this book I have also written much more extensively on the nature of design drawings and the way knowledge is encoded in them."

Compared to the 3rd Edition, the 4th Edition deletes the 3rd Edition's Chapter 14: "Designing with Drawings". This is a bit unfortunate, as the 3rd Edition's material on the role of drawings in the design process can be usefully applied to the role of models in enterprise architecture, and to get at Lawson's ideas on the role of drawings, one would have to seek out his published papers on the subject. These papers are often online, but are not surprisingly only available for a fee to those who are not subscribers to the relevant journals.

The 4th Edition's Chapter 14: "Designing with Others" adds four new sections:

- Design process maps revisited
- The nature of design organizations
- Three views of the design process
- The three views related

The 4th Edition deletes the 3rd Edition's Chapter 16: "Designing with Computers". An alternative treatment of the role (and risks) of using computers as a design tool can be found in Sherry Turkle's "Simulation and its Discontents" which I reviewed in the November 2010 issue of the JEA (Vol. 6, No. 4). Chapters 13 and 15 of the 3rd Edition are replaced with Chapter 15: "Design as Conversation and Perception".

The 4th Edition also deletes the 3rd Edition's Chapter 17: "Quo Vadis?", replacing it with Chapter 16: "Towards a Model of Designing".

CONCLUSION

Chapter 17 is a summary of the current state of Lawson's model of designing, the destination towards which his research has been taking him. This is probably the biggest difference between this edition and its predecessors – Lawson is now comfortable enough with his progress toward that goal to finally put some stakes in the ground, even if tentatively. I'm not going to summarize this chapter, because I don't want you to read this review and decide you now don't have to read the book. Read the book and think hard about how you might apply what it says to the way you think about and practice enterprise architecture. For me to do so for you would probably require another book.

Lawson's design research focus is largely on the design of tangible artifacts like buildings and products. There is not even an acknowledgement of the design of intangible artifacts anywhere in the book. If there were, it might be easier to apply the lessons of this book to enterprise design, and thus, enterprise architecture.

The thing that makes an enterprise different from most other artifacts is the role that its people play. Without its people, an enterprise is just a non-functional assortment of capital assets. The thing that makes enterprise architecture different from most other design disciplines is that it requires that we design, among many other things, the roles that people play in the operation and transformation of the enterprise.

I have long believed therefore that any enterprise architecture academic curriculum must be based on a foundation of design, sociology, and psychology courses. For the design part, this book would be a strong candidate for recommended if not required reading.

ABOUT THE REVIEWER

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