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## Journal of Enterprise Architecture

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The Journal of Enterprise Architecture (JEA) is a peer-reviewed international quarterly publication for the enterprise architecture community. Issues are published in February, April, August, and November each year. JEA supports global academic and practitioner communities of interest through the publication of articles that promote the profession of enterprise architecture, and deals with issues regarding practices and methods, case studies, and standards at the national and international levels. Note that the views expressed in JEA articles are those of the respective authors, and not necessarily those of the publisher, the editorial board, or the Association of Open Group Enterprise Architects (AOGEA).

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Editor’s Corner

By John Gøtze

Journal of Enterprise Architecture is now on its seventh volume and continues to bring you the most substantial Journal of, by, and for enterprise architects all over the world.

I am pleased to present this first issue in 2011.

This issue’s Architect in the Spotlight is Gartner-analyst Philip Allega. The next big thing in enterprise architecture, he argues, is helping the business, and IT, visualize what future is being created, or might be created. Rather than classical command and control, enterprises should embrace ‘people as strategy’. Because then, enterprise architecture gets fun, again, he points out.

Personally, I have always found enterprise architecture fun. But Allega is right. We need to make enterprise architecture even more relevant, impactful, and, yes, fun.

One of the things I’ve always found fun to work with is principles. In the first article, Erik Proper and Danny Greeffhorst focus on the role of principles in enterprise architecture, and present a conceptual framework to position the different types of principles, and highlight their roles in enterprise transformations.

In the second article, Patrick Turner and David Tuffley discuss how enterprise architects could deal with the enterprise leadership and enterprise architecture organizational behavior, and argue that it is here that enterprise architecture must show its true value to the enterprise: to really support leadership and the strategic intent of the enterprise.

In the third article, Hjalte Højsgaard takes the same approach and argues that enterprise architecture must meet market-orientation, and thereby introduces Market-Driven Enterprise Architecture (MDEA) and presents his findings from an exploratory study in the international enterprise architecture community.

In the fourth article, Anna Sidorova and Leon A. Kappelman take a novel approach to the classic discussion about business-IT alignment by using an Actor-Network Theory (ANT) perspective. Enterprise architecture work helps to achieve agreement and thus alignment of the interests of internal actors.

In the fifth article, Mark Meyers recommends that lead architects need to be creative and extremely careful in their approach to developing an enterprise architecture program, but finds that there are ways to achieve success as a frugal enterprise architect.

In this issue’s Case Study, John Grasso presents a case study about the US Federal Railroad Administration. Grasso preformed a formal audit of their implementation of enterprise architecture, and reports on his findings.

In our Book Reviews section, I am very pleased to bring you reviews of two of my personal favorite books of 2010: Chris Potts’ RecrEAtion, and Sharon Evans’ Zoom Factor for the Enterprise Architect.

I would like to announce a new feature in future issues of the Journal: Letters to the Editor. So, if you have any issues of concern, please send me a letter to john@gotzespace.dk. I obviously intend to publish letters, but reserve the right to reject denigrating and otherwise improper letters. Letters should be maximum 700 words.

You are of course also invited to submit full articles to the Journal. Please see the submission guidelines on aejournal.org. Our double-blind review process is ready and working, and our reviewers are eager to provide inputs to your submissions. If you want to help reviewing articles, please contact me.

ABOUT THE EDITOR

Dr. John Gøtze is program manager at the IT University of Copenhagen and lecturer at Copenhagen Business School. He is also a partner in EA Fellows, and runs Carnegie Mellon University’s EA Certification program in Europe.
Architect in the Spotlight

Philip Allega

VP, Gartner Group

This section aims to bring recognition to a variety of contributors to the enterprise architecture field – from early pioneers, to current practitioners beginning their careers, to experts from other fields that influence enterprise architecture – and is intended to show the rich diversity of backgrounds and views that the enterprise architecture community enjoys.

Philip Allega is a Research Vice President responsible for teaching, coaching, and critiquing Gartner’s clients to help them realize the business value of engaging in enterprise architecture as a strategic discipline. Mr. Allega covers the processes and deliverables that support IT planning and administration (for example, enterprise architecture, enterprise program management, governance, IT portfolio management, and IT strategy and planning). His practical advice concerning IT investments and management processes is sought by senior IT leadership teams in both public-sector and Fortune 1000 organizations across North America and Europe. The first half of his career was spent in IT organizations, the second half as a research analyst in enterprise architecture. He holds an MBA from the University of California, Irvine.

HOW DID YOU BECOME INVOLVED WITH ENTERPRISE ARCHITECTURE?

In January 1990, my CIO sent me and some colleagues to spend time with John Zachman. Realizing I would not be allowed the time to document our business and IT in ‘excruciating levels of detail’, but intrigued with the concepts, I found Larry DeBoever’s work in enterprise architecture at that time to be more applicable. I adapted enterprise architecture concepts in the early 1990s for a financial services company and then for a food division of PepsiCo and with other PepsiCo companies. Larry DeBoever hired me into a team focused on enterprise architecture at META Group in 1998, acquired by Gartner in 2005.

WHAT IS THE NEXT BIG THING IN ENTERPRISE ARCHITECTURE?

Market noise that distracts practitioners from delivering business value.

Enterprise architecture methodology and framework debates have been ratholes for enterprise architecture practitioners to argue over; rather than focusing upon the needs of their key stakeholders, many have become enamored with completing a method or framework.

Noise concerning reporting relationships and whether enterprise architecture will be most effective when reporting to the CIO or reporting elsewhere in the business is also distracting practitioners.

Matching personal aspirations and what enterprise architecture can do for an organization to the expectations and needs of key stakeholders helps practitioners realistically scope and focus enterprise architecture programs for their organizations for today, allowing them to reset what enterprise architecture will be for their organization as these expectations and needs change.

WHAT IS THE NEXT BIG THING IN ENTERPRISE ARCHITECTURE?

Helping the business, and IT, visualize what future is being created, or might be created, as conditions (environmental trends, investment decision choices, project choices) change. While some pundits are busy arguing over whether enterprise architecture will overtake business strategy, leading practitioners are helping their business understand what future state is being created and whether it fits with the desires of business leaders.

Command and control companies lend themselves to planning strategy first and then enterprise architecture follows in developing standards, model, patterns, and other future state advice. Companies who take a ‘people as strategy’ approach with greater decision control in the hands of the employees require an enterprise architecture function, and supporting tools, that helps business and IT leaders understand what future results are most likely given the choices and behaviors of those choices, in almost real time, under varying conditions and scenarios. enterprise architecture gets fun, again.

WHAT IS IT LIKE BEING AN ENTERPRISE ARCHITECTURE ANALYST?

The basics of the role begin with creating, testing, and tweaking hypothesis about how the market of vendors, consultancies, pundits, and practitioners engage in enterprise architecture. These are tested and vetted via surveys, client inquiries, interactive presentations with practitioners, and vendors to help provide models to understand how enterprise architecture programs, the practitioners within enterprise architecture, and near neighbor disciplines create and execute enterprise architecture under varying conditions within IT organizations and, at times, within business leadership teams. Cutting through the immense amount of market hype to reduce fear, uncertainty, and doubt with real practitioners of varying levels is immensely satisfying.
WHAT WAS YOUR FAVORITE ENTERPRISE ARCHITECTURE EXPERIENCE?

My first test of applied enterprise architecture advice resulted in a conversation with my, then, CEO concerning whether I was an idiot for having used enterprise architecture to guide the selection of a 4GL rather than a 3GL for application development. He was aware of technical challenges in this decision and asked me about them.

I made the point that the answer was not made in a vacuum about technical merit alone but upon what would help the company create an IT environment to deliver solutions that would enable the company to engage in business processes that executed the company strategy. Since he had helped develop and sign off on the strategy, desired business process, and IT environment requirements that helped make the decision about the application development tool, he quickly realized that the answer in tool was the right one.

WHAT WAS A LEAST FAVORITE ENTERPRISE ARCHITECTURE EXPERIENCE?

The Chief Architect of a rather prominent brand name firm threatened to “knock my head off” after I had made the bold claim, on stage in front of almost 1,000 people and his CIO, that enterprise architecture practitioners need to stop focusing upon technical architecture only and start focusing upon business value outcomes. With his CIO by his side, and the veins on his neck bulging, he told me that enterprise architecture was only about technology and that I was making him look stupid by giving such bad advice. I never did convince him that enterprise architecture was about more than IT, but I felt safer when I learned of his coming retirement.

WHAT WOULD YOU SAY TO SOMEONE CONSIDERING MAKING ENTERPRISE ARCHITECTURE THEIR CAREER AREA? (AND TO SOMEONE HAVING AN ENTERPRISE ARCHITECTURE CAREER?)

This is an evolving, young, discipline. There are many paths that enterprise architecture might take that have yet to be fully defined. Enterprise architecture has yet to commoditize to a common set of beliefs and practices that are generalized and well understood by those who are not practitioners. That makes the continuing change enterprise architecture programs and practitioners will face in the coming decade both challenging and fun as they help clarify what enterprise architecture is becoming.

For the day-to-day practitioner, passion about making their business better and a commitment to identifying, sourcing, and helping the careers of others who share that passion marks most of those I have met through my contacts over the years.

In 1990 I did not think that this would become the focal point of my career, but I continue to enjoy enterprise architecture and working with others engaged in enterprise architecture every day. My friend, and colleague, Chris Wilson, once said that: “Enterprise architecture is not a job, it’s a life sentence.”

Chris was joking; but, like all jokes, there’s a kernel of truth in this. For those considering making enterprise architecture their career area, you may find it to be an exciting, at times frustrating, and highly impactful role in support of your organization’s success. That, in turn, is captivating and may help make this choice more than just a job choice.
Call for Papers

The Journal of Enterprise Architecture is accepting article submissions for its 2011 issues. Research and best practice articles are sought on enterprise architecture-related topics, including:

- Case Studies, Configuration Management, Culture, Documentation
- Evaluation, Frameworks, Governance, Implementation, Maintenance
- Methodologies, Taxonomies, Theory, Training, Tools, Use, Value

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Author submission guidelines can be found on the JEA website at www.aeajournal.org.
INTRODUCTION

Enterprise architecture, and the associated formulation, implementation, and governance processes, are increasingly recognized by organizations as an important capability (Lankhorst et al 2005; Op ‘t Land et al 2008). Key concepts in the field of enterprise architecture include concerns, principles, models, views, and frameworks (Op ‘t Land et al 2008). Ample research has been conducted on architecture frameworks, architecture modeling languages (Lankhorst et al 2005; Iacob 2009), model analysis (Johnson & Ekstedt 2007; Iacob 2007), as well as viewpoints and concerns (Proper et al 2005; Lankhorst et al 2005; Buckl et al 2008). In this article we turn our focus to the concept of principles and its role in the field of enterprise architecture. Given that principles have not received a lot of research attention (Fischer et al 2010), there is a need to better understand their essence.

Several approaches position principles as an important ingredient; e.g., Davenport (1989); Richardson (1990); Tapscott & Caston (1993); Wagter et al (2005); Op ‘t Land et al (2008); Van’t Wout et al (2010); Beijer & De Klerk (2010); while some even go as far as to position principles as being the essence of architecture (Dietz 2008; Hoogervorst 2009; CSC Index 1986; Fehskens 2010). Architecture principles fill the gap between high-level strategic intentions and concrete design decisions. At the same time, initial case studies (Lindström 2006; Lee 2006; Go 2006; Kersten 2009; Van Boekel 2009; Van den Tillaart 2009; Ramspeck 2008; Greerhorst et al 2007; Greerhorst 2007; Bouwens 2008) indicate there to be a wide variation in the actual use of principles. The primary aim of this article is therefore to arrive at a first version of a conceptual framework which more clearly identifies and positions the different types of principles.

The framework presented in this article is the first iteration in a design science-driven research effort (Hevner et al 2004) in which we aim to more clearly define the concept of architecture principles, and develop an associated methodology for defining and describing architecture principles. This first iteration provides a synthesis of existing views on enterprise architecture and enterprise engineering (Op ‘t Land et al 2008; Dietz 2008).

The remainder of this article is structured as follows. Before we are able to sensibly explore the different types of principles, and their roles in enterprise transformations, the second section offers a review of our understanding of the fundamental purpose of architecture as a means to direct enterprise transformation. In the third section, we then provide a conceptual framework of the different types of principles that can be discerned within our field.

ARCHITECTURE AS A MEANS TO GOVERN ENTERPRISE TRANSFORMATIONS

In line with Op ‘t Land et al (2008), we take the perspective that enterprise architecture should play a pivotal role in governing the continuous improvement process of an enterprise. In order to better understand the governing role of enterprise architecture, this section positions architecture as a means to govern enterprise transformations. As we will see, principles are the key means to govern the direction of the transformation of an enterprise.

In our view, governing enterprise transformations first and foremost entails the perspective on an enterprise as a purposely designed and implemented artifact. This enables the governing system to govern the enterprise transformation in terms of a clear goal, its current state,
and the desired future states of the enterprise. Doing so implies a perspective on properly governed enterprise transformation as being a form of engineering. This gives rise to the field of enterprise engineering (Dietz 2006, 2008) which is an emerging discipline that regards the design and implementation of enterprises from an engineering perspective. Two key paradigms underpin this discipline. The first paradigm states that enterprises are purposefully designed and implemented systems. Consequently, they can be re-designed and re-implemented if there is a need for change. The second paradigm of enterprise engineering is that enterprises are primarily social systems, supported by technical systems. This means that the dominant system elements are social individuals, and that the essence of an enterprise’s operation lies in the entering into and complying with commitments between these social individuals, while the implementation of this essence involves the design of an orchestrated collaboration between social beings and technical artifacts. Enterprise engineering should therefore also deal with other forces, such as emergence and the fact that enterprises are human-driven, that make it quite a different ‘game’ to play.

In line with Rijsenbrij et al (2002) and Op ’t Land et al (2008), the governance of an enterprise transformation process is regarded as involving a force-field between enterprise strategy, program management, and enterprise architecture. When only considering the typical project parameters, one runs the risk of conducting ‘local optimizations’ at the level of specific projects. For example, when making design decisions which have an impact that transcends a specific project, projects will still aim for solutions that provide the best cost/benefits trade-off within the scope of that specific project while not looking at the overall picture. Such local optimizations are likely to damage the overall quality of the result of the transformation (Op ’t Land et al 2008). Enterprise architecture is concerned with an operationalization of the direction in which the enterprise aims to transform itself, in terms of core properties of the enterprise being engineered. This operationalization allows the different change projects to be assessed whether they contribute to the realization of the strategy, while guarding the properties that transcend specific projects.

In this article we focus on the position of enterprise architecture in relation to enterprise engineering, and the potential roles of principles within this. Fehrsken (2008) states that the architecture of a ‘thing’ should explicitly address alignment, relating the role of architecture to the mission of that ‘thing’. He defines architecture as: “those properties of a thing and its environment that are necessary and sufficient for it to be fit-for-purpose for its mission”. This has led us to the view that the main purpose of an enterprise architecture is to align an enterprise to its essential requirements. As such, it should provide an elaboration of an enterprise’s strategy to those properties that are necessary and sufficient to meet these requirements. These properties will impact the design of the enterprise, and enable the steering and coordination of transformation programs and projects. The essential requirements refer to those requirements that (when not attained) have a high impact on the goals of the enterprise’s key stakeholders.

Dietz (2008) provides insight into the meaning of architecture, by defining it as follows: “Theoretically, architecture is the normative restriction of design freedom.” We believe that the essential meaning of an enterprise architecture is that it provides a normative restriction of design freedom towards transformation projects and programs (or put more positively: a reduction of design stress). This does not exclude architecture as a means for other goals. Indeed Lankhorst et al (2005) and Op ’t Land et al (2008) classify architecture view points into designing, deciding, contracting, and informing viewpoints. Furthermore, in Op ’t Land et al (2008) enterprise architecture is positioned explicitly as a means for informed governance of enterprise transformation, requiring indicators and controls to govern enterprise transformations.

The desire to restrict design freedom implies normative instruments with which such restrictions can be made. We believe that architecture principles are key instruments in this (Op ’t Land & Proper 2007), and we are certainly not alone in doing so. Several approaches position principles as an important ingredient, while some even go as far as to position principles as being the essence of architecture. Architecture principles fill the gap between high-level strategic intentions and concrete designs. They ensure that the enterprise architecture is future directed, and can actually guide design decisions, while preventing analysis paralysis by focusing on the essence. Furthermore, they document fundamental choices in an accessible form, and ease communication with all those affected. They are formulated based on drivers such as strategy, goals, and risks. Potential undesired impact on the goals of stakeholders can be reduced by formulating architecture principles.

A CONCEPTUAL FRAMEWORK FOR ARCHITECTURE PRINCIPLES

As argued before, we take the perspective that architecture principles are a cornerstone of enterprise architecture. The goal of this section is to provide a conceptual framework for architecture principles. As mentioned before, the framework presented in this article is the first iteration in a design science-driven research effort (Hevner et al 2004) in which we endeavor...
to more clearly define the concept of architecture principles, and develop an associated methodology for defining and describing architecture principles. The first iteration, as presented in this article, provides a synthesis of existing views on enterprise architecture and enterprise engineering (Op ’t Land et al 2008; Dietz 2008).

HISTORY
The term ‘principle’ is said to originate from the Latin word ‘principium’ (Meriam–Webster 2003), which means ‘origin’, ‘beginning’, or ‘first cause’. Vitruvius, an architect in ancient Rome, used principles to explain what is true and indisputable, and should apply to everyone. Vitruvius considered principles as the elements, the laws of nature that produce specific results. For instance, he observed how certain principles of the human body, such as symmetry and proportion, ensure ‘perfection’. The human body was a great source of inspiration to him. He even believed that the principles of the human body should also be applied in the design of gardens and buildings because it would always lead to a perfect result: an ultimate combination of beauty, robustness, and usability.

When using principles in the sense of beginning, they generally provide insight into the causes of certain effects. These causes can be laws of nature, beliefs, or rules of conduct. Laws of nature simply are, and influence, the things we do. Examples of such principles are the law of gravity and the Pauli exclusion principle. The latter is a quantum mechanical principle formulated by Wolfgang Pauli in 1925. It states that no two identical fermions may occupy the same quantum state simultaneously. Another example, more directly relevant to enterprise engineering, is the principle of requisite variety from general systems theory, which states that a regulating system should match the variety of the system that should be regulated (Beer 1985).

Beliefs are typically founded in moral values. Examples of such principles are Martin Luther King’s principles of non-violence that were to guide the civil rights movement. In an enterprise engineering context, examples of such principles would be: “No wrong doors” (suggesting that clients should be helped at whichever office/desk they approach the enterprise) and “The customer is always right”.

Rules of conduct are explicitly defined to influence behavior, and are typically based on facts and beliefs. General examples include the Ten Commandments from the Bible; e.g., “You shall not murder” and “You shall not commit adultery”. In our enterprise engineering context, examples would be: “Clients can access the entire portfolio of services offered by any part of the government by way of all channels through which government services are offered” and “Before delivering goods and services to external parties, we must hold receipt of the associated payment”.

The remainder of this section will show various dimensions in which principles can be positioned. We distinguish scientific principles from normative principles, positioning architecture principles as normative principles. We divide normative principles into credos and norms, in which the latter form is needed in order to provide enough restriction of design freedom. We show how principles relate to requirements and instructions. Finally, we position architecture as a form of essential design, focusing on the fundamental and essential aspects (Fēhskens 2008).

SCIENTIFIC PRINCIPLES VERSUS NORMATIVE PRINCIPLES
The American Engineers’ Council for Professional Development (The Engineers’ Council for Professional Development 1941) states that engineering concerns: “the creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilizing them …”. Principles are used in a wide range of engineering disciplines such as industrial engineering, chemical engineering, civil engineering, electrical engineering, and systems engineering. They can be seen as a form of design knowledge that should be shared, in order to increase the quality of designs. In line with The Engineers’ Council for Professional Development (1941), we will refer to these principles as scientific principles. We define a scientific principle as: “a law or fact of nature underlying the working of an artifact”.

Scientific principles are likely to be cross-disciplinary in the sense that they will be applicable in various design disciplines. Lidwell et al (2003) provides a list of 100 ‘universal principles of design’ consisting of laws, guidelines, human biases, and general design considerations. The principles can be used as a resource to increase cross-disciplinary knowledge and understanding of design, promote brainstorming and idea generation for design problems, form a checklist of design principles, and to check the quality of design processes and products. Examples of principles described by Lidwell et al that fall into the category of scientific principles are the ‘exposure effect’ and ‘performance load’. The first principle states that: “repeated exposure to stimuli for which people have neutral feelings will increase the likeability of the stimuli”. The latter states: “the greater the effort to accomplish a task, the less likely the task will be accomplished successfully”.

Principles have always played an important role in civil engineering, a professional engineering discipline that deals with the design, construction, and maintenance of the physical and naturally built environment, including
works such as bridges, roads, canals, dams, and buildings. A well-known principle in this field is the Archimedes principle, defined by Archimedes in the third century BC. The principle states that: “any object, wholly or partially immersed in a fluid, is buoyed up by a force equivalent to the weight of the fluid displaced by the object”. Principles from general systems theory, such as the earlier mentioned law of requisite variety (Beer 1985), are examples of scientific principles that are applicable in an enterprise engineering context.

The other class of principles we see is what we call ‘normative principles’. We define a normative principle as: “a declarative statement that normatively prescribes a property of something”. Architecture principles are a specific form of normative principle; they guide/direct the enterprise by normatively restricting design freedom. This is in line with the common interpretation of the term. TOGAF® states that: “principles are general rules and guidelines, intended to be enduring and seldom amended, that inform and support the way in which an enterprise sets about fulfilling its mission”.

The use of principles in the context of enterprise architecture can be traced back to a multi-year deep-dive research project led by Michael Hammer, Thomas H. Davenport, and James Champy, called the Partnership for Research in Information Systems Management (PRISM) (CSC Index 1986), which was sponsored by approximately 60 of the largest global companies (DEC, IBM, Xerox, Texaco, Swissair, Johnson & Johnson, Pacific Bell, AT&T, etc.). It is a principles-based architecture framework, also involving core terminology of, what was at that stage, a novel paradigm. In this context, principles were defined as: “simple, direct statements of an organization’s basic beliefs about how the company wants to use IT in the long term”. Note that, in this definition, the operative word is ‘wants’. It refers to the fact that, fundamentally, such principles are used to express a normative desire. Even more, it also expresses how these principles will aim to bridge the communication gap between top management and technical experts. The PRISM model, being from 1986 (Davenport 1989; Richardson et al 1990) is among the first published enterprise architecture frameworks, and as such actually precedes the Zachman framework (Zachman 1987). PRISM’s concept of principles as well as how they guide the definition and evolution of architectures was its most salient and widely accepted contribution.

The PRISM model has strongly influenced other enterprise architecture standards, methods, and frameworks. The earliest publications referring to the concept of principle, in an enterprise architecture context, can indeed be traced back to the PRISM project. Furthermore, the HP Global Method for IT Strategy and Architecture (Beijer & De Klerk 2010; ICTU 2007), which is based on work at DEC starting in 1984, was almost completely based on the PRISM model and the concept of principles. Many years later, the PRISM report (CSC Index 1986) also influenced the IEEE definition of architecture, as many of the IEEE 1471 committee members (DEC included) were employed by the original sponsors of this early work. The concept of architecture principle, as it is defined in TOGAF® today, is also inspired by the PRISM model.

Normative principles do not exist in isolation. They are based on all sorts of other artifacts, such as the strategy, issues, the existing environment, and external developments. On the other hand, they also influence all sorts of other artifacts, such as guidelines, requirements, designs, and implementations. One can regard the normative principles as bridging between strategy and operations; they are primarily an alignment instrument. They are formulated based on knowledge, experience, and opinions of all sorts of people in the organization; senior management, as well as the people that do the actual work. This mixture of people is also the target audience of normative principles. In that sense, the definitions of normative principles also provide a common vocabulary for the organization.

CREDOS VERSUS NORMS

In practice, we see normative principles at various levels of precision. Greethorst (2007) made the distinction between architecture principles and guidelines, where guidelines are more specific than architecture principles. ICTU (2007) distinguishes between fundamental principles and derived principles, where fundamental principles are the basis for derived principles. The level of precision influences the ability to assess the compliance of a design or architecture to the principle. When considering the role of principles bridging between strategy, via architecture to design, this is quite natural. At first, a principle will be formulated rather informally and refined later on in order to use it as a means to restrict design freedom. The definition of the word ‘principle’ in the Meriam–Webster dictionary suggests multiple forms of principles:

- 1a: a comprehensive and fundamental law, doctrine, or assumption
- 1b (1): a rule or code of conduct
- 1b (2): habitual devotion to right principles <a man of principle>
- 1c: the laws or facts of nature underlying the working of an artificial device
- 2: a primary source: origin
- 3a: an underlying faculty or endowment <such principles of human nature as greed and curiosity>
In terms of general definition, scientific principles refer to the interpretation of principles as laws or facts of nature underlying the working of an artificial device; normative principles refer to principles in the sense of a comprehensive and fundamental law, doctrine, or assumption or a rule of conduct that guides changes in the enterprises by influencing/directing the design of these changes.

At the start of their life-cycle, normative principles are just statements that express the enterprise’s fundamental belief of how things ought to be. At this stage, their exact formulation is less relevant. This is in line with intentions behind TOGAF® and the Zachman framework, where the architecture process starts with the creation of an architecture vision. In this phase, architecture is very future-oriented and mostly a creative process. The principles can be used as a means to express a vision, which is mostly based on personal beliefs of the stakeholders involved in the envisioning. They can be seen as normative principles in their initial stage. They are not yet specific enough to actually use them as a norm. In other words; assessing compliance of architectures and designs to these principles is not feasible. They are primarily used as a source of inspiration. Examples of principles in this phase, taken from practical cases, are:

- We should follow citizen logic.
- Work anywhere; anytime.
- Re-use as much as possible.
- Applications should be decoupled.

Principles in this phase can best be referred to as being a credo. The Meriam–Webster dictionary defines credo as: “a set of fundamental beliefs; also: a guiding principle”. This is very close to the definition of principle by Beijer & De Klerk (2010); “A fundamental approach, belief, or means for achieving a goal ...”. In terms of the dictionary definition of principle, we consider this to correspond to its interpretation as a comprehensive and fundamental law, doctrine, or assumption. As such, credos are things an enterprise consciously chooses to adopt. They represent the fundamental beliefs or assumptions underpinning further architectural decisions. This allows enterprises to provide a first elaboration of an enterprise’s strategy towards the desired design of the enterprise. We define a credo as: “a normative principle expressing a fundamental belief”.

When enterprises want to use normative principles as a way to actually limit design freedom, the principles need to be more specific. This is when the exact formulation of the principle becomes important. They need to be formulated in such a way that compliance to them can be assessed. This starts with a reformulation of the principle statement, but extends to other properties. The full specification will need to contain definitions of terminology used, as well as a definition of how to assess the compliance of a design to the principle. The examples given previously could be reformulated as follows to make them more specific:

- The status of customer requests is readily available inside and outside the organization.
- All workers are able to work in a time, location, and enterprise-independent way.
- Before buying new application services, it must be clear that such services cannot be rented, and before building such application services ourselves, it must be clear that they cannot be purchased.
- Communication between application services will take place via an enterprise-wide application service bus.

Once normative principles have been (re)formulated specific enough to use them to restrict design freedom, we can refer to them as a norm. The Meriam–Webster dictionary defines a norm as: “a principle of right action binding upon the members of a group and serving to guide, control, or regulate proper and acceptable behavior”. In terms of the dictionary definition of principle, we consider this to correspond to its interpretation as rule of conduct. Norms can also be regarded as a tactic by which a credo can be enforced. To indeed enable the normative effect of norms, they are required to be specific, measurable, achievable, relevant, and time-framed. We define a norm as: “a normative principle in the form of a specific and measurable statement”.

When considering the TOGAF® [TOGAF 9, Section 3.17] definition of principle:

*A qualitative statement of intent that should be met by the architecture. Has at least a supporting rationale and a measure of importance.*

and more specifically the purpose it attributes to such principles [TOGAF 9, Section 36.2.4]:

*Principles are general rules and guidelines, intended to be enduring and seldom amended, that inform and support the way in which an enterprise sets about fulfilling its mission.*

we take the stance that TOGAF® requires/presumes architecture principles to be in the form of norms.

**PRINCIPLES VERSUS REQUIREMENTS AND INSTRUCTIONS**

Normative principles limit design freedom. They are, however, not the only statements which limit design
freedom. Requirements also limit design freedom. However, requirements state what (functional or constructional) properties a (class of) system(s) should have, and why the stakeholders want the (class of) systems to have these properties (Beijer & De Klerk 2010). Normative principles provide policies on how the design of the (class of) system(s) will ensure that the actual implemented system(s) will meet the requirements. Requirements are the basis for solutions, expressing their required characteristics. Fisher et al (2010) states that architecture principles refer to the construction of an enterprise, while requirements refer to its function. We define a requirement as: “a required property of an artifact”.

Generally, enterprise architectures are not only specified in terms of normative principles, but also in terms of more instructive statements, such as models and detailed descriptions on how to apply these in a specific situation. We will refer to these statements as design instructions, since they tell designers specifically what to do and what not to do. Design instructions will refer to the concepts used in the actual construction of the enterprise, such as: value exchanges, transactions, services, contracts, processes, components, objects, building blocks, etc. Enterprises typically use languages such as UML®, BPMN®, the TOGAF® content framework, ArchiMate®, or the language suggested by the DEMO method (Dietz 2006) to more explicitly express their architectures in terms of concrete modeling concepts. Design instructions provide a more operational and tangible refinement of the normative principles. Due to their tangible nature, in terms of actual concepts used in the construction of the enterprise, architecture models enable enterprises to study/analyze the effects of different options for the future, as well as analyze problems in the current situation (Lankhorst et al 2005).

We define a design instruction as: “an instructive statement that describes the design of an artifact”.

Collectively we will refer to normative principles and design instructions as directives to express the fact that they both direct the design of the enterprise (albeit at different levels of specificity) and both involve a choice by the enterprise to direct their transformation. The Meriam–Webster dictionary defines directive as: “serving or intended to guide, govern, or influence”, while the OMG’s Business Motivation Model (BMM) (OMG 2006) also uses the notion of directive as the most general form of guidance/regulation. In terms of the NAF definition of architecture (Dietz 2008), these two flavors of directive collectively cover its role as a normative restriction of design freedom.

Figure 1 provides – in the style of Object Role Modeling (ORM) (Halpin and Morgan 2008) – a domain model positioning credos, norms, normative principles, design instructions, requirements, and scientific principles. In the ORM diagram, the encircled cross is used to signify the fact that credos, norms, scientific principles, design instructions, and requirements are mutually-exclusive. The general notion of proposition is used as a further generalization of scientific principles, requirements, and directives. Each proposition must have a quality and a definition (signified by the black dot in the diagram), while they have at most one definition (signified by the short bar on the fact type).

ARCHITECTURE PRINCIPLES VERSUS DESIGN PRINCIPLES

Regarding an architecture as a normative restriction of design freedom raises the question of what is the difference between architecture and design. More operationally, what should be included in an architecture, and thus restrict the freedom of ensuing design activities, and what should indeed be left to designers? As suggested by the IEEE and TOGAF® definitions of architecture, the architecture level should focus on fundamental aspects. An enterprise architecture should provide an elaboration of an enterprise’s strategy, while focusing on the core concerns of the stakeholders. As
such, an architecture is typically positioned at a level concerned with a class of systems. A design focuses on the remaining requirements and design decisions pertaining to a specific system being developed, which will typically have a limited impact on the key concerns of the stakeholders.

Fehskens (2008) states that architecture should explicitly address alignment, relating the role of architecture to the mission. He redefines architecture as: “those properties of a thing and its environment that are necessary and sufficient for it to be fit-for-purpose for its mission”. In his view, architecture should focus on what is essential, on ‘the stuff that matters’. This equates to those properties that are necessary and essential. This is also what distinguishes architecture from design. A different architecture implies a different mission, whilst different designs may address the same mission.

Rivera (2007) acknowledges that architecture is about the essence. He adds that, generally speaking, design work seeks to find optimal solutions to well-understood problems. It’s more science than art, algorithmic in nature, and deals mostly with a system’s measurable attributes. Architecting deals primarily with non-measurable attributes using non-quantitative tools and guidelines based on practical lessons learned. In his view, the architecture uses a heuristic approach. Whereas design and engineering work is primarily deductive in nature, architecture work is primarily inductive.

The distinction between design and architecture also allows us to distinguish between architecture principles and design principles. We define a design principle as: “a normative principle on the design of an artifact”. As such, it is a declarative statement that normatively restricts design freedom. In contrast, we define an architecture principle as: “a design principle included in an architecture”. As such, it is a declarative statement that normatively prescribes a property of the design of an artifact, which is necessary to ensure that the artifact meets its essential requirements.

With the above definitions in place, we can now provide more insight into the role of enterprise architecture as a means to bridge from strategy to design. Figure 2 illustrates the flow from enterprise strategy, via architectures, to the design of some specific system within the system of systems that constitutes the enterprise, to that system’s implementation. The diagram also makes the role of requirements, design principles, and design instructions at both the architecture and design levels more explicit. It furthermore shows how scientific principles support the creation of architectures and designs.

Figure 2: Architecture as a Bridge from Strategy to Design

As a further illustration of the flow from strategy to design, we use a fictitious insurance company. Their strategy is based on operational excellence. To this end they have formulated the objective to cut costs with 20% within two years, which can be considered an architectural requirement. Based on this architecture requirement they have defined an architecture principle which states that: “business processes are standardized and automated”. Although they could not find any scientific principles to support this, they had good experiences with process standardization in other organizations. The architecture principle is translated to specific design instructions on their claims handling process in terms of a series of ArchiMate® models (Iacob et al 2009). These instructions define the specific activities which must be present in all claims handling processes. A new claims handling system is designed to support the standardized claims handling process. A requirement for this system is that it integrates with the recently developed customer portal. The lead designer strongly believes that business rules should be defined and implemented separately from other application functionality in this claims handling system and therefore defines the design principle that business rules are defined in a business rules engine. He also provides more specific design instructions on how to actually define these business rules, by prescribing the specific constructs in the business rules engine that should be used. These design instructions are used by the developers that use the rules engine to implement the system.
Finally, the situation depicted in Figure 2 should not be mistaken to be a top-down steering approach only. Architecture principles can indeed be used as a top-down control mechanism. However, by observing how emergent structures within a (networked) enterprise may lead to violations of existing principles, architecture principles can be used as an indicator mechanism as well.

CONCLUSION
In this article we have explored the concept of principle in relation to enterprise transformations, leading to a conceptual framework more clearly defining principle and associated terminology.

The presented framework is the first iteration in a design science-driven research effort (Hevner et al 2004) in which we aim to more clearly define the concept of architecture principles, and develop an associated methodology for defining and describing architecture principles. We have produced a domain model of the concepts involved, taking into account established definitions as well as practical experiences. While the proposed framework is a synthesis of existing theoretical perspectives as well as empirical insights, in line with the design science approach, the necessary next step is to validate this framework in terms of additional practical cases and experiments. With the current conceptual framework in place, we can indeed endeavor to do so.

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Article

A Process-Driven Approach to Modeling Leadership

By Pat Turner and David Tuffley

Abstract
This article proposes a new approach for defining and categorizing the activity of leadership with a strong orientation towards the definition and primacy of management and strategy layers of activity when seeking to attempt to understand and design new and emerging patterns within the enterprise. The specific model type within the emerging Next-Gen EA framework that talks to the concept of leadership is that of Organizational Capability that lies within the Business Function Layer. This new functional category also links to subordinate process models which define the specific activities from which the function is characterized. Together, the Function Type and the underlying process flows can be grouped to be termed a Reference Model of Organizational Behavior (RMOB). Together, this functional component and supporting process flows are fully conformant with the requirements for Process Reference Models, as prescribed by ISO ISO/IEC TR 24774:2010 and ISO/IEC 15504: 2004. This RMOB therefore has all the strength and flexibility of a robust software engineering tool, yet it is coupled with generic ability to describe a core function within the modern organization that has, to date, defied rigorous or quantifiable definition. This ability to describe, model, and capture ‘capability sets’ supported by underlying process, information, and technologies within an organization fulfills one of the key determining factors within the Next-Gen EA framework, namely the ability to model the modern organization at all levels and add further sophistication to the model types provided by enterprise architecture in the quest to solve senior management business and strategy problems.

Keywords
Next Generation Enterprise Architecture, Organizational Behavior, Leadership, Capability Sets, Innovation, BPM, Software Engineering

INTRODUCTION

The Next Generation Enterprise Architecture (Next-Gen EA) framework seeks to extend the traditional emphasis of enterprise architecture as a purely ICT modeling exercise focused on analyzing, modeling, and managing the inter-play of purely technology-driven components, layers, and activities within the modern organization. The Next-Gen EA approach therefore seeks to ascribe primacy to an originating strategic intent (being goal, objective, plan, or definable measure such as a KPI) which is then inherited by a management function for execution until complete (Turner et al 2009).

This simple logic flow, which reflects nothing more than a raison d’être for modern management theory, clearly positions strategy as the absolute primary justification for all activities within the modern firm, with the management role becoming a subordinate function tasked with delivering successful execution against this strategic intent (Turner et al 2009). The definition of underlying business and technology layers therefore, within an enterprise, are simply resources or ‘capabilities’ available to the manager to assist them in the fulfillment of this strategic intent. Assisting senior managers in their quest to combine resources and ‘capability sets’ in order to execute against strategic intent in the most productive and efficient manner possible is therefore one of the core objectives of the emerging Next-Gen EA framework (Turner et al 2009). Associated areas of endeavor such as coherency management (Doucet et al 2009) seek a similar understanding of the modern organization, evaluating the consistency and uniform nature of these management responses and whether they are truly ‘coherent’ both in terms of executing against the original strategic intent but also in harnessing the capabilities and resources available in a useful and effective manner.

The concept of leadership, therefore, is high on the list of organizational model types that would be extremely useful to classify and understand if we are talking about the effectiveness of management responses in dealing with strategic intent. A leadership view or model type is not, however, commonly modeled or valued within traditional enterprise architecture approaches. So, from a Next-Gen EA and coherency management perspective, there are some key Communities of Interest (COI) within any organization that are not currently being served by existing enterprise architecture practices, methods, models, and tools (see Figure 1.0).
Figure 2.0 provides an alternate view of the key components required to deliver an effective decision support environment that provides the new and emerging model types and views required by senior decision-makers and strategists. A further paper to be published later in 2011 will describe in detail over 1,500 cataloged business and strategy requirements collated from enterprise architecture consulting assignments conducted by the authors over the last five years that support this emerging enterprise architecture framework. These requirements then can be seen as a ‘solution gap’ in current enterprise architecture offerings that needs to be addressed. A failure to provide easy-to-use and produce management models of key concepts such as capability, leadership, innovation, and risk are high on this list.

These key propositions are summarized in the paper by Turner et al (2009): Architecting the Firm, in which the failure of traditional enterprise architecture frameworks to address many of the foundational questions asked by senior managers in modern organizations is described. The four case studies in the original paper illustrated the ‘solution gap’ within several COIs encompassing strategists, senior business decision-makers, program directors, senior executives, and business innovators, all of whom did not or could not see the value in existing enterprise architecture approaches within their respective organizations. One of the key recurring themes was a lack of defined model types that addressed important but intangible issues such as culture, innovation, leadership, and risk. Figure 3.0 provides an illustration of one type of approach: the modeling of deep ‘capability sets’ that span many of the traditional enterprise architecture layers and model types which existing enterprise architecture frameworks currently address.

Figure 1.0: Next-Gen EA Lifecycle View
However, capability set modeling is an emergent area and many traditional enterprise architecture practitioners fail to even see the relevance of such questions to the existing discipline of enterprise architecture and have little or no interest in the development of model types and underlying data sets required to answer these questions. A more familiar approach may be useful in establishing the importance of modeling concepts such as leadership, innovation, and risk. The authors feel that...
these concepts are indeed highly relevant and in fact are critical to the ongoing relevance and value of enterprise architecture in helping senior managers and decision-makers ensure the success, survival, and effective allocation of resources within the modern organization. If this relevance is not demonstrated, then the efficacy of enterprise architecture itself as a long-term management discipline will also start to become questioned.

With regard to the specific concept of leadership, there are some meta-models such as GERAM and the soon to be published GERAM 2.0 (Bernus et al 2006) that posit these concepts as constructs of interest within their model of the modern organization. In summary, however, very few methodologies or enterprise architecture approaches contain model types that attempt to deal with leadership in the real-world applied sense.

So, what would an organizational model of leadership look like and where would the practitioner start to define the concept and core attributes of a leader? Is leadership simply an additional trait or typology set that is a function of management style, to be used in the fulfillment of the strategic task? Or is leadership simply one of several other intangible qualities such as culture, innovation, and motivation which, whilst slightly harder to define, might equally play an important role in the successful fulfillment of strategic intent within the modern organization. Using a more conventional enterprise architecture process modeling approach, the Reference Models of Organizational Behavior (RMOB) framework demonstrated in this article can be used to show how a concept such as leadership can be defined in a measurable way using accepted concepts such as function and process that already lie at the heart of both the enterprise architecture and the software engineering disciplines. This article therefore proposes a conventional process-oriented approach to begin to explore the concept of leadership and discusses how this approach fits within the emerging Next-Gen EA framework.

This article will therefore explore RMOBs as a means to address this shortfall in our ability to adequately describe ‘soft’ concepts such as leadership within the firm. RMOBs describe aspects of desired organizational behavior that if performed repeatedly will become institutionalized and which will result in consistently achieving the prescribed purpose. This approach re-focuses attention from conformance to prescribed activities and tasks, to a focus on the demonstration of desired organizational behavior, thereby moving towards the concept of coherency management at the heart of Next-Gen EA (Turner et al 2009) and taking us away from the traditional role of a process-oriented reference model.

CAN LEADERSHIP BE DESCRIBED AS A PROCESS?

RMOBs are arguably consistent with the generalized view of enterprise architecture as concerning itself with describing in a formal, structured way the relationships between the elements including people and technology of an organization in such a way that they can manage ongoing change and achieve their goals (Bernus et al 2006). RMOBs must conform to the criteria for process reference models of which RMOBs are a category. These criteria are prescribed in ISO/IEC 15504: 2004 and ISO/IEC TR 24774:2010. The leadership RMOB discussed in this article conforms to these standards.

This article therefore is positioning a new model type being that of leadership which is suggested should become one of the commonly ascribed models produced when seeking to understand the operations of any modern organization. This approach is seen as a good example of the efficacy of the emerging Next-Gen EA framework in explaining how actual modern organizations operate.

Leadership is not alone in the broad category of behaviors engaged in by members of the organization as they pursue their objectives. If leadership can be described in a Process Reference Model (PRM) and supported by a Process Assessment Model (PAM), then theoretically so too might these other behaviors not yet serviced by a PRM. For example, ISO/IEC 15504: 2004 offers organizations the means to develop and assess their integrated teaming capability against the measurement framework prescribed by ISO/IEC 15504: 2004 (Tuffley 2006).

We begin by examining whether there are grounds to believe that PRMs are applicable in addressing leadership in a software engineering environment. It will be seen from the discussion that PRMs and Model-Based Process Improvement (MBPI) can arguably be applied to a range of software engineering challenges, including the challenge of project leadership. As seen in Figure 4.0, there are two broad justifying reasons:

1. Leadership can be taught and learned by those who would practice it (Drucker 1996; Bennis 1994; Humphrey 2002).
2. Defining a process is a necessary step for organizational effectiveness (Repenny & Sterman 1997).

Deming (1997) clearly advocates this approach when he states: “If you cannot describe what you are doing as a process, then you don’t know what you are doing”.

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To find improved ways of managing this often difficult process now and into the future (Herbsleb & Moitra 2001). MBPI potentially offers the means by which organizational challenges such as the leadership of complex virtual teams can be met (Heston & Phifer 2009). MBPI has not (to the knowledge of the author) been used to address leadership, though there is arguably a sound basis for thinking that it can be used in this way. MBPI-based approaches therefore aim to understand and to then improve the performance and maturity of an organization’s processes. It combines the discipline of process improvement with the several international standards and frameworks now in use (i.e., ISO/IEC 15504: 2004, CMMI®). Combining this awareness of process performance with internationally recognized standards is advantageous to organizations. It affords a structured and comprehensive framework as a way forward and prescribes in general terms the scope of activities required to systematically improve their process maturity. Heston & Phifer (2009) describe the following organizational benefits to MBPI:

- **Improving consistency and repeatability:** Consistency and repeatability assist with minimizing process variation, a major source of product defects. It also allows project staff to move into and out of projects more easily by having clearly defined roles and responsibilities.
- **Improving communication:** Achieved through the adoption of a common vocabulary with clearly prescribed meanings that allows project staff, clients, and business partners to communicate with less ambiguity.
- **Enabling more improvement:** Process improvement programs create an environment which is conducive to further improvement. Beyond consistency and repeatability comes the ability to measure and record process performance. This performance data can then be used to plan further improvements and to benchmark against best practice.
- **Providing motivation:** Objective targets, for example, being assessed at a certain level of maturity, become a visible motivator for project staff to maintain their efforts to improve process performance.

**LEADERSHIP PRM IN PRACTICE**

The Leadership PRM was developed using a design research approach in which an initial prototype was developed based on the broad literature and reviewed in a series of design iterations over an 18-month period (a total of six reviews) within the context of industry-based consulting assignments undertaken in Brisbane, Queensland by one of the authors over a two-year period.

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**MBPI AS A SOLUTION TO RISING ORGANIZATIONAL COMPLEXITY**

The business of managing complex projects across dispersed geographical locations has never been more difficult, given the rising complexity of the global economic environment and the multi-national corporate entities that now inhabit this world. There is a clear need to formalize and apply in real situations. The basic topic of team functioning was examined first, which led to the identification of what characteristics are likely to create a successful team. Aiming from this work on successful teams, leadership as opposed to management is clearly identified as being of critical importance in many team and work-related scenarios.

This requirement for leadership is further exacerbated when the concept of distance is introduced. The further physically separated the team is from their defined leader, the more important the concept of leadership becomes. This approach has not yet been normalized for other personality traits within the group (i.e., cohesion, aggression, motivation, etc.) which will be explored in later papers, but for the moment leadership and distance will be the focus of our inquiry. The conceptual leadership model proposed below therefore acknowledges the basic distinction between co-located and virtual teams, and that integrated teams can be either. Virtual teams do not have to be integrated but commonly are. Integrated teams do not have to be distributed, but commonly are. Therefore, the characteristics of successful teams and successful leaders are considered for both co-located and virtual teams, culminating in the characteristics of successful leaders of integrated teams operating in virtual environments.

Figure 4.0: MBPI Enables Definition of Leadership Processes

If we accept these as our fundamental premise, then the conceptual overview diagram in Figure 2.0 illustrated above further evolves the question to become: how can the challenge of more effective team leadership be met? Assuming that the leadership factors could be identified from a broad literature review, then a PRM is a logical way for these factors to be formalized and applied in real situations. The basic topic of team functioning was examined first, which led to the identification of what characteristics are likely to create a successful team. Aiming from this work on successful teams, leadership as opposed to management is clearly identified as being of critical importance in many team and work-related scenarios.

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Figure 4.0: MBPI Enables Definition of Leadership Processes

If we accept these as our fundamental premise, then the conceptual overview diagram in Figure 2.0 illustrated above further evolves the question to become: how can the challenge of more effective team leadership be met? Assuming that the leadership factors could be identified from a broad literature review, then a PRM is a logical way for these factors to be formalized and applied in real situations. The basic topic of team functioning was examined first, which led to the identification of what characteristics are likely to create a successful team. Aiming from this work on successful teams, leadership as opposed to management is clearly identified as being of critical importance in many team and work-related scenarios.

This requirement for leadership is further exacerbated when the concept of distance is introduced. The further physically separated the team is from their defined leader, the more important the concept of leadership becomes. This approach has not yet been normalized for other personality traits within the group (i.e., cohesion, aggression, motivation, etc.) which will be explored in later papers, but for the moment leadership and distance will be the focus of our inquiry. The conceptual leadership model proposed below therefore acknowledges the basic distinction between co-located and virtual teams, and that integrated teams can be either. Virtual teams do not have to be integrated but commonly are. Integrated teams do not have to be distributed, but commonly are. Therefore, the characteristics of successful teams and successful leaders are considered for both co-located and virtual teams, culminating in the characteristics of successful leaders of integrated teams operating in virtual environments.

**MBPI AS A SOLUTION TO RISING ORGANIZATIONAL COMPLEXITY**

The business of managing complex projects across dispersed geographical locations has never been more difficult, given the rising complexity of the global economic environment and the multi-national corporate entities that now inhabit this world. There is a clear need to formalize and apply in real situations. The basic topic of team functioning was examined first, which led to the identification of what characteristics are likely to create a successful team. Aiming from this work on successful teams, leadership as opposed to management is clearly identified as being of critical importance in many team and work-related scenarios.

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period in association with the Software Quality Institute (SQI) at Griffith University. The reviews included the standard PRM developer’s method of practitioner and expert reviewers, plus an ISO/IEC TR 24774:2010 conformance review to ensure that the model met the requirements of the standard. The PRM was also validated with Dromey’s Behavior Engineering (Dromey 2006), a formal method for checking content and syntax for errors and ambiguities that was developed initially for validating software requirements for complex systems, but which has proven a highly effective method for validating PRMs (Tuffley & Rout 2009).

![Figure 5.0: Conceptual Overview of how Leadership PRM & PAM Evolved](image)

Having passed through these six reviews, the V1.0 PRM was released and reviewed again by a focus group over a full day. The group comprised two practitioner project managers and two experts on process models in software engineering. The objective of this post-release review was to:

- **Evaluate the efficacy of the Leadership PRM, particularly in relation to** (a) fitness-for-purpose, (b) organization of and content of elements, and (c) what additional components could be added to make it more usable from a practitioner’s point of view.

As a result of the review, V1.1 PRM was produced. This version incorporated the accumulated feedback from the focus group and resulted in substantial changes by (a) consolidating and merging several processes, (b) reordering the processes to reflect a sequence more naturally performed in projects, and (c) adding additional informative material relevant to virtual and/or integrated project environments. All of these changes were consistent with the review’s terms of reference.

Importantly, for the purposes of this article, the consensus opinion of the focus group was that the Leadership PRM is a usable organizational model. They each wanted a copy of the update V1.1 PRM for use in their own projects. This feedback lends support to the argument that an RMOB that conforms to the requirements of a PRM in a software engineering sense can be a useful and usable artifact. Also emerging from this first post-release review was a PAM based on the Leadership PRM. This PAM was developed in accordance with ISO/IEC 15504: 2004, Parts 1 and 2.

**Table 1: Structure and Content of Leadership PAM**

<table>
<thead>
<tr>
<th>Leadership Process Assessment Model (PAM)</th>
<th>Individual Process Group (IND)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IND.1 Vision</td>
<td></td>
</tr>
<tr>
<td>IND.2 Objective(s)</td>
<td></td>
</tr>
<tr>
<td>IND.3 Integrity</td>
<td></td>
</tr>
<tr>
<td>IND.4 Action-orientation</td>
<td></td>
</tr>
<tr>
<td>IND.5 Intelligence</td>
<td></td>
</tr>
<tr>
<td>IND.6 Individualized consideration</td>
<td></td>
</tr>
<tr>
<td>IND.7 Management-by-exception</td>
<td></td>
</tr>
<tr>
<td><strong>Team Process Group (TEM)</strong></td>
<td></td>
</tr>
<tr>
<td>TEM.1 Team structure</td>
<td></td>
</tr>
<tr>
<td>TEM.2 Team requirements</td>
<td></td>
</tr>
<tr>
<td>TEM.3 Team recruitment</td>
<td></td>
</tr>
<tr>
<td>TEM.4 Team environment</td>
<td></td>
</tr>
<tr>
<td>TEM.5 Team formation</td>
<td></td>
</tr>
<tr>
<td>TEM.6 Team roles</td>
<td></td>
</tr>
<tr>
<td>TEM.7 Team rules</td>
<td></td>
</tr>
<tr>
<td>TEM.8 Team authority</td>
<td></td>
</tr>
<tr>
<td>TEM.9 Team performance management</td>
<td></td>
</tr>
<tr>
<td>TEM.10 Team development</td>
<td></td>
</tr>
<tr>
<td><strong>Organization Process Group (ORG)</strong></td>
<td></td>
</tr>
<tr>
<td>ORG.1 Team boundaries</td>
<td></td>
</tr>
<tr>
<td>ORG.2 Team collaboration</td>
<td></td>
</tr>
<tr>
<td>ORG.3 Team &amp; home organization balance</td>
<td></td>
</tr>
</tbody>
</table>

An example process from the PAM is shown in Table 2 below. It and the other 15 processes have now been
elaborated into a draft PAM. The first review established that a PAM which embodies at least the process dimension is viable. The second and subsequent reviews (V1.2 onwards) will investigate the feasibility of including the capability dimension in the Leadership PAM. While it has been established during the validation of the PRM that each of the outcomes can be substantiated by the presence of artifacts and/or activities, it is not yet clear whether the discernable process indicators can be distinguished with sufficient clarity to establish the capability dimension.

Only by performing a number of assessments using the draft PAM and accumulating data in the work products/activities/conditions section will we know whether a capability dimension is feasible. This work is ongoing.

Table 2: Structure and Content of PAM Example 1

<table>
<thead>
<tr>
<th>Process ID</th>
<th>IND.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Name</td>
<td>Vision</td>
</tr>
<tr>
<td>Process Purpose</td>
<td>The purpose of the vision process is to create and communicate a shared vision in ways that inspires people to realize that vision.</td>
</tr>
<tr>
<td>Process Outcomes</td>
<td>As a result of successful implementation of the vision process:</td>
</tr>
<tr>
<td>(1)</td>
<td>A vision of the goal(s) is created.</td>
</tr>
<tr>
<td>(2)</td>
<td>The vision of the goal(s) is communicated to the team.</td>
</tr>
<tr>
<td>(3)</td>
<td>Commitment by team to the shared vision is gained.</td>
</tr>
<tr>
<td>Base Practices</td>
<td>IND.1.BP1: Create the vision. The leader envisions a desirable future condition. [Outcome 1] IND.1.BP2: Communicate the vision. The leader communicates the vision in a way that creates positive expectation in the team members. [Outcome 2] IND.1.BP3: Commitment to vision by team. The leader obtains commitment from the team members for the realization of the vision, making it a shared vision. (Bernus et al 2006)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work Products/Activities/Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs</td>
</tr>
<tr>
<td>Business goals [Outcome 1]</td>
</tr>
<tr>
<td>Customer requirements [Outcome 1]</td>
</tr>
</tbody>
</table>

Note that the PAM can be used in three possible ways: (a) by project managers to evaluate their own practice, and engage in self-improvement by benchmarking against best practice, (b) by organizations wishing to improve their internal management capability, and (c) theoretically by external agencies wishing to evaluate a potential supplier’s management capability though this would be some distance away since the capability dimension has not been established.

Table 3: Structure and Content of PAM Example 2

<table>
<thead>
<tr>
<th>Process ID</th>
<th>IND.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Name</td>
<td>Objectives</td>
</tr>
<tr>
<td>Process Purpose</td>
<td>The purpose of the objectives process is to create and communicates objective(s) based on the vision and derived goals.</td>
</tr>
<tr>
<td>Process Outcomes</td>
<td>As a result of successful implementation of the objectives process:</td>
</tr>
<tr>
<td>(1)</td>
<td>Practical objective(s) for goal(s) achievement are developed.</td>
</tr>
<tr>
<td>(2)</td>
<td>Positive expectation for achieving objective(s) is encouraged.</td>
</tr>
<tr>
<td>Base Practices</td>
<td>IND.2.BP1: Develop objectives. The leader derives a set of practically worded objectives from the shared vision and subsequent goals that give the team a concrete set of outcomes to achieve. [Outcome 1] IND.2.BP2: Encourage positive expectation. The leader generates an optimistic mindset and outlook in the team towards the achievement of the objectives. [Outcome 2]</td>
</tr>
</tbody>
</table>

Work Products/Activities/Conditions

It is clear that the above example IND.1 demonstrates how a previously intangible concept such as leadership can be broken down into its constituent parts that are relevant both as a generalized model of leadership or as a specific representation of leadership within any given context for a specific task and activity within a chosen organization or industry segment. Furthermore, it is also clear that this definition of leadership as a repeatable and tangible set of constructs, tasks, activities, and decision points within a process and contextual setting can also be broken down further into shared roles and actions by several agents within the organization itself. The Next-Gen EA framework can be used to clearly demonstrate that an iconic leadership activity such as IND.1.BP1 also does not occur in a vacuum and is actually a combination of a series of events, activities, and subcomponents involving a range of actors within the organization.

Therefore, it is clear that this approach supports all of the preconditions required for a coherent management approach as advocated by Saha and Gotze et al as
outlined below. Saha and Gotze are clearly identifying an alignment issue that exists within many complex modern organizations in which the role of managers in ensuring superior resource allocation and optimized decisions is becoming more and more difficult and harder to achieve as the complexity of the internal and external operating environments increases. The Next-Gen EA framework also clearly positions this as the key challenge to be solved if our organizations and management teams are to be seen as effective.

CONCLUSION

This article discusses the issue of effective leadership in organizations and argues the case that (a) leadership is a skill that can be learned, and which can be formalized into a Process Reference Model (PRM) that is intelligible from an enterprise architecture perspective, and (b) PRMs in the strict sense can be redefined to include a new category of PRM called provisionally an Reference Model of Organizational Behavior (RMOB), which focuses on organizational behavior in pursuit of goals.

In support of the case that leadership can be learned is the extensive body of work by influential researchers on leadership like Warren Bennis (1994) and Peter Drucker (1996). This does not ignore the innate charisma of so-called 'born leaders', but makes the case that leadership can be understood and applied more effectively in a practical sense. The Next-Gen EA framework itself clearly supports this approach in its emphasis on the need to further understand the decision-making requirements of modern organizations in order to de-mystify the creative genius approach to modern management practices, particularly given the exponential growth in the range and complexity of decisions now required to be made by modern senior and upper-level managers. It is clear that if a soft concept such as leadership can be de-constructed in this manner such that all of its underlying components can be analyzed and explored, then it would be possible to further de-construct other soft concepts within the modern organization such as culture, innovation, and capabilities. The authors posit that these important concepts must be understood if we are to truly attempt to model and manage all of the important activities that occur within the modern organization.

Importantly, the concept of leadership outlined in this article and the PRM put forward can be further extended within the Next-Gen EA framework to incorporate all of the underlying ICT components and functions that support the specific leadership activities and processes defined within the PRM. The Process Assessment Model (PAM) and specific work examples can be linked to the specific databases, systems, applications, and infrastructure upon which these leadership activities rely for execution and review. Very much like a traditional process hierarchy layer view (Turner et al 2009) a base practice such as 'develop objectives' can be linked to both specific process steps and also the supporting system events, data sets, and application functions required to complete this process. Subsequent papers published within the emerging Next-Gen EA framework will also explore other alternate models of leadership as ‘capability sets’ which derive deep supporting capabilities as ‘vertical slices’ through all of the traditional layers of enterprise architecture models utilizing the PAM model outlined in this article as a key building block within this broader capability set of leadership.

In summary, this article suggests that a process-driven leadership model (PRM) developed by a rigorous design research process and tested in preliminary trials and found to be useful by practitioners and experts is arguably a viable organizational model that should be considered as part of any normal enterprise architecture framework or analysis conducted when seeking to understand the modern organization.

Strengthening this position is the draft PAM that considers initially the process performance dimension, but which will be elaborated in ongoing trials for the inclusion of the capability dimension. So not only is a Leadership PRM and PAM useful in its own right, but it also points to the possibility of developing other reference models for organizational behavior and PAMs covering a range of organizational behaviors in a range of disciplines including but not limited to financial institutions and banks, automotive systems and software, aerospace systems and software, medical device systems and software, IT service management, test process improvement, small and very small enterprises.

This would significantly extend the breadth of application of the standardized approach to process assessment. From an enterprise architecture perspective, a Leadership PRM and its derived PAM are arguably consistent with a generalized view of enterprise architecture as optimized formal descriptions of the elements and relationships including people and technology of an organization in order to achieve their goals (Bernus et al 2006). As such they make a worthwhile contribution to the enterprise architecture domain and support the emerging Next-Gen EA framework which welcomes and supports such lines of enquiry in its desire to further understand and improve the operations and effectiveness of activities within the modern organization.
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REFERENCES


The Open Group Conference
London 2011
May 9-13, 2011

Enterprise Architecture Plenary—Monday, May 9
Evolving EA to Architect the Business
Is viewing the enterprise as “IT and the business” perhaps overly simplistic? What is “the business” such that it has an architecture? What does a business architecture specify? Is the way the IT community thinks and talks about architecture appropriate for, or meaningful to, the business community? If not, how do we engage with the business community? Do architects from the IT community have the right skills and knowledge to architect the business? What skills and knowledge are necessary?
During The Open Group Conference, London we will explore these questions in plenary sessions and more focused tracks.

Jericho Forum® Conference—Tuesday, May 10
The Critical Role of a Digital Identity Ecosystem to Improve Cybersecurity
Effective management of identity at a global level is key to safe and secure use of ubiquitous computing in our global world, where national borders have little or no real meaning for the vast majority of messages winging their way around our globe, and where enterprise business operations are increasingly multinational. We need a digital identity ecosystem that all can use. Such an ecosystem needs to enable every person to look after their digital identity so they can keep it safe, secure, and as private as they wish, using the personas or managing the specific relationships they choose to use.
Can we achieve this? Yes we can! Hear the answers at the Jericho Forum® security conference, part of The Open Group Conference, London, and which is open to all conference attendees.

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Hear the latest ideas on how to build and measure ROI from Cloud Computing. Discuss the best practices and commonly-encountered issues for Cloud deployment. Gain an understanding of the risks as well as the rewards from using the Cloud.

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Market-Driven Enterprise Architecture

Market-Orientation and Enterprise Architecture – a combined operational model, empirical exploration of their joint constructs, and effects on business performance

By Hjalte Højsgaard

Abstract
Throughout the last decade, business leaders have consistently reported their top two challenges as managing change and complexity. Market-orientation and enterprise architecture are two disciplines that lend themselves to helping leaders meet such challenges. Yet, while they have gained separate momentum in academia and practice, they remain poorly integrated and suffer from resulting individual deficits. This article summarizes the findings from an exploratory study (Højsgaard 2010) of what has been entitled Market-Driven Enterprise Architecture (MDEA).

Under the premise that organizations can benefit from both areas, and that they hold joint potential in maximizing business success, the MDEA is developed as a conceptual and practical integration of market-orientation and enterprise architecture. By developing the model into a measurement scale and applying it to a sample of the enterprise architecture community, empirical evidence is found for the presence of MDEA in practice, support of reliability and validity of the MDEA measurement scale, as well as positive and statistically significant relationships to business performance.

INTRODUCTION
Between September 2009 and January 2010, IBM interviewed 1,541 CEOs, general managers, and senior public sector leaders from different sizes of organizations in 60 countries and 33 industries (IBM Corp. 2010). The study was the fourth in a biannual series of Global CEO Studies, aimed at gaining insight into the agendas and actions of global leaders. In 2004, 2006, and 2008, the top challenge for global leaders was identified as the inability to cope with change. In 2010, it was how to deal with complexity.

The report, titled Capitalizing on Complexity, delineates how some standout organizations perform better than others in the midst of complexity. According to one excerpt:
The effects of rising complexity call for CEOs and their teams to lead with bold creativity, connect with customers in imaginative ways, and design their operations for speed and flexibility to position their organizations for 21st century success. (IBM Corp. 2010)

On one side stand volatility and uncertainty in markets. Market dynamics are shifting, which demands that organizations be more alert and agile than ever before to stay aligned with market drivers. On the other side stands the organization itself, and its capacity for managing external forces and opportunities for growth.

The market-connectedness variable of this equation has been dominated by the discipline of market-orientation. This stream of research has found that companies can be more or less connected to certain market constructs, such as customers and competitors, be more or less attentive and responsive to intelligence related to these constructs, and that these attributes have a positive impact on business performance (Narver & Slater 1990; Jaworski & Kohli 1993).

The complexity element of the equation on the other hand has been targeted by the discipline of enterprise architecture. While enterprise architecture has a history of dealing mainly with IT infrastructure, or Information Systems Architecture (Zachman 1987), it is increasingly perceived as a holistic discipline for the enterprise system at large. One example is coherency management, which employs enterprise architecture to advance alignment, agility, and assurance in large complex enterprises, and to design and operate complex enterprises that must continually adapt to changes in mission and market conditions (Doucet et al 2009).

The main objective of this article is to present a preliminary exploration of a joint form of market-orientation and enterprise architecture, which can provide management guidelines to implement both areas in unison and allow businesses to reap advantages from both fields.

METHODOLOGY AND RESEARCH DESIGN
The foundation study for this article was conducted in three stages. First, objective literature review of both market-orientation and enterprise architecture was performed to gain insight into each area’s separate contribution to a joint construct, making possible an initial reconciliation of the areas. Second, five experts were interviewed across market-orientation, enterprise...
architecture, and industrial psychology as a means of uncovering additional nuances and to test for face validity; resulting in a refined model of MDEA. Third, quantitative exploration was performed in another three stages. First, the MDEA model was developed into a measurement scale of 7 dimensions and a total of 35 items, which was also tested for face validity with select experts and refined accordingly. The measurement scale was then deployed in the form of an online survey administered to the enterprise architecture community at large. The collected data, a narrow sample of 73 complete response sets, was then purified and analyzed for reliability and validity. Finally, the constructs were tested for their correlation to subjective measures of performance.

FINDING THE JOINT CONSTRUCT

Implications of Market-Oriented

A precursor to market-orientation is commonly accepted to be Drucker’s formulation that a company’s primary responsibility is to serve its customers (Drucker 1954). This has later been referred to as the marketing concept.

Through the legacy of Drucker’s view, customer-orientation is arguably still the most central component to market-orientation. Another central theme is that of profitability, or simply survival for non-profit organizations. Attention to profitability is important because this is the only true yardstick by which we can measure contributed value; that is, if the value of what we do is greater than the effort it takes to produce it (Drucker 1954). Regardless of whether you’re in a public, private, non-profit, or government organization, the arithmetic still holds. Albeit, profitability is a disputed subject and often claimed to be a consequence as opposed to a direct effort (Kohli & Jaworski 1990), much like eating cannot be said to be the aim of human life (Levitt 1969). Customer focus on the other hand has unanimous support.

‘Outside-in’ is a more recent label used to capture the guiding principles or ‘customer value imperatives’ that make some organizations more effective, and perhaps also more efficient (Day & Morman 2010). Where the marketing concept and outside-in can be referred to as philosophies, market-orientation stands in contrast by dealing directly with its implementation. For example, its corresponding activities and behaviors. Specifically, the triad of generation, dissemination, and responsiveness to market intelligence is the most common delineation of market-orientation attributes from a behavioral viewpoint (Kohli & Jaworski 1990).

In accordance with the marketing concept, intelligence is primarily related to forces that affect the ability to create superior customer value. Hence, attention to customer’s current and future needs is central. Competitor insight is another dimension of market intelligence, but mostly as a function of how to serve customers relatively better (Day 1990). Similarly, market intelligence relates also to political, economical, social, and technological factors, all forces that can influence value creation.

Creation of customer value is the focal point. While the customer is central for this reason, it is equally important to be attentive towards the full breadth of stakeholders that can affect your ability to deliver customer value. Examples of such stakeholders can be your internal decision-makers or influencers, or perhaps external parties in the form of regulatory bodies that either promote or constrain your organization’s product or service offerings. The more you are subject to the influence of stakeholders or are directly dependent of them, the more important it becomes to be attentive to them. You may even want to go as far as considering them customers too.

Intelligence acquisition is key; however, it is important to realize that it is an organization-wide effort and not solely a functional responsibility; for example, that of marketing. Intelligence can appear everywhere and all employees must therefore be attentive to it.

Duly noted, simply acquiring intelligence will not suffice. It must be diffused within the organization, made available where it is of use, and then effectively responded to as appropriate. Dissemination and responsiveness are two sides of the same coin. A dominant theme relating to both is the notion of Inter-Functional Coordination, which pertains to the organization-wide ability to exert orchestrated action towards change (Narver & Slater 1990). It is also the recognition that every employee is an opportunity to create value somewhere in a customer’s value chain (Porter 1985).

The sharing of intelligence, of course, is critical because this is the basis for concerted action (Kohli & Jaworski 1990). In summary, the behavioral view puts a heavy emphasis on information, specifically about customers, competitors, and the broader environment, and how this information is then leveraged to continuously create value by way of effective orchestrated response. In a joint market-orientation and enterprise architecture construct, these provide a valuable starting point.

While behaviors suggest explicit processes, market-orientation is also considered a mind-set of the organization. In essence, “[market-orientation] is the organization culture … that most effectively and efficiently creates the necessary behaviors for the creation of superior value for buyers and, thus, continuous superior performance for the business” (Narver & Slater 1990). As such, culture is here seen as the guiding logic that not so much determines whether
we are doing things right, but if we're doing the right things – at the individual employee level. The implementation of instrumental value creating processes is something, but it is the mindset of employees that determines the input and output of these. Towards customers as well as other stakeholders, the mindset of the individual employee is what effectively governs the continuity of appropriate service levels and attention to changes in needs.

In other terms, and in accordance with Schein's cultural taxonomy (1984), market-orientation is to be defined by the values, norms, and artifacts that influence employee behaviors in favor of the outside-in philosophy.

In studying these cultural building blocks, values have been found to influence the presence of norms, while norms positively predict the presence of artifacts. Norms, however, cannot be directly tied to desired market-orientation behaviors unless the corresponding artifacts are also present (Homburg 2000).

Additionally, Homburg & Pflesser (2000) adhere to a cultural symbolic perspective, which recognizes that organizational attributes can take different symbolic meaning within different subcultures (Hatch 1997). Hence, a cultural analysis needs also to appreciate contextual interpretation of symbolic meaning.

In summary, the cultural market-orientation view lends credence to the notion that an market-orientation is not simply functional, but also psychological. However, this does not refute the idea of working with it in an instrumental fashion. Concrete building blocks for a joint market-orientation and enterprise architecture construct are specifically found in values, norms, artifacts, and symbols and how these influence employees and employee behaviors in alignment with outside-in principles.

**Implications of Enterprise Architecture**

Where market-orientation has older roots and has been driven much by academia, enterprise architecture is not only younger but has been developed to a greater extent by practitioners and organizations in situ, responding to new needs and challenges presented by the swift late 20th century advancements in technology and the coming of the Information Age.

Zachman's Framework for Information Systems Architecture (1987) has arguably had the same effect on the delineation of many enterprise architecture frameworks, processes, and taxonomies, as the marketing concept has had on market-orientation. The potential for I/S architecture to become architecture for the enterprise was realized from the beginning. However, the I/S legacy has been dominating the discipline as a consequence of the paradigmatic starting point.

A classical enterprise architecture framework example is found in Bernard’s (2005) position on enterprise architecture as an integrated strategy, business, and technology perspective. The EA³ cube model that embodies this meta-structure is divided into a vertical five-level queue typical of classical enterprise architecture (see also TOGAF 2009); that is, goals and initiatives at the top, followed by processes and services, data and information, systems and applications, and finally network and infrastructure. These levels and components can be more or less connected vertically and horizontally across different lines of business.

In contrast, Ross et al (2006) focus not as much on the framework of enterprise architecture but how some standout businesses in general are characterized by a capacity to build and leverage a 'digitized foundation for execution'. A key integrating finding from their research is the concept of the core operating model, which illustrates leadership commitment to a certain operating logic. Via this logic, management decidedly determines the degree of business process standardization and integration necessary to satisfy customer needs. Where customer needs are highly diverse across market segments and the business is organized accordingly, standardization and integration may not be beneficial. Enterprise architecture is here seen purely as the identification of the processes, data, technologies, and customer interfaces that bring the operating model from vision to reality (Ross et al 2006).

Doucet et al (2009) introduce yet another aspect of enterprise architecture worth highlighting. Like in EA as Strategy, instead of seeing enterprise architecture as merely a detailed blueprint of systems, data, and technology, enterprise architecture is a business vision and a source of competitive advantage. It is not the outcome, but the means of achieving agility, alignment, and assurance. Enterprise architecture scopes can be holistic, advocating for an integrated strategy, business, and technology perspective, but the leap forward in ensuring its success is the degree to which an organization is oriented towards such integration. The organic, ever-greening enterprise architecture view of the embedded mode in Coherency Management (see Doucet et al 2009) leads us to believe that enterprise architecture is essentially rooted in a cultural foundation, much as market-orientation behaviors have been proven to root in organizational culture.

Hence, when deploying enterprise architecture, it is all the more important to consider the influence of culture on organizational strategy, operations, infrastructure, performance, not to mention its fit with the overall architectural effort.
In summary, enterprise architecture contributions are found mainly in the following arenas. The original forms of enterprise architecture as descendants of I/S give a modular view of the enterprise system and a taxonomy that can serve as a structural guideline in a joint model. The I/S legacy is perceived as an asset for this same reason, and the components of enterprise architecture that relate specifically to IT should be maintained in preservation of the strengths that lie in this background. However, a joint model needs to take a different starting point than IT, one that is similar to that of market-orientation and enterprise architecture as strategy, which come from an outside-in perspective. Additionally, a joint model need not only recognize the structural advantages from enterprise architecture, but also the cultural component that appears from the embedded mode of enterprise architecture similar to the cultural manifestation of market-orientation.

In view of both market-orientation and enterprise architecture contributions, Figure 1 presents an abridged conceptual mapping of how the two disciplines coalesce.

![Figure 1: Conceptual Domains – Potential for Market-Driven Enterprise Architecture](image-url)
MARKET-DRIVEN ENTERPRISE ARCHITECTURE

Expert interviews conducted on the back of this initial understanding were predominantly in support of the logic behind the joint concept and act as an early indicator of face validity. Discussions of the inter-relationships yielded further insight into the key dimensions. Figure 2 depicts the final product of the preceding synthesis.

Outside-In Thinking and Expanded Periphery

As described in some detail previously, market-orientation is to a great extent rooted in the culture of an organization. It boils down to the belief system, and so the mindset and behavior of every single employee in every function, at all levels. This particular characteristic of market-orientation has broadly been captured in the phrase ‘outside-in thinking’ (Day & Moorman 2010), which is thought to be a suitable descriptor of the mindset-factor in isolation. Behavior, and thereby culture, can best be incentivized by means of reward systems, and so ties together with the structure and operational systems of the enterprise. As such, the membrane that wraps the entire MDEA construct depicts the depth of outside-in thinking. The more outside-in thinking is immersed, the more alignment there will be around its core principles: the sensing of customer value, and realization of oneself as a networked relational entity in the context of an expanded periphery. Since outside-in thinking denotes a mindset, the principles, or imperatives, of customer value and relationships apply not just to what is ‘outside’ in the absolute sense. The term is expansive, why it is considered helpful to think of customers and relationships as both external and internal, direct and indirect. While not all employees have direct contact with external customers, most employees will have some form of internal customer. Transversely, employees who serve mostly internal customers and stakeholders – for example, support functions such as IT – must understand how their contributions ultimately serve external customers, vis-à-vis their recognition of themselves as part of a greater value network (Porter 1985).

Figure 2: Market-Driven Enterprise Architecture
Expanded periphery, stippled around the cube, emphasizes the borderline that inevitably exists between the organization and its surroundings. However, this borderline can be more or less open or closed in terms of relationships and inter-dependencies with external constituents.

**Architectural Components**

Experts interviewed generally agreed with the hierarchy of influence that should drive architectures from the top down. In accordance, the architecture components have been divided into three levels: Strategy and Leadership, Business Operating Logic, and Operating Capabilities. Each of these levels contains a subset of constructs that help define the integrated market-orientation and enterprise architecture model.

**Strategy & Leadership**

Market drivers, strategic drivers, and leadership commitment constitute this level.

Market drivers depict the explicit intelligence activity directed at understanding market trends. Strategic drivers contrast with market drivers by being the firm’s strategic sense-making of its intelligence, along with an understanding of the firm’s position in its broader value network. As such, strategic drivers are derived from the firm’s understanding of its market in synthesis with how its leadership envisions its continued strategic position.

Without exception, leadership commitment was emphasized in expert interviews as a key to success with both market-orientation and strategic enterprise architecture, but it must be genuine and followed through with adamancy and consistency. In contrast, organizations applying management concepts such as a ‘theme of the year’ may develop practices, but it is not incorporated into the fabric of the organization. Speaking specifically for market-orientation, the real examples of success are seen in organizations where it becomes second nature because it is integrated into its core value system and continuously drummed into the employee mindset by senior management (Slater, Interview 2010). Put differently: “If you don’t take the leadership role, then the organization quickly figures out it’s not a priority.” (Day, Interview II 2010).

**Business Operating Logic**

This level comprises the operating model as defined by Ross et al (2006), and the core business processes needed to operationalize the strategic vision of the firm. If the operating model is designed according to principles of outside-in thinking, and in consideration of market trends and the firm’s broader value network, then core business processes and operating capabilities must inherit accordingly.

**Operating Capabilities**

Influenced by the top two levels, an operating capability is here defined to be an ability possessed by the enterprise as a whole, by sub-organizations, individuals, or by systems, to deliver goods and services to customers in accordance with its operating logic. Influenced directly from market-orientation and enterprise architecture, employees and employee behaviors stand alongside systems design, IT and business services as two categorical capability centers generically required by organizations.

Values, norms, artifacts, and symbols are all immanent cultural influencers of capabilities as well as explicit building blocks expressed by the architectural effort. Artifacts carry meaning in both the cultural sense and the common use of the term as an enterprise architecture work product.

**Strategic and Operational Alignment**

Strategic alignment and operational alignment distinguishes, by way of simple awareness and agreement with strategic goals and objectives, how these goals and objectives are manifested in processes, capabilities, and actual work products.

Metrics, incentives, and governance systems are found to be strong precursors of achieving alignment. Clear and frequent communications that are easily understood at all organizational levels also carry significant weight. In addition to these top-down elements, expert interviews also suggested that bottom-up pro-activeness towards engaging in and understanding strategies is a prerequisite to vertical alignment (Bernard, Interview 2010).

**Cross-Functional Coordination & Cultural Strength**

In addition to cross-functional coordination, interviews brought attention to cultural strength as a parallel form of horizontal alignment. A theoretical underpinning behind this characteristic can be found in the paradigms of Martin & Meyerson (1988), who introduce differentiation and ambiguity as alternatives to a fully integrated culture. The differentiation paradigm stresses inconsistencies, absence of organization-wide consensus, and non-leader sources of cultural content. Ambiguity, on the other hand, is characterized neither by harmonious nor conflict-full cultures. Instead consensus, dissensus, and confusion coexist, making it difficult to draw cultural and sub-cultural boundaries. The paradigms are helpful in terms of how we understand the presence of a certain culture and seek to grasp it as a...
capability with influence on the organizational ability to achieve goals effectively and efficiently. A strong culture denotes one in which all members of the organization are fully aligned around its values. Such a culture requires less governance because employees intuitively do ‘what is right’. However, a weak culture, one of differentiation or ambiguity, necessitates many control mechanisms to enforce the vision, goals, and objectives of the organization. Hence, a strong culture is considered more efficient than a weak culture. Moreover, cultural compatibility with the architectural efforts can determine success or failure and the resources required to govern and rectify ongoing evolution.

**EMPIRICAL EXPLORATION OF MDEA CONSTRUCTS**

To test for MDEA behaviors in practice, the MDEA model had to undergo significant delimitations. Seven dimensions form the final MDEA measurement scale. Outside-in thinking towards internal customers, external customers, and the broader environment captures the outbound orientation, whereas strategic alignment, operational alignment, cross-functional coordination, and cultural strength capture core elements relating to internal orchestration and coherency, vertically and horizontally. Each dimension holds five items in the form of behaviors, such as: “In my workgroup ... we discuss the purpose and effectiveness of how our activities satisfy the needs of our external customers”.

Under a test administration targeting enterprise architecture professionals worldwide, a total of 73 complete and valid responses answered to the 35 statements on a 7-point Likert scale. 65 of the 73 fell accurately within desired enterprise architecture groups as either CIO, CTO, Chief Enterprise Architect, Senior Enterprise Architect, Enterprise Architect, Business Architect, IT Architect, Governance Architect, or Enterprise Architect Consultant. 13 countries were represented, of which Denmark and USA accounted for respectively 34% and 26%.

**Reliability and Validity of MDEA Measurement**

Measures of reliability and validity of the MDEA instrument are required to depict the presence of MDEA behaviors within the acquired sample. Cronbach’s coefficient alpha for internal consistency was used to measure reliability, for which a benchmark is the recommended 0.70 for exploratory research (Nunnally 1978). Reliabilities for all seven subscales were found to meet this criteria: For outside-in constructs – internal customers, external customers, and the broader environment, reliability scores were 0.82, 0.87, 0.77, respectively. For vertical alignment constructs – strategic alignment and operational alignment, reliability scores were 0.83 and 0.86. Horizontal alignment constructs – cross-functional coordination and cultural strength were 0.77 and 0.85. Hence, all scales demonstrate acceptable to good reliability. The reliability of the 35-item linear combination was 0.95.

It must be noted that while a high value for Cronbach’s alpha indicates good internal consistency of the scales, it does not provide insight to the dimensionality. Exploratory Factor Analysis (EFA) would have been appropriate to test for uni-dimensionality. However, with the sample size yielding only a subject-to-item ratio of 2:1, this would not have been considered feasible.¹

As a means of validity testing, nomological validity tests were conducted against expected inter-relationships between the subscales. Summarized in Table 1, a total of four propositions were tested, including an expected relatively lower correlation between two subscales (proposition 4).

<table>
<thead>
<tr>
<th>Proposition</th>
<th>Regression Equations</th>
</tr>
</thead>
<tbody>
<tr>
<td>P₁: Higher Cultural Strength leads to higher Cross-Functional Coordination.</td>
<td>[ Y_1 = b_1 X_1 + e ]</td>
</tr>
<tr>
<td>P₂: Higher attention to Internal Customers leads to better Strategic and Operational Alignment and Cross Functional Coordination.</td>
<td>[ Y_2 = b_2 X_2 + e ]</td>
</tr>
<tr>
<td>P₃: Higher general Outside-In Thinking is positively related to higher general Coherency.</td>
<td>[ Y_3 = b_3 X_3 + e ]</td>
</tr>
<tr>
<td>P₄: The correlation between OIT towards the Broader Environment and Cultural Strength is not expected to be as high as those yielded by the other propositions.</td>
<td>[ Y_4 = b_4 X_4 + e ]</td>
</tr>
</tbody>
</table>

Where, \( Y_1 \) denotes the mean score on cultural strength, and \( X_1 \) denotes the mean score on cross-functional coordination. \( Y_{2,1} \) to \( Y_{2,3} \) denotes the mean score on strategic alignment, operational alignment, and cross-functional collaboration respectively, and \( X_{2,1} \) to \( X_{2,3} \) all denote outside-in thinking towards internal customers. \( Y_3 \) denotes the aggregate mean score of all outside-in scales, and \( X_3 \) denotes the aggregate mean score of all remaining scales, related to coherency. Finally, \( Y_4 \) denotes outside-in thinking towards the broader environment, and \( X_4 \) denotes cultural strength.

Table 2 below summarizes the findings.

¹ Best Practices in Exploratory Factor Analysis (Costello & Osborne 2005) has documented subject to item ratios of 2:1 producing highly uncertain results: only 10% of samples resulting in correct factor structures versus 60% for 10:1 and 70% for 20:1, 15% with Heywood cases (factor loadings greater than 1.0, an impossible outcome), and significant (1.93) number of items misclassified on wrong factors.
Table 2: Summary Outcomes of Nomological Validity Tests

<table>
<thead>
<tr>
<th>Proposition</th>
<th>b</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>P₁</td>
<td>***.56</td>
<td>.47</td>
</tr>
<tr>
<td>P₂₁</td>
<td>***.71</td>
<td>.51</td>
</tr>
<tr>
<td>P₂₂</td>
<td>***.62</td>
<td>.36</td>
</tr>
<tr>
<td>P₂₃</td>
<td>***.56</td>
<td>.49</td>
</tr>
<tr>
<td>P₃</td>
<td>***.67</td>
<td>.53</td>
</tr>
<tr>
<td>P₄</td>
<td>**.33</td>
<td>.12</td>
</tr>
</tbody>
</table>

*** p < .001, ** p < .01, * p < .05

It is evident from these tests that the expected relationships all appear to hold, and at very strong and significant levels. Thus, there is reason to believe that the scales are valid. Furthermore, the findings are supported by the relatively lower correlation found in proposition 4.

Implications of Reliability and Validity Tests

Statistical reliability and validity are here a demonstration of the MDEA construct’s presence in practices within the sample group, and the conformance of behaviors of these constructs with the expectations formed by the literary and qualitative explorations. Conversely, if no reliability and validity had been found, we could not be sure that the developed concepts have any root in practice.

MDEA and Organizational Performance

Both enterprise architecture and market-orientation have made claims at improving business performance. Similarly, tests can be run against how MDEA behaviors affect performance metrics.

Table 3: Performance Correlation with Total MDEA Score

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable: Total MDEA Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
</tr>
<tr>
<td></td>
<td>Full Sample</td>
</tr>
<tr>
<td>Total Mean Performance Score</td>
<td>.02*** / .01** / .02*</td>
</tr>
<tr>
<td>Overall Performance</td>
<td>.02*** / .01* / ns</td>
</tr>
<tr>
<td>Innovation</td>
<td>.02*** / .03*** / ns</td>
</tr>
<tr>
<td>New Product Success</td>
<td>.01* / ns / .02*</td>
</tr>
<tr>
<td>Customer Satisfaction</td>
<td>.01* / ns / ns</td>
</tr>
<tr>
<td>Sales Revenue Growth</td>
<td>.02*** / .01* / .02*</td>
</tr>
<tr>
<td>Profit Growth</td>
<td>.02** / .01* / .02*</td>
</tr>
<tr>
<td>Profitability</td>
<td>.02*** / .02* / .02**</td>
</tr>
</tbody>
</table>

Since the practice of enterprise architecture was a constant for all participants, the total sample was split into two subgroups depending on the organization’s years of enterprise architecture as a proxy of enterprise architecture maturity. In sample 1, enterprise architecture had been practiced less than two years, and in sample 2 enterprise architecture had been practiced more than two years. 19% of the latter group had been practicing enterprise architecture for more than ten years.

On the enterprise architecture side, Weill & Ross (2009) report that firms with a strong digitized platform have 17% greater alignment between needed capabilities and the capabilities implemented, which is positively correlated with profitability. They also report that these firms have relatively higher operational efficiency (31%), customer intimacy (33%), product leadership (34%), and strategic agility (29%).

On the market-orientation side, the most cited studies of market-orientation-performance linkage are those of Narver & Slater (1990) and Jaworski & Kohli (1993), each of which document positive and significant correlations to overall performance by using primarily judgmental measures. An extensive meta-analytic review of market-orientation-performance literature conducted by Kirca et al (2005) sheds further light on the variety of outcomes proven by the literature: Overall business performance, profitability, sales, market share, quality, customer loyalty, customer satisfaction, innovation, new product performance, plus organizational outcomes such as organizational commitment, team spirit, customer orientation, and job satisfaction.

It is here of greatest interest to examine the relationship of the MDEA model in its entirety with total business performance, whereas the performance correlations of the individual MDEA dimensions are of lesser concern. The conducted survey collected judgmental measures of performance on a total of seven items: overall performance, innovation, new product success, customer satisfaction, sales revenue growth, profit growth, and profitability.
In preparation for regressions, the dataset was normalized to correct for a general skewness to the left.

**MDEA Performance Correlations**

Table 3 summarizes the results of the simple performance regressions using the total MDEA score as the single predictor variable against each of the performance variables for the full sample as well as the two subsamples.

Although modest, MDEA scores are seen to positively correlate with all performance outcomes at the 99.9% confidence level. While individual coefficients are small, R^2 suggests that 30% of the variance in mean performance scores is explained by performance on the MDEA scales. Hence, the outcomes support the hypothesis that strong MDEA behaviors in enterprise architecture practices yield relatively higher competitive advantage, as measured by the reported mean score of all subjective performance indicators. It should further be noted that sample 2, enterprise architecture practice > 2 years, generally exhibited greater correlation coefficients than sample 1, which is also consistent with expectations. Of the individual performance measures, MDEA and innovation yielded the highest and most significant coefficient estimate (b = .03, p < .001), although no significance was seen for sample 2. Customer satisfaction, however, produced the lowest correlation and with least significance.

In consideration of these findings, it is important to stress that the constructs themselves are not expected to ‘cause’ advantage, but rather they are predicted to collectively contribute to the development of this latent intangible construct (Hult & Ketchen 2001).

**MANAGERIAL IMPLICATIONS**

The discussions and analyses have primary application as a platform for continued research. However, the findings also have direct managerial utility. Most organizations are arguably, at least in their vision, placing greater emphasis on customer focus and regard it as a strategic priority. The MDEA model provides a strategic approach to enterprise architecture from a market-oriented viewpoint. It emphasizes the organization-wide practical priority of changes in market demands as well as complexity, and it proposes a logical framework for understanding the linkages and operational components of that. Furthermore, from the basis of the vast research in the market-orientation-performance link in particular, advantages appear to favor those firms with strong MDEA performance.

What should be clear from the present research is that enterprise architecture is far from being solely a concern of IT. It is a long-term-oriented management approach for the design of organizations that are strategically, operationally, and culturally coherent. Conversely, market-orientation is not only a marketing concern, and neither is it just strategic. It is a set of core principles that must be immersed in every aspect of the organization. Together, market-orientation and enterprise architecture form an integrated view on the organization with regards to two of the topmost challenges facing business leaders. The MDEA model has delineated exact factors that can encourage desired implicit and explicit behaviors, and leadership can directly influence these factors.

**ABOUT THE AUTHOR**

Hjalte Hojsgaard holds an MSc in Business Administration and Computer Science from Copenhagen Business School, Denmark, and an MBA in International Management from MIIS, California. Hjalte has professional experience within strategy, architecture, and processes, as well as development of market-driven organizations.

Interest in the complete foundation study behind this article may be directed to hjalte@hhprojekt.dk.

**REFERENCES**


Article

Better Business-IT Alignment Through Enterprise Architecture: An Actor-Network Theory Perspective

By Anna Sidorova and Leon A. Kappelman

Abstract
Enterprise architecture has attracted the attention of information systems (IS) academics as well as information technology (IT) and business professionals. While enterprise architecture has been proposed as a solution to the business-IT alignment problem, there is little theoretical basis that would explain how enterprise architecture work can lead to better alignment. Here we draw on the Actor-Network Theory (ANT) to highlight the role of enterprise architecture in achieving and sustaining such alignment. Specifically, we argue that enterprise architecture work helps to achieve agreement and thus alignment of the interests of internal actors within the context of enterprise interests and inscribes such agreement into architectural artifacts. Such artifacts can then be used in negotiations with external parties, such as IT vendors, thereby protecting the interests of the enterprise. Enterprise architecture work is also likely to reduce the likelihood of members of the enterprise, such as IT staff, from forming close ties with external parties, such as IT solution vendors, at the expense of the interests of the enterprise. We argue that this would result in stronger business-IT alignment. We conclude by highlighting two important goals of enterprise architecture as viewed through the ANT lens: (1) to help achieve an alignment of interests within the enterprise, and (2) to serve as a tool for protecting the interests of the enterprise in internal and external negotiations. These in turn point to the importance of the soft skills of enterprise architects and the need for clear and readily understandable enterprise architecture artifacts.

Keywords
Enterprise Architecture, Actor-Network Theory, Politics, IT Architecture, Socio-Technical, Business-IT Alignment, Strategy

“Architecture is politics.” – Mitch Kapor

INTRODUCTION
As IT permeates every aspect of the modern enterprise, it is increasingly important to ensure that IT adequately supports operations and that IT decisions are in alignment with the organization’s objectives. In fact, achievement of business-IT alignment has been for decades consistently cited among the top concerns of IT executives (Luftman & Kempaiah 2007). The increasingly complex IT environment includes not only the assorted amalgamation of hardware, software, and infrastructure within the organization, maintained and managed by IT staff housed in different departments and business units, but also numerous vendors, contractors, and outsourcing partners, as well as the larger and more complex, and often even more disparate, organization itself. In such an environment, achievement of business-IT alignment is particularly difficult, and maintaining it even harder.

Focusing on enterprise architecture has been proposed as a path towards improved capabilities to align IT with ‘the business’ (Kappelman 2007; Luftman & Kempaiah 2007; Ross 2003). As such, enterprise architecture has gained importance in the eyes of academics and practitioners alike. The recognition of enterprise architecture by academics is reflected in the inclusion of enterprise architecture as a required course in the latest revision of the IS model undergraduate curriculum (Heikki et al 2009). Yet most enterprise architecture practice and research is focused on solving largely technical issues, such as integration among systems, and is usually viewed as belonging exclusively to the IT domain (Salmans & Kappelman 2010). Alignment, on the other hand, by definition lies at the intersection of IT and business, and usually is viewed as a mainly managerial and socio-technical issue. Therefore, the potential plethora of methods, practices, models, tools, and mechanisms for focusing enterprise architecture on the broader context of the enterprise in order for IT to better align for the achievement of organizational objectives remains not well understood or operationalized.

In this article we use Actor-Network Theory (ANT), a theoretical framework used to study socio-technical
phenomena, to bridge the gap between technical and socio-political issues, and to highlight the socio-political nature of enterprise architecture. We propose that such a view illuminates the role of enterprise architecture and the importance of the ‘softer’ skills of enterprise architects in achieving business-IT alignment. Moreover, a greater socio-technical awareness can help enterprise architecture practitioners better leverage their competencies in achieving such alignment, as well as other business and/or technical objectives. In the following sections we briefly review mostly North American research and development on enterprise architecture as well as key principles and concepts of ANT that are most instrumental in understanding the nature of enterprise architecture and the role of enterprise architects. We then analyze the architectural process and the enterprise from an actor-network point of view. Based on this analysis we propose how enterprise architecture can be used to better achieve business-IT alignment.

ENTERPRISE ARCHITECTURE IN PRACTICE AND RESEARCH

The conceptual foundations of enterprise architecture evolved from academic and practitioner, public and private, for-profit and not-for-profit, as well as federal, state, and local government efforts. The data modeling techniques and system analysis, design, and development methods developed and promulgated in the 1970s and 1980s by ideas like Ed Yourdon’s structured analysis and design methods (DeMarco 1978; Yourdon 1975), Peter Chen’s (1976) entity-relationship diagrams, and Clive Finkelstein’s Information Engineering (Finkelstein & Martin 1981) laid some of the foundations. The importance of enterprise architecture and its role in guiding managerial and technological decisions has long been acknowledged by business and IT professionals from industry and governmental institutions. Architecture was fundamental to IBM’s Business Systems Planning (BSP) systems development methodology from its beginnings in the early 1970s. John Zachman used concepts from classical architecture in the development of his Framework for Information Systems Architecture which was used inside IBM in the early 1980s in conjunction with BSP, first published externally in 1987, and appears to have evolved into a comprehensive ontology of the enterprise and its socio-technical architecture (Zachman 1987, 2010; Zachman & Sowa 1992).

The US Defense Department (DoD) initiated its Technical Architecture Framework for Information Management (TAFIM) project in 1992 and developed the Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Architecture Framework in the mid-1990s to promote interoperability across systems and services. The Open Group Architecture Framework (TOGAF®) Version 1 released in 1995 was based on the TAFIM (Hagan 2004). Steven Spewak published Enterprise Architecture Planning in 1993 providing guidance particularly for federal agencies to develop an enterprise architecture. Meanwhile, the DoD developed the Joint Technical Architecture (JTA) in 1997 to facilitate the flow of information in support of warfare and C4ISR evolved into DoDAF (DoD Architecture Framework).

Responding to the need for guidance as federal agencies began to create their enterprise architectures in compliance with a 1996 legislative mandate to do so, the CIO Council of the Office of Management and Budget (OMB) sponsored the development of the Federal Enterprise Architecture Framework (FEAF) (CIO Council 1999). OMB and the General Accountability Office (GAO) published A Practical Guide to Enterprise Architecture in 2001 to provide guidance on setting up an enterprise architecture program and for developing and maintaining an enterprise architecture (CIO Council 2001). Around that time GAO also developed an enterprise architecture Maturity Model and an initial set of measures to assess enterprise architecture progress and practices (GAO 2003). Many groups offer various kinds and qualities of enterprise architecture-related trainings and certifications, both Gartner and Forrester have enterprise architecture research practices, and many vendors offer enterprise architecture-related conferences, services, and products. A Society for Information Management (SIM) EA Working Group (SIMEAWG) was formed in October 2006 and published its Guide to Enterprise Architecture three years later (Kappelman 2010).

Throughout the 1990s the term ‘enterprise architecture’ appeared in a number of academic publications; however, such studies either adopted a black-box3 approach to enterprise architecture (El Sawy et al 1999) or treated enterprise architecture as a close synonym for Information Architecture (Miller 1997). Similarly, the enterprise architecture course description in the new model curriculum for IS undergraduates is mostly concerned with applications, infrastructure, and operations4 (Heikki et al 2009). Academic interest in

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3 “The word black box is used by cyberneticians whenever a piece of machinery or a set of commands is too complex. In its place they draw a little box about which they need to know nothing but its input and output.” Bruno Latour, 1987, Science in Action, Harvard University Press, Cambridge, MA, pp.2-3.

4 The enterprise architecture course description states that: “This course explores the design, selection, implementation, and management of enterprise IT solutions. The focus is on applications and infrastructure and their fit with the business. Students learn frameworks and strategies for infrastructure management, system administration, content management, distributed computing, middleware, legacy system integration, system consolidation, software
enterprise architecture continued into the 2000s with enterprise architecture being proposed as a solution to alignment and IT integration challenges. In her 2003 article Creating a Strategic IT Architecture Competency: Learning in Stages, MIT’s Jeanne Ross concluded that: “the payback for enterprise IT architecture efforts is strategic alignment between IT and the business” (p.43). Jerry Luftman’s assessment of IT-business strategic alignment maturity included the degree to which the enterprise architecture is integrated (Luftman & Kempaiah 2007). Under the leadership of Syracuse University’s Scott Bernard, the Association for Enterprise Architects published the Journal of Enterprise Architecture (www.aajournal.org) in 2005. Kate Kaiser led a SIM-sponsored study of 104 CIOs to determine their skill needs for the decade and found much emphasis on the business domain with enterprise architecture ranked at the top of the business domain skills (Collet 2006). Ross, with her MIT colleagues Peter Weill and David Robertson, released the book Enterprise Architecture as Strategy in 2006. Yet, in spite of the practitioner interest and academic publications related to enterprise architecture (e.g., Venkatesh et al 2007; Ross et al 2006; Ross 2003) little theoretical understanding exists about what enterprise architecture is and how it can be developed, managed, and used.

Moreover, there is no one agreed-upon conceptualization of enterprise architecture or even of the term ‘architecture’ when applied to enterprises, while architecture is a very precise concept when applied to buildings or manufactured goods. For example, while some treat enterprise architecture as a description of the status quo, others subscribe to the view of enterprise architecture as a set of standards and blueprints for the future enterprise, and some include both the as-is and to-be along with the transition plan between those present and future states. Similarly, some simply equate enterprise architecture with IT or technology architecture, while others conceptualize enterprise architecture as enterprise-wide requirements, and some see enterprise architecture as providing an all-encompassing model or approach for planning and running the organization. Broader conceptualizations of enterprise architecture seem to parallel Senge’s (1990) idea of a ‘learning organization’ with enterprise architecture’s system thinking approach, use of models, team learning, and shared vision providing management with all the knowledge about the enterprise and a shared ‘language’ to align the ideas of strategy and with the reality of implementation (Simons et al 2010; Kappelman 2007). The implications of such a shared language to business-IT alignment are profound since in order to achieve alignment of the things in an enterprise (such as goals, systems, people, machines, raw materials, and so on), those who manage them must first achieve alignment of their thinking.

Nevertheless, for the most part enterprise architecture-related writings are either very technical in nature, failing to take into account broader organizational and social issues, or are empirically-based focusing on specific enterprise architecture practices. Furthermore, the focus among many practitioners and academics is on doing enterprise architecture, or even more narrowly only on designing and building information systems. Thereby they confound the product and process of enterprise architecture, often with a focus on physical implementation while ignoring logical design objectives and basic principles of architecture. The presence of such a multiplicity of views suggests that enterprise architecture is (1) an immature and (2) highly complex dynamic construct (perhaps understandably so since enterprises are highly complex and dynamic) that is (3) finding traction and value in many theoretical and practical areas and that (4) encompasses the technical and social, the present and future, as well as the logical and physical dimensions of organizations.

We believe that our understanding of the practice of enterprise architecture and its role in achieving business-IT alignment can be significantly sharpened through the lens of a socio-technical process theory, which could also highlight the social and political processes associated with enterprise architecture. Such an approach may also be beneficial since at least to some significant extent enterprise architecture is about requirements and that there are: “complex patterns of interaction among users and analysts in defining requirements” (Davis, 1982 p.5). In the next section we review some key concepts from ANT, which we believe can be helpful in the development of a theory-driven view that goes beyond a narrow technical or IS/IT architecture definition of enterprise architecture.

OVERVIEW OF ANT

ANT was originally proposed by Michael Callon and Bruno Latour in the early 1980s to describe the creation and evolution of socio-technical networks (Callon & Latour 1981). The theory was later extended and formalized (Latour 2005; Law 2000). In its original conceptualization the theory focused on ‘actors’ defined as: “any element which bends space around itself, makes other elements dependent upon itself and translates their will into the language of its own” (Callon & Latour 1981 p.286). This translation of interests leads
to the creation of networks of aligned interests, or actor-networks.

Later extensions of the theory focused on the dynamics of relationships among such actors and actor-networks (Law 2000). The term ‘actor-network’ reflects their dual nature as actors and as networks of actors. Despite being networks comprising multiple heterogeneous actors, such actor-networks are often viewed by external observers as individual actors and their coherency (the internal alignment of interests) is taken for granted. This phenomenon is referred to as ‘punctualization’ (Monteiro 2000). The heterogeneous nature of actor-networks usually becomes obvious to external parties when misalignment within the network occurs.

The process of actor-network creation is central to ANT, and is particularly relevant to the process of building business-IT alignment via enterprise architecture work. This process, referred to in ANT literature as the process of translation, is detailed in the study of scallops and fishermen (Callon 1986). The translation process is defined from the point of view of a focal actor and its goal is to align the interests of other actors and actor-networks with the interests of the focal actor. The translation process is a multi-step process involving problematization, interessement, and enrollment stages (Callon 1986). Once the alignment of interests is achieved, it is often inscribed into technical artifacts such as a computer application or a production line, or other elements that are difficult to change, such as a legal contract (Latour 1992). Such an inscription process may, in turn, require the recruitment of yet more actors such as programmers, engineers, or lawyers, and consequently may lead to the need to consider their interests.

ANT does not make an a priori distinction between human and non-human actors, thereby making it appropriate for examining entities that comprise social and technical elements, such as information systems or organizations. Therefore, technical artifacts that are used or created as a part of the inscription process (such as software, computer hardware, requirements documents, or other enterprise architecture artifacts, and so on) can also be viewed as actors. ANT takes a radically relational approach to defining actors, where: “entities … achieve their significance by being in relation to other entities” (Law 2000 p.4). For example, the student registration system can only be defined as such when placed within a larger network of an educational institution.

Because of the nebulous difference between individuals and collectivities (actors and actor-networks), ANT helps bring together different level of analysis, from individual, to group, to organizational, as well as including people, places, and things as deemed necessary. This is particularly useful in the study of such multi-faceted phenomena as business-IT alignment since it encompasses all those levels. In addition, its ability to treat technical and social actors alike made it attractive for studying problems related to the development and use of information systems (Walsham 1997). Among the early applications of ANT in IS research, Walsham and Sahay (1999) used ANT concepts for analyzing the case of GIS implementation in India. ANT was used to examine a variety of IS-related phenomena including the causes of failure of a large business process change initiative (Sarker et al 2003) and to examine issues related to standardization in IS (Hanseth et al 2006). ANT was also used for exploring a variety of organizational and business issues (e.g., Newton 2002). In the next section we apply concepts of ANT to understand better how enterprise architecture can help in the achievement of business-IT alignment.

**ACTOR-NETWORK VIEW OF ENTERPRISE ARCHITECTURE**

**Enterprise as an Actor-Network**

A modern enterprise represents an obvious example of an actor-network. While most organizations are commonly viewed by outsiders as distinct legal entities with strategies, legal representations, even unique identities, members of those organizations view them as constantly changing collections of people, objects, rules, ideas, politics, and so on (Law 2003). Let us follow the formation of a hypothetical enterprise through multiple translation processes (see Figures 1a, 1b, and 1c). Let us further assume that at the start of this enterprise there are two important actor-networks: the entrepreneur in possession of ideas and technology, and an investor in possession of capital and other resources. The enterprise actor-network is created as a result of a successful negotiation process between the two actors. In ANT terminology, such negotiations involve a translation process whereby the interests of the entrepreneur and the investor become aligned.

![Figure 1a: Creation of Enterprise AN](image)

To ensure the stability of the agreement (alignment) achieved during the translation process, the aligned interests are inscribed into a number of artifacts, such as a business plan, a charter, a loan agreement, articles of
incorporation, and so on. Such artifacts usually include references to the design of the enterprise, such as the legal and governance structure, the business model which implies the core business processes, as well as references to technology and personnel requirements. Depending on how enterprise architecture is defined, some or all of these artifacts are part of the architecture of the enterprise. As the enterprise grows, the enterprise actor-network grows to include vendors, customers, suppliers, employees, production technology, information technology, contracts, annual reports, SEC filings, and so on.

Figure 1b: Growth of Enterprise AN

Figure 1c: Illustration of Interests and Alignments in the Enterprise AN

**IT Development and Implementation as a Negotiation among Actor-Networks**

For the purpose of better understanding business-IT alignment, it is especially interesting to explore the role of IT in the enterprise actor-network. The ubiquitous nature of IT makes the enrollment of IT a required condition for the enrollment of other actors. IT is critical for accounting and bookkeeping, it may be a necessary condition for establishing a relationship with a vendor, a customer, or another stakeholder. IT solutions may be sought as a means to achieve re-alignment of interests within the enterprise actor-network, as in the case of IT-enabled transformation initiatives.

In order to enroll IT into the enterprise actor-network its interests need to be translated into the interests of the enterprise actor-network, the process commonly referred to as system development and implementation. Among the key actors are IT directors, users, legacy systems, analysts, consultants, vendors, IT solutions, server farms, networks, and so on. Importantly, each of the actors is already a part of several actor-networks. For example, project sponsors, IT managers, and end users are usually a part of the enterprise actor-network and their interests are, to varying degrees, aligned with the interests of the enterprise. For argument's sake, let us assume that the interests of IT managers are also aligned with those of the enterprise – we will trace the roots of possible misalignment by examining the IT implementation process. Consultants, vendors, IT solutions, and other human and non-human actors are also parts of their respective actor-networks. IT solutions developed by external vendors represent the interests of such external vendors. Consultants that work on an IT project have their interests aligned with those of the consulting firm, as well as of the consulting profession as a whole. Development and implementation of a new IT into an enterprise can be viewed as a negotiation, or translation process, in which interested actors try to align their interests (see Figure 3 for a schematic representation of potential actors in such negotiations).

As a part of the translation process associated with IS development and implementation, various artifacts (also referred to as immutable mobiles in ANT terminology) are created to inscribe the agreement achieved among various actors and actor-networks. These include artifacts such as logical and physical design diagrams, budgets, plans, user requirements, as well as contracts, purchase agreements, system code, user documentation, and so on. More often than not these translation process associated with IS development and implementation involves compromises on the part of different actors. The interests of actors that are not inscribed into these artifacts are often compromised in favor of the interests of more technical actors, which are often less flexible, and cannot in the words of Callon (1980) bend themselves. Thus, inscription of interests into artifacts protects those interests from being compromised, yet can also make the network less flexible for the purposes of aligning itself with other networks.

**Enterprise architecture as an Inscription of Aligned Interests of an Enterprise**

The role of enterprise architecture in maintaining business-IT alignment can be highlighted by examining translation processes associated with IT implementation. Therefore, next we examine a transition process of a hypothetical IT solution (developed by an external vendor) at a hypothetical enterprise. Such a translation process would involve two actor-networks: the enterprise actor-network and the IT solution/vendor actor-networks. For the purpose of this illustrative example let us assume the following rather typical alignment of interests (see Figure 2):
The interests of the enterprise actor-network are represented by the IT director, project sponsor, and end users.

The IT solution is a part of an actor-network, which includes vendors, built-in business processes, protocols, standards, compatible technologies, consultants, administrators, and the like.

The result of such a situation is depicted in Figure 3.

Figure 2: implementation as Negotiation between Actor-Networks

If viewed from the point of view of the enterprise, the IT implementation processes should involve translation of the interests of the IT solution actor-network into its own. This would ideally involve bending the interests of the IT solution actor-network to be aligned with the interests of the enterprise, probably by means of extensive customization. Such customization would imply compromising some of the interests of the IT solution actor-network. If viewed from the point of view of the IT solution actor-network, the same implementation process should involve recruitment of one more loyal customer into the IT solution actor-network. This can be achieved by compromising the interests of the enterprise by convincing the entire enterprise to change itself to align with the IT solution (for example, the case of business process re-design to fit an ERP application) or by simply recruiting some important representatives of the enterprise actor-network into the IT-solution actor-network.

Following the logic of ANT (Latour 1992) the extent to which the aligned interests of an enterprise are compromised in favor of an IT solution depends on how well such interests are inscribed into technical artifacts. The interests of many major IT solution networks are inscribed into a variety of artifacts, including software code, user documentation, implementation guidebooks and methodologies, and best practice case studies. By creating and maintaining its enterprise architecture, an enterprise can create a comparable set of technical artifacts that can be used to represent the aligned interests of the enterprise in negotiations with other actors, such as IT solution providers of various kinds.

An enterprise without a clearly agreed and documented enterprise architecture would be at a disadvantage in negotiating with various IT solution actor-networks. First, without preliminary work on defining its enterprise architecture, the key actors within the enterprise, such as the project sponsor, IT directors, and end users, are not likely to have an a priori agreement on issues pertaining to the specific IT implementation, and thus their interests and those of the enterprise would not likely be aligned. Without reaching such an agreement through enterprise architecture work it is possible that potential differences in interests among such actors could be exploited by the IT solution actor-network. Secondly, even if the agreement exists but is not inscribed in difficult-to-change artifacts, individual actors may be more likely to change their position if presented with convincing arguments and/or enticements. In such situations the IT implementation process is more prone to result in the recruitment of individual actors within the enterprise actor-network by the IT solution actor-network, in order to align the interests of such individual enterprise actors with those of the IT solution actor-network.

Figure 3: Recruitment of IT Staff by the IT Solution Actor-Network Resulting in the Lack of Business-IT Alignment

Some of the enticements, arguments, and tools that can be used in the recruitment of IT managers by vendor actor-networks could include training sessions for IT staff, technical support, educational conferences at premium venues, and compatibility with existing technologies. In many cases the recruitment of IT professionals often starts before such IT professionals join a particular enterprise through various training and certification courses as well as vendor sponsorships of conferences, advertising in industry trade publications, and initiatives with university academic departments and professors. As a result many IT professionals identify themselves with specific technologies and IT solutions. Depending on the effectiveness of such recruitment efforts by the IT solution actor-network, such recruited actors often have greater allegiance to specific technologies or solutions rather than the interests of their enterprise. This can easily lead to misalignment within the enterprise actor-network as depicted in Figure 3, for example. Such misalignment manifests itself in unfulfilled customer expectations, the disappointment of business users with IT, negatively disruptive IT implementations, and even failed IT projects.

We argue that much of the lack of business-IT alignment is the result of such repeated recruitment of IT staff of an enterprise by various IT-solution actor-networks. We
CONCLUSION

In this article we have used concepts from Actor-Network Theory (ANT) to examine the relationships between enterprise architecture and business-IT alignment. By viewing a modern enterprise as an actor-network and examining the IT implementation process as a negotiation among actor-networks, we traced potential roots of misalignment between IT and business to IT staff as well as other organizational members being recruited by external IT solution actor-networks. We then proposed that the process of creating and maintaining an enterprise architecture would help strengthen the alignment of interests of various members of the enterprise actor-network, and may also break (or at least weaken) the ties of IT staff and others with specific IT solution actor-networks. The resulting architectural descriptions could also serve as representations of the aligned interests of the enterprise in future negotiations with IT solution actor-networks. Viewed through the ANT lens the key goals of enterprise architecture are (1) to help achieve an alignment of interests within the enterprise, and (2) to serve as a tool for protecting the interest of the enterprise in internal and external negotiations. This has several important implications for enterprise architecture researchers and practitioners.

First, if enterprise architecture work is viewed as a process of building alignment within an enterprise it can no longer be relegated to the IT department. Instead, it should be treated similarly to, or perhaps as an extension of, strategic planning. Consequently, the tools and techniques used to develop an enterprise architecture should be focused on the soft skills of consensus building at least as much as ensuring technical precision. Secondly, if enterprise architecture descriptions are to be used in negotiations, such descriptions should be relatively easy to comprehend and interpret by the various actors involved in such negotiations. For enterprise architecture practitioners, it may mean abandoning heavy technical jargon and complex enterprise architecture tools in favor of building shared language and representations. The proposed view also highlights the important and often overlooked political aspects of enterprise architecture. We hope that such a perspective could help raise an interest in enterprise architecture among C-level executives and strategists. We also hope that highlighting the benefits of enterprise architecture for representing the interests of the enterprise in external negotiations will inspire more organizations to enterprise architecture development.
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REFERENCES


Article

The Frugal Enterprise Architect

By Mark P. Meyers

Abstract

In the last three years we have seen a significant focus placed on the practice of enterprise architecture, its importance to the strategic forward momentum of an organization, and the need to master the methodology, mechanics, and traceable metrics attached to the program. With books, magazine articles, and white papers highlighting the need to properly structure and invest appropriately in enterprise architecture, fledgling programs with modest budgets struggle to apply these broad but often considered ‘best practice’ recommendations. Depending on corporate culture and tolerance for organizational change, senior management teams may be the toughest to convince of the value of a newer enterprise architecture program when, from their perspective, the wheels of the organization have turned smoothly for years. Lead architects with limited program budgets will need to be creative and extremely careful in their approach to developing an enterprise architecture program, but there are ways to achieve success as a frugal enterprise architect.

INTRODUCTION

With arguably no limit to the number of publications or industry references one might find to highlight the causal factors and percentage chances for enterprise architecture program failure, the newly appointed enterprise architect with a limited budget might have trouble determining where best to start building a program.

Examples gleaned from enterprise architecture conferences may not clarify the direction the frugal enterprise architect should take. One case study in 2006 featured ‘IT architecture governance’ as a critical part of building an enterprise architecture program. Building off a vision statement and strategies that were aligned with IT services, the presentation provided a comprehensive look into how to immediately drive to well-defined technology architecture, but more specifically, a measurable governance of that architecture (Scott & Vescovi 2006).

Another perspective from the same conference provided a broader view of enterprise architecture where considerable importance was placed on capturing and understanding business requirements and strategic intents. These critical artifacts served as the foundation for the build out of additional information, technology, and solution architecture definitions (Casarella 2006).

Both of these company case studies indicated the scope of enterprise architecture activities, and the employment of substantial teams of architects who approached the analysis of those enterprise architectural views in parallel. Working teams were also typically aligned with the information technology (IT) department, requiring investment from and accountability to IT in order to support their respective enterprise architecture programs.

There is evidence to support that the primary value measurements from an enterprise architecture program have shifted away from IT governance and more towards the qualitative perspective of strategic business value since 2006. Despite that shift in value measurement, there remains a strong recognition that the practice of enterprise architecture does still add value to the enterprise and should be staffed appropriately. With stronger cross-industry support for building a properly funded enterprise architecture program, research firms including Gartner indicate that an adequately staffed enterprise architecture team should consist of 2% to 4% of a company’s total IT headcount (Short & Burke 2010).

Other organizations who believe in the benefits of an enterprise architecture program, but who are impacted by the economic and staffing challenges of the last decade, would love to have a fraction of that IT staffing percentage on their team. The reality is that many companies were forced to start their programs with a single or very few full-time resources dedicated to enterprise architecture. Newer perspectives on delivering value through an enterprise architecture program indicate that it should be aligned with the business, but most newborn enterprise architecture programs are still funded and aligned with IT.

How does the enterprise architecture team of one or very few wade through the articles, white papers, and conference recommendations to build a proper enterprise architecture program, when assumptions for recommendations by these same professional entities assume the existence of a large team of resources?
Perhaps the frugal enterprise architect can find a way to deliver true business value during the early phases of an enterprise architecture program, even without appropriate staffing.

FIRST, IGNORE FEELINGS OF PROGRAM INADEQUACY

For organizations that fall into the $3 to $5 billion market cap range and up, chances are very good that they will have a relationship or multiple relationships with consulting and other industry research firms. When called upon to offer guidance on the building of a successful enterprise architecture program, the historical evidence and relevant case studies feature broad sweeping and well-staffed enterprise architecture initiatives. The frugal enterprise architect can be found reviewing those white papers and exhibiting facial expressions indicating shock and awe.

One particular subscription service features enterprise architecture program feedback from ten of the country’s largest firms across manufacturing, financial services, and energy industry segments. Focused on critical Chief Architect activities in the first 100 days in office, the activities include (Corporate Executive Board 2008):

- Evaluating the enterprise architecture function:
  - Developing relationships with key business and IT leaders
  - Executing a comprehensive enterprise architecture maturity diagnostic
  - Building or re-drafting of the enterprise architecture organizational model
  - Creating a map of key leadership competencies and pitfalls
- Ensure IT alignment with business:
  - Current business and IT strategy alignment review
  - Project reviews to ensure alignment with stated business strategy
  - Adjustment of program priorities as needed
  - Development of a technology readiness scorecard
  - Re-drafting of the enterprise strategic roadmap
- Propagate the enterprise architecture program value proposition:
  - Expectation setting exercises with the business
  - Create a map of enterprise architecture deliverables to business drivers
- Create an enterprise architecture scorecard based on measurable metrics
- Establish enterprise architecture governance and project engagement:
  - Develop/update and publish enterprise architecture principles
  - Integration of principles into business and IT decision-making
  - Embed strategic planning (roadmap) artifacts into project planning
  - Build enterprise architecture governance councils and organizational model
  - Build the solution catalog
- Assessing the current asset portfolio:
  - Map and assess IT assets to ability to perform or support that asset well
  - Baseline IT asset value
  - Develop an asset criticality matrix based on value factors

That bulleted list appears overwhelming to a new lead architect unless they happened to be walking into a previously formed, well staffed, and experienced enterprise architecture organization. The frugal or start-up enterprise architecture program might consider it a strategic win, if they could simply develop solid working relationships with key business and IT leaders during that same timeframe. It will take longer than three months to convey the holistic message and value of an enterprise architecture program to an executive and departmental leadership who have never heard of such an initiative. The message and value of enterprise architecture can be made clear, but the organizational and culture change needed to support a new program takes a bit longer.

Other approaches to the delivery of an enterprise architecture program vary quite a bit between a focus on strategic business planning and the expectation that the practice is somehow restricted to the governance of an IT organization. When evaluating either model, often represented in the form of a three-circle Venn diagram, the frugal enterprise architect still needs to find a starting point on which to focus. Without expressly stating the assumption in the white paper that features the model, the enterprise architect will eventually be involved in all areas of that model simultaneously, but typically not at program start-up.

An example of this model was featured in a published presentation about IT governance, where the goal was to reach the center point or intersection of all three circles. The product of this functioning model was deemed a Managed IT Portfolio (Paras 2006). Adapting
the diagram below from that original IT governance model, we softened the focus of the revolving process to extend the enterprise architecture view into business vision and the strategic alignment of business with IT; see Figure A.

Understanding the value of the enterprise architect or enterprise architecture team’s involvement in the whole process, where does one begin? Again, the optimal answer would be to stay connected and partnered with each set of activities in Figure A and within all silos of the organizational structure. The smaller enterprise architecture team may not have that capability. They may be forced to focus on a single area of that three-circle diagram and preferably one that shows short-term returned value. The frugal enterprise architecture program may be limited to the number of parallel activities they can successfully address.

![Figure A](image)

**AVOID THE FALLLACY OF BEST PRACTICE**

‘Best practice’ is a subjective term. Near and dear to the hearts of anyone from the ranks of IT or any business leader who has suffered through endless vendor proposals, the reference to best practice is bandied about with the expectation of unquestioned acceptance. The fact that a consulting partner or a prospective vendor claims that they can offer the perspective into a best practice for a particular process or technology, simply means that it comes from their bounded experience. The recommendation for any best practice is derived from opinion really, on how to deploy a process or a technology based on work experience or feedback from their respective customers.

Research firms including Gartner, Forrester, and the Corporate Executive Board help to highlight the diversity around the concept of enterprise architecture best practice, by publishing their own perspectives on what those practices are. In many cases the differences between their recommendations are difficult to discern, though their opinions are based on experience with different customers. This is not to say that these white papers and summary perspectives are not valuable, they are. Especially when building an enterprise architecture program from scratch, the frugal enterprise architect still needs to find a starting position, an approach for
deploying a new program, and a set of tools that perform well. External case studies highlighted in these white papers provide some insight into how others have approached the challenge.

Making things more confusing for the frugal enterprise architect, technology companies, consulting firms, and educational institutions now use ‘best practice’ when describing the motives behind the creation of their own enterprise architecture frameworks. In fact, aside from those frameworks that are mandated for use by government agencies, the list of enterprise architecture frameworks deployed in the marketplace today is staggering. If the frugal enterprise architect was looking for a single best practice when selecting an enterprise architecture framework, frustration is just around the corner.

Table A highlights a partial list of enterprise architecture frameworks and modeling tools, the operative word being ‘partial’. The table does not include those frameworks specific to a state government like the California Enterprise Architecture Framework, university-specific adaptations, or other customized private sector frameworks.

Table A

<table>
<thead>
<tr>
<th>Partial List of Enterprise Architecture Frameworks</th>
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<tbody>
<tr>
<td>GERAM</td>
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<td>RM-ODP</td>
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<td>TOGAF®</td>
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<td>AM</td>
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<tr>
<td>TRAK</td>
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<tr>
<td>MEGAF</td>
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<tr>
<td>Praxeme/EST</td>
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<tr>
<td>SAM</td>
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<tr>
<td>IAF</td>
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<tr>
<td>CLEAR</td>
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<td>OBASHI</td>
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<td>ZIFA</td>
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<td>TEF</td>
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Partial List of Enterprise Architecture Frameworks

<table>
<thead>
<tr>
<th>Framework</th>
<th>Description</th>
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<tbody>
<tr>
<td>PEAF</td>
<td>Pragmatic Enterprise Architecture Framework</td>
</tr>
<tr>
<td>OEAF</td>
<td>Oracle Enterprise Architecture Framework</td>
</tr>
<tr>
<td>Deloitte EAF</td>
<td>Deloitte Consulting Enterprise Architecture Framework</td>
</tr>
<tr>
<td>SAP-EAF</td>
<td>SAP Software – Enterprise Architecture Framework</td>
</tr>
<tr>
<td>PERA</td>
<td>Purdue Enterprise Reference Architecture Framework</td>
</tr>
<tr>
<td>DoDAF</td>
<td>The US Department of Defense Architecture Framework</td>
</tr>
<tr>
<td>MODAF</td>
<td>The UK Ministry of Defense Architecture Framework</td>
</tr>
<tr>
<td>NAF</td>
<td>The NATO Architecture Framework</td>
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<tr>
<td>AGATE</td>
<td>The France DGA Architecture Framework</td>
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<tr>
<td>DNDAF</td>
<td>The DND/CF Architecture Framework (Canada)</td>
</tr>
<tr>
<td>GEA</td>
<td>Government Enterprise Architecture – Queensland Government</td>
</tr>
<tr>
<td>FDIC-EAF</td>
<td>FDIC Enterprise Architecture Framework</td>
</tr>
<tr>
<td>FEA</td>
<td>Federal Enterprise Architecture Framework (US)</td>
</tr>
<tr>
<td>NIST EA</td>
<td>NIST Enterprise Architecture Model</td>
</tr>
<tr>
<td>TEAF</td>
<td>Treasury Enterprise Architecture Framework (US)</td>
</tr>
<tr>
<td>NORA</td>
<td>Nederlandse Overheid Referentie Architectuur (Netherlands)</td>
</tr>
</tbody>
</table>

It would be difficult to say from the Table A example that there is a definitive best practice for an enterprise architecture framework. Networking with other enterprise architects at conferences, through direct correspondence or within enterprise architecture blogs, we can obtain plenty of input as to what enterprise architecture best practice is. When evaluating that feedback and evidence, however, the answer is most likely that there simply is no single best practice. Even though a growing number of enterprise architecture frameworks agree in principle to the building blocks of any given program, the methods used for implementing such a program are as varied as senior management personalities and corporate cultures.

Once we accept the fact that an enterprise architecture program may need to be structured uniquely to our own organization, we will need to evaluate methodologies and toolkits, assess organizational opportunities for start-up, and then design a unique approach for implementing the program. When it comes to recognizing the need for non-standard and creative approaches for resolving this type of challenge, we appear to be in good company. Taking a quote from US Navy Captain D. Michael Abrashoff: “Innovation and progress are achieved only by those who venture beyond standard operating procedure. You have to think...
imaginatively, but realistically about what may lie ahead and prepare to meet it." (Abrashoff 2002).

If the concept of a best practice is nothing more than a view into how others have approached a similar problem, the answer is not to rush into the implementation of an enterprise architecture program based on someone else’s vision of how it should be done. The frugal enterprise architect will need to assess options for frameworks and approaches to delivering a program, that simply ‘feel right’. The best practice for our own organization is really that which best serves sponsors, answers the need to fill a specific gap in organizational strategic planning, and builds a program that can be readily accepted into the corporate culture. Ultimately a creative, unique, and frugal decision needs to be made to put your enterprise architecture program on the right path, for you.

TO GOVERN OR NOT TO GOVERN

One starting point for a new enterprise architecture program is the institution of governance over newly proposed projects. Whether involving business change or technology improvement. From a procedural perspective, it is relatively easy to add that checkpoint in the project review and approval process where a new set of enterprise architecture principles or mission and vision statements can be brought to bear on the decision. Even though detailed perspectives for business, IT, and solution architecture may not yet exist, the frugal enterprise architecture team can begin leadership activity through governance early in the program’s deployment. It is a tempting path for the enterprise architect, because the labor investment needed to apply a governance activity is relatively small.

Referring back to enterprise architecture thought leadership in 2006 and 2007, enterprise architecture governance was widely accepted as an effective way to integrate a business request for project work with an architectural review for acceptability (Cullen & Leganza 2007). Assuming the two groups could work together amicably, some requests for work would naturally get rejected by the enterprise architecture review process. Amicable or not, the enterprise architecture governance process had just become the stopping point for some business-initiated project requests.

The acceptability of that earlier trend is in question, however, based on recent feedback from CEOs across the country. Highlighted in two presentations at Gartner’s 2010 Symposium/ITXpo, one session highlighted the corporate shift to a business-driven process for enterprise architecture, away from a governance focus. One discussion questioned the value of an enterprise architecture program, if the executive leadership perceived it to be group that says ‘no’ when business/technology proposals are presented for review.

The feedback from these business leaders indicated that the enterprise architecture program should be focused on aligning business and IT strategy, and learning to work together as one organization (Burton 2010). Similarly, in a session covering risk and innovation, the audience was asked for a show of hands from those currently engaged or planning to engage in a major IT project in 2011. The nearly unanimous response led the session leader to follow with: “There is no such thing as an IT project.” His point was centered on the fact that all projects are or should be driven from a strategic business need for a certain capability. Examples included the need to access information more quickly, to re-engineer or automate business process, or to enhance business decision-making capability with analytics. The CEO/CIO feedback referenced in this session indicated that the IT and enterprise architecture organizations shouldn’t be focused on governance at all. In fact, the common reference to business teams as ‘clients’ or ‘customers’ by IT also needs to go away. The new perspective as defined by the interviewed CEO community was that IT is just another business area and we all should be working together towards the same organizational goals. The concept of business leaders being clients or customers makes them a separate entity somehow, segregated from the IT organization. It is a subtle distinction, but one currently perceived by the CEO community to be less collaborative. If the enterprise architecture organization is aligned with IT, the association is unavoidable and needs to be managed appropriately (Hunter 2010).

STARTING AS A TRUSTED ADVISOR

Though governance provided a method for tracking quantitative measures of an enterprise architecture program, they tend to drive a wedge between business and IT/enterprise architecture groups. The ability to track the number of projects that fall into defined principles or strategies, or the ability to reference the re-use of hardware or software solutions, is desirable because it is measurable. As mentioned earlier, feedback from business leadership suggests that the enterprise architecture program should be focused instead on business and enterprise architecture/IT partnership, with softer skills and more qualitative measures. Among them is collaborative engagement with business leadership to understand the business, their long-term vision for the company, and the sort of capabilities they need to help reach those end-state goals.

The frugal enterprise architect should take this opportunity to establish those business relationships or strengthen them, mostly because it happens to be one of the least expensive and best results-oriented activities available. Working yourself into, or back into, the position of trusted advisor sets the stage for all other
collaborative activities. Without this basic asset, the enterprise architect’s motives may remain in question and the development of a partnership becomes all the more difficult. If you need a formula to help explain the concept of building trust, there is one actually. Adding the factors for credibility(C), reliability(R), and intimacy(I), divided by a factor of self-orientation(S), yields the level of trust (Maister 2001): \[ T = \frac{C + R + I}{S} \]

Especially while engaged in the building of a new, or the restarting of a floundering enterprise architecture program, the first order of business should be to extend into each business area in the enterprise and build that trusted advisor relationship. 35% of organizations surveyed in 2010 indicate that they will indeed be starting or restarting their own program from scratch in 2011. That percentage of start-up or do-over programs supports the need to take a different, relationship-oriented approach to enterprise architecture program building (Burton 2010).

Talk is cheap. Actions need to follow, but the building of those relationships and a real attempt to understand business needs and strategies is both frugal and productive. The best way to bolster those critical relationships is not by trying to convince them about the benefits of governance. That just sounds like the enterprise architecture group is looking for ways to tell the business ‘no’. A smile, a handshake, an empathetic ear, and deliberate and mutually beneficial collaboration is the answer: “If you want to gather honey, don’t kick over the beehive.” (Carnegie 2009).

FOCUSDING ON STRATEGIC BUSINESS PLANNING

Falling back on the question of what can be done if someone has been forced into becoming a fractal enterprise architect, the answer may be as clear as the face in front of their nose. Bludgeoned metaphors aside, creating face-to-face relationships with business leaders who own the task of strategic planning may be an inexpensive step one. An integral part of most enterprise architecture frameworks and execution plans, the creation of an enterprise mission, vision, and strategic business plan requires the building of personal relationships with key business leaders to get the job done.

One of the unexpected supporting philosophies for the value of a business focus to an enterprise architecture program comes from prominent universities and business schools. Carnegie Mellon may have the best definition of enterprise architecture as it pertains to business; enterprise architecture is: “A means for describing business structures and processes that connect business structures.” (Carnegie Mellon 2011).

Thought-leaders at Massachusetts Institute of Technology – Sloan Center for Information Systems Research also make a strong connection between the practice of enterprise architecture and the critical function of strategic business planning. Strategic initiatives defined by the business, not IT, drive the prioritization of projects and programs reflected in a strategic roadmap, where the enterprise architecture program and its architectural perspectives are the beneficiary of that business-driven activity (Ross 2006).

The Harvard Business Review also featured analysis by Robert Kaplans and David Norton, and highlights how a common mission, vision, and defined strategy should carve out the remaining facets of a broad strategic planning process. While the article never explicitly mentions the practice of enterprise architecture, the recommended steps taken in the Norton-Kaplan strategic planning model could be dropped directly into TOGAF® at the top of that model. The Norton-Kaplan perspective on Mastering the Management System fits neatly into TOGAF® Phase A: Architecture Vision (Kaplan & Norton 2008).

Though not a business school, Gartner’s enterprise architecture model also provides the justification for strategic business planning as the driver for the built out of all enterprise architectural perspectives. Starting with an understanding of mission, vision, and the prioritized strategic intents of the business, the work required to build out business architecture, information architecture, technology architecture, and solution architecture can then be portioned and addressed a piece at a time (Gartner 2005).

We now know that planning, optimization, and process design occur throughout the organization and enterprise architecture teams should not be positioned or expected to be the only driver of those artifacts. We need to work to blur the lines between the enterprise architecture practice and the strategic planning needs of the whole organization (Rollings 2010).

With as much business and collegial thought-leadership support for relationship building and a focus on strategic business planning, approaching this critical and cornerstone component to an enterprise architecture program first, is both wise and frugal.

BREAKING UP THE COMPLEXITY

The ‘one piece at a time’ approach to strategic business planning is also, quite naturally, a frugal approach to building the first components of an enterprise architecture program. Supported by a mathematical analysis involved with the management of complexity, it becomes easy to see why the building of a common set of mission, vision, and strategic intents might be difficult. If we pulled all corporate business silos and their leadership teams into a room and tried to understand everyone’s perspective on key strategies and priorities,
the number of separate opinions on strategies and priorities makes the process unmanageable. If we break up those discovery sessions into smaller but logical groupings and initiate strategic planning workshops by organizational silos, we can more easily roll up those outputs and outcomes into a summarized view (Sessions 2008).

This approach also plays well in the frugal enterprise architecture program, because a smaller team can break up the strategic planning workshops in serial mode, executing them by business area (silo) and then pulling them all together into a summary roadmap once the individual workshops are complete. Separate business units or departments are represented below as a column or silo in the organization; see Figure C.

Holding strategic planning workshops for each silo in the organization allows the frugal enterprise architect to focus on strategies and processes associated with production/manufacturing, or supply chain, or any of those departments separately. This focused effort by silo helps to build more personal relationships with each business management team and allows the enterprise architect to gain a deeper understanding of their strategies. Complexity is reduced by breaking up the strategic planning efforts, but the quality of deliverables and the level of buy-in by those participating business leaders remains high.

Also consider sub-teams or part-time participation in enterprise architecture working groups as a means of breaking up the complexity. If the organization cannot fund full-time resources to work on deeper enterprise architecture perspectives including business architecture, information architecture, technology, or solution architecture, propose part-time teams to begin the work. A business architecture sub-team made up of cross-functional business participants can initiate the process of defining a first set of business architecture principles, standards, organizational models, and process flows. Though not a full-time enterprise architecture team, the part-time sub-team is a frugal way to get that perspective of the enterprise architecture off the ground.

CONCLUSION

The frugal enterprise architect can still be successful, despite available guidance on the need for much larger teams and a plethora of opinion on what best practice means when building a program. Each company’s organizational structure, culture, relationship of business to IT, and a host of other factors will help form your approach of how enterprise architecture can be successfully deployed. Your implementation of an enterprise architecture program will be unique. Though the term ‘best practice’ is becoming the skeptic’s watch phrase, there are still some common-sense steps and approaches to help the Chief Architect build relationships and kick-start their program even with limited resources at their disposal. Most every enterprise architecture framework or toolset starts the process with the definition of a mission and vision statement, along with a business-driven set of enterprise strategies. If you can break up that collection effort into manageable

More efficient program management, because the business leadership (not IT) has set the strategic roadmap priorities
- Tighter alignment of technical capabilities to business strategy
- Improved business agility due to focus on strategic priorities
- Reduced program risk and potential cost while focused on approved initiatives
- Tighter grasp on business context in IT planning and staffing
- Stronger relationship between business leadership and IT
- Reduction of tactical changes to the approved future state architecture
- Improved general knowledge of the enterprise architecture program and processes

Figure C

With a completed set of strategic planning workshops now feeding your chosen enterprise architecture framework, those deliverables get the program to a point where other intangible and qualitative measures of a functioning enterprise architecture program can be featured. Compiling this set of strategies into a prioritized enterprise roadmap and ultimately feeding a project portfolio review, a number of qualitative measurement categories can be tied to the enterprise architecture program. Qualitative gains could include:
pieces, establishing trusted advisor relationships along the way, progress towards a summarized strategic roadmap allows the frugal enterprise architect to achieve an important win.

Governance and the tracking of quantitative results are an important part of a mature enterprise architecture program. They are not however, as important to executive leadership as the creation and maintenance of positive business and IT personal relationships and a focus on strategic business planning. From a frugal enterprise architect’s perspective, these activities carry the biggest return from a modest investment of time.

Break up the work load. Develop relationships and work on strategic business plans one business unit or department at a time. Knowing that you can roll up those key artifacts into a summarized pool of new supporting resources and strategic plans, the enterprise-level artifact is the product of that roll up. Create part-time sub-teams when funding is not available for full-time enterprise architecture teams. This part-time commitment is easier for business and IT leaders to approve, and the team’s formation allows some progress into the areas of the enterprise architecture program otherwise left untended.

THE FRUGAL ENTERPRISE ARCHITECT’S TO DO LIST

1. Solicit guidance from peers and trusted partners on enterprise architecture program start-up methods.
2. Evaluate enterprise architecture frameworks for best fit with your organization.
3. Don’t assume that an external view of ‘best practice’ is best for your organization.
4. Pick a custom approach for start-up and delivery of the program and stick to it.
5. Start the program communication and relationship building early.
6. Avoid the allure of instituting governance programs that find ways to say ‘no’.
7. Begin analysis into business area mission, vision, and major strategic intents.
8. Break up the complexity by meeting with business areas one silo at a time.
9. Continue building relationships as trusted advisor during strategic planning sessions.
10. Summarize your findings and feed these into your first generation of an enterprise strategic roadmap.
11. Build part-time sub-teams to take vision and strategy into deeper definitions for business architecture, information architecture, technology, and solution architecture.
12. When the program starts to yield positive qualitative results, make your pitch for more resources.

ABOUT THE AUTHOR

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Auditing the Implementation of Enterprise Architecture at the Federal Railroad Administration

By John T. Grasso

Abstract
After several years of work, implementing enterprise architecture in the Federal Railroad Administration (FRA – a part of the US Dept. of Transportation), in Fall 2009, attention was turned to the question: How to efficiently yet comprehensively audit their implementation of enterprise architecture, to identify strengths, weaknesses, and areas for future improvement? At that time, US agencies such as OMB and GAO had issued guides for reviewing (or evaluating, appraising, or auditing) government agency implementations of enterprise architecture, but these guides were not completely consistent with one another. A new, harmonizing version was being developed by GAO and was released in August 2010, containing the Enterprise Architecture Management Maturity Framework, Version 2.0 (EAMMF 2.0). This provides a management maturity framework which can permit an organization to achieve increasingly higher states of enterprise architecture management maturity.

This article presents a pilot test project developed and conducted within the FRA, using the new EAMMF 2.0 elements and an audit methodology drawn loosely from the Software Engineering Institute’s Capability Maturity Model Integration (CMMI®) models and its companion Standard CMMI Appraisal Method for Process Improvement (SCAMPI) SM appraisal methods. The audit methodology proved to be an efficient way to assess FRA’s efforts in enterprise architecture. Findings also show that FRA’s implementation of enterprise architecture reflects very high enterprise architecture management maturity, suggesting that FRA has positioned itself well to support future initiatives such as the US development of high-speed rail and to continue to coordinate with its many constituencies including the railroad industry, other federal agencies, state and local government railroad agencies, and the public-at-large, to realize the benefits of enterprise architecture, all while dealing with rapid change, value, agility, standards, risk, and transformation.

Keywords
Enterprise Architecture, Process Improvement, Evaluating Work Processes, Enterprise Architecture Management Maturity

INTRODUCTION

After observing industry best practices, the US Federal Government passed the Clinger Cohen Act in 1996, aiming to reduce the failure of large information technology (IT) projects by mandating an enterprise architecture for evolving or maintaining existing IT and acquiring new IT to achieve the agency’s strategic and information resources management goals (GAO 2003).

The Clinger-Cohen Act of 1996 mandated the establishment and use of enterprise architectures by federal agencies in the US. It required federal agency Chief Information Officers (CIOs) to develop, maintain, and facilitate integrated system architectures. The enterprise architecture development process assists the executive leadership of an organization by determining procedural, technical, and budgetary requirements to progressively transition an enterprise from a current baseline ‘as-is’ architecture to the next desired target ‘to-be’ architecture.

Under the executive branch of government, the Office of Management and Budget (OMB) has required that agencies document and submit their enterprise architectures to OMB along with updates when significant changes occur. OMB also uses various reviews to evaluate the adequacy and efficiency of each agency’s enterprise architecture compliance. At the same time, the Government Accountability Office (GAO), under Congress, also reviews enterprise architecture progress and benefits realization on behalf of the legislative branch.

Responding to these mandates, the US Department of Transportation (DOT) has taken a federated approach for architecting its enterprise. The DOT enterprise architecture constitutes 13 mission-specific architectures (such as for the Federal Aviation Administration, Federal Highway Administration, and so on) as well as a departmental-level Common Operating Environment. This federated model takes into consideration the complexities, varying missions, and characteristics of a multi-agency environment. The Federal Railroad
Administration (FRA) is one of the Operating Administrations (OAs) within DOT. FRA’s mission is to promulgate and enforce rail safety regulations, administer railroad assistance programs, conduct research and development in support of improved railroad safety and national rail transportation policy, provide for the rehabilitation of Northeast Corridor rail passenger service, and consolidate government support of rail transportation activities.

FRA’s enterprise architecture represents a segment of DOT’s enterprise architecture. Both are based on the Federal EA Framework (FEAF) and include five layers: strategic, business, information, application, and infrastructure sub-architectures. Goals include reducing redundancy and overlap of applications and systems, improving access to information, and guiding technology investments, among others. The FRA Office of IT (FRA OIT) leads the FRA enterprise architecture program as one of the mandated IT programs that are managed by the Office of IT. That effort began with an IT architecture design document produced in 2001 and continued with implementation of an IT and enterprise architecture governance process and structure that was integrated with capital planning and investment management. For example, FRA established a Capital Planning Board, Architecture Working Group, Capital Planning Working Group, Acquisition Working Group, and Configuration Control Board (CCB). In doing so, FRA followed a blueprint provided by Dr. Scott A. Bernard (FRA Deputy CIO & Director of OIT, and author of the comprehensive Introduction to Enterprise Architecture, 2005).

Over these years, FRA also hosted a series of workshops to review implementation of enterprise architecture, and attract comments and suggestions from an EA Quality Board and an IV&V (Independent Verification & Validation) EA Advisory Committee of which the author was a member during 2009-2010. The external advisors contributed to planning and implementing numerous advances through enhancements in enterprise architecture communications plans, data quality, enterprise architecture repositories, information sharing, knowledge management, segment architectures, and a special initiative to upgrade and standardize the mobile IT systems that are used by FRA’s field staff deployed all across the US.

AN AUDIT METHODOLOGY

In Fall 2009, attention turned to the question: How to efficiently yet comprehensively audit FRA’s implementation of enterprise architecture, to identify strengths, weaknesses, and areas for future improvement? At that time, OMB and GAO had issued guides for reviewing (or evaluating, appraising, or auditing) implementations of enterprise architecture, but these were not completely consistent with one another.

In general, assessments, audits, maturity ratings, appraisals, and similar concepts applied to evaluate the capabilities or maturity of an organization’s work processes, practices, and performance require (1) a reference model for developing products and services, and (2) a methodology to conduct the activities and obtain findings that are valid and reliable.

Approaches can be taken from other disciplines. The Software Engineering Institute at Carnegie Mellon University was established in 1984 by the US Department of Defense (DoD), to generate ways to improve quality of software and systems that were being delivered to the government by contractors. The 1980s saw great unhappiness with delivered software and systems which too often were late, over budget, and failing to fully satisfy the original purpose. Indeed, concerns regarding failures in software and system development projects somewhat resemble the Clinger-Cohen motivation for enterprise architecture (i.e., to realize greater benefits from investments in IT).

SEI proceeded to develop the SW-CMM (Capability Maturity Model for Software), which became widely adopted as a de facto standard for process improvement. SW-CMM has been superseded by a set of CMMI® ‘constellations’ (for new software and system development, for provisioning of services, and for software and system acquisition; a constellation is a set of models, training, and appraisal methods). The CMMI® approach may be described with two parts. First, CMMI® is a reference model for developing products and services; i.e., with activities for every process in the software development lifecycle, that are ordered or grouped into levels of capability and/or maturity. The elements may include more-elementary ways of implementing a given process, as well as more-advanced, more-sophisticated, or best-practice ways of implementing that same process. The companion appraisal method (SCAMPI) uses the elements of CMMI®, to review the work processes of a specific organization, to determine its strengths and weaknesses, confirm capabilities and/or maturity level, and identify opportunities for future improvement.

For example, using numbers from the original SW-CMM, five maturity levels had been delineated into 18 key process areas, further into 52 operational items, and finally into checklists with 316 total key practices which served as evaluation criteria for reviewing a given organization’s work processes.

However, as stated above, the assessment and maturity frameworks applied to enterprise architecture were not completely consistent with one another. For example, GAO (2003) had released its EA Management Maturity
Framework, v1.1, which identified 31 elements organized within four maturity stages (i.e., beyond the infancy stage). Ratings were to be given:

1. Showing that the agency has adopted a commitment to perform the function
2. Showing that the agency has allocated the resources (people, processes, and technology) needed to perform the function
3. Demonstrating that the function has been performed
4. Verifying that the function was satisfactorily performed

By comparison, OMB (2009) issued its latest EA Assessment Framework (EAAF v3.1) which featured a large number of assessment criteria described across 24 pages. EAAF v3.1 also mentions ‘architecture maturity levels’ and practices are denoted as Level 1 through Level 5. To measure the effectiveness of enterprise architecture OMB used three enterprise architecture capabilities areas of:

- Completion of an enterprise architecture
- Use of the enterprise architecture to drive improved decision-making
- Results that brought measurable improvements to program effectiveness

In 2009-2010, a new, harmonizing version of EAMMF was developed by GAO (2010) to contain many characteristics of the previous GAO EAMMF as well as the OMB capability areas, integrated into EA Management Maturity Framework v2.0 (EAMMF v2.0). To develop the update, GAO had solicited comments from 27 federal departments and agencies, from the private sector, state governments, and academia, and leveraged its own prior experience in applying its v1.1 framework.

In essence, EAMMF v2.0 contains a set of 59 elements (i.e., practices, structures, activities, and conditions), organized into a management maturity framework which can facilitate an organization to achieve increasingly higher states of enterprise architecture management maturity. Moreover, the document refers to CMMI® models and SCAMPI appraisal methods as points of reference. Thus, EAMMF 2.0 was chosen as the framework used in the pilot test audit of the implementation of enterprise architecture at FRA.

**CONDUCTING THE PILOT TEST**

To conduct the pilot test, an audit methodology was needed, with requirements, activities, and practices for conducting the audit. This was created, drawing loosely on the Software Engineering Institute’s SCAMPI appraisal methods. SCAMPI appraisal methods provide flexibility and choices. There are (a) Staged and Continuous representations, and (b) Class A, B, or C appraisal methods. Class A is the most rigorous and officially recognized method. Class B provides options and trade-offs in choice of model scope, and the selected practices are characterized on a scale such as red, yellow, and green. Class C provides even more options, including characterization of approaches to process implementation according to a scale defined by the user. It is beyond the scope of this article to delve deeply into all of these alternatives and trade-offs.

The lightweight method used here first involved: (a) adopting EAMMF 2.0’s elements as a list of 59 audit criteria which helped define the scope, and (b) to aid in the process, creating a brief set of training materials and a spreadsheet tool with a rating worksheet to be completed during the audit process.

Next, to apply this approach to FRA in a pilot test, a Joint EA Audit Team was assembled, comprising the author, who served as team leader, and eight members of the FRA Office of IT.

Then, FRA's enterprise architecture policies, documentation, and repository were reviewed, and some personal and group interviews were conducted, all to determine how well FRA's implementation of enterprise architecture satisfied the EAMMF 2.0 criteria. The team considered a variety of objective evidence by which to confirm each element, in order to have confidence that final ratings would be valid and reliable. Sources of evidence were:

- DOT & FRA executive policy statements and organizational enterprise architecture documents
- Activity reports, meeting minutes, and other work artifacts maintained in the enterprise architecture repository on sharepoint
- Results of committee meetings and personal or group interviews conducted with those having roles in enterprise architecture including LOB stakeholders
- Enterprise architecture tools, technologies, and products

Finally, ratings, derived from team consensus were assigned to each of the 59 EAMMF 2.0 criteria, while noting the specific sources of objective evidence that supported those ratings. Results were entered into the spreadsheet tool.

**FINDINGS AND CONCLUSIONS**

The audit team was able to quickly review the elements for Maturity Stages 1-4. Stage 1 elements refer to Establishing EA Institutional Commitment and Direction. Stage 2 elements refer to Creating the Management Foundation for EA Development and Use. Thus, Stages
1-2 address initial executive and organizational commitment, which FRA had secured long ago (in many organizations, the issue is to secure and then maintain that commitment).

Similarly, Stage 3 elements refer to Developing Initial EA Versions, while Stage 4 elements refer to Completing and Using an Initial EA Version for Targeted Results. Thus, Stages 3-4 address initial implementations of enterprise architecture. But FRA had produced EA v1.0 in September 2003, and six more updates since that time, each of which was increasingly more comprehensive and extensive. So these were also considered to be confirmed.

Elements for Maturity Stage 5 drew the most discussion among the audit team.

Results for Maturity Stage 5 refer to Expanding and Evolving the EA and Its Use for Institutional Transformation. In fact, both Stages 5 & 6 address expansions, integration, and ongoing continuous improvement.

<table>
<thead>
<tr>
<th>Element ID #</th>
<th>Description of the Core Element (CE)</th>
<th>Source(s) of Objective Evidence for Rating of that Core Element (e.g., policy documents, operating reports, personal interviews, etc.)</th>
<th>% Confirmed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td>Organization head has approved current version of the corporate enterprise architecture.</td>
<td>FRA EA v3.2 was submitted for draft review in July 2010, and released as final in Fall 2010. Currently, these are submitted to the Executive Board, but not necessarily directly to the Administrator.</td>
<td>80%</td>
</tr>
<tr>
<td>45</td>
<td>Organization component heads or segment owners have approved current version of their respective subordinate architectures.</td>
<td>FRA EA v3.2, plus FRA EA Segment Architecture Report and Update (February 9, 2009), with Five Segments: Office of Chief Counsel (addressed 1st), Office of Railroad Safety (2nd), Office of Financial Management and Administration (3rd), Office of Railroad Policy and Development (in process), and Office of the Administrator. Admittedly, some segment architectures are still in process of development.</td>
<td>100%</td>
</tr>
</tbody>
</table>

One element (#44) was given a consensus rating of 'confirmed as 80% implemented'. Element 44 asks whether the organization head has approved the current version of the corporate enterprise architecture, but its guidance is worded in a way that opens the possibility of differences in interpretation. This arises from the inclusion of both 'Expanding and Evolving the EA' (which is a long-term process of expansion, integration, and continuous improvement) and 'Its Use for Institutional Transformation' (which may consist of individual events that may occur even early in the long-term process). Specifically in the case of FRA, a draft version of EA v3.2 was released for thorough review in July 2010 and was released as final during Fall 2010. That process of reviewing and approving enterprise architecture annual reports and transition plans includes submission to the Executive Board, but not necessarily directly to the Administrator. The Administrator has approved this process of using the Executive Board, and s/he still may receive updates from individual members of the Executive Board, or from the Board as an entity, or indeed, from line-of-business executives as to the progress in implementing their segment architectures. Also, new versions typically build upon previous versions and represent a cyclical implementation of annual transitions from as-is to to-be architectures. They do not necessarily contain major changes in direction requiring top executive approval of each implementation of each step in each transition plan.

The guidance for Element 44, EAMMF 2.0 (pp.78-79) states:

“The current version of the corporate enterprise architecture should ultimately be approved by the head of the organization. Among other things, this approval should be based on a recommendation from the executive committee that is grounded in evidence that enterprise architecture quality measures have been met. Such approval recognizes and endorses the corporate architecture for what it is intended to be – an institutional tool for managing both business and technological change and transformation.”

It should also be noted that another element (#45) was given a consensus 100% rating, while noting: "Admittedly, some segment architectures are still in process of development.". EAMMF 2.0 provides the following guidance for Element 45:

“For the same reasons that the corporate enterprise architecture should be approved by the organization head, the latest version of each subordinate architecture should be approved by its corresponding organization head or segment owner. The evidentiary basis for such approvals should also be grounded in quality measures that are provided to the approving executive, along with a recommendation for approval by any designated subordinate architecture.
The enterprise architecture audit team discussed these statements of guidance and noted that evolving versions of the corporate enterprise architecture may be interpreted as being approved by the Administrator through the use of an Executive Board (rather than personally), and evolving versions of segment architectures may be interpreted as being approved by line-of-business executives through FRA’s segment architecture development processes.

Since the audit methodology used in this pilot test is patterned loosely after the SCAMPI appraisal method, the team reviewed that. In SCAMPI appraisals, all ratings are determined through a process of consensus by the SCAMPI Appraisal Team, even if the team perceives differences in interpretation among themselves and ultimately agrees on a ‘strange’ interpretation. Indeed, the SCAMPI Appraisal Method Description specifically instructs SCAMPI Lead Appraisers that they should not attempt to impose a specific interpretation and drive the SCAMPI Appraisal Team toward a specific rating, but may only point out relevant documentation on the CMMI® models and the SCAMPI method description, as references, during the process of reaching consensus on a rating.

In the end, the application of this methodology in a pilot test with FRA’s implementation of enterprise architecture suggests a very high level of enterprise architecture management maturity in FRA. Considering all 59 elements covering all six Maturity Stages (beyond initial Stage 0 that has no elements to be rated), FRA has implemented 58.8 of the 59 elements (i.e., 99.66% confirmed). FRA’s Maturity Stage is arguably at the highest level.

Lessons learned include issues with EAMMF 2.0 including uncertainty of interpretation in rating elements. Some interpretation variability is probably unavoidable. The Preface of EAMMF v2.0 itself admits to an intention of flexibility and reasonable discretion with the following:

“... version 2.0 builds on the prior version by introducing considerably more scope and content to accommodate the evolving and complex nature of enterprise architecture as one of many enterprise management disciplines and the practical realities surrounding actual enterprise architecture development and use. As such, this version of the framework provides a more current and pragmatic construct for viewing enterprise architecture development and use. In this regard, it provides a flexible benchmark against which to plan for and measure enterprise architecture program management maturity that permits thoughtful and reasonable discretion to be applied in using it. Restated, the framework is not intended to be a rigidly applied ‘one size fits all’ checklist, but rather a flexible frame of reference that should be applied in a manner that makes sense for each organization’s unique facts and circumstances.”

There are also issues in assigning an overall Maturity Stage rating. EAMMF v2.0 (pp.40-41) states:

“...EAMMF provides a simplified and structured way to answer a very complex question – Where does an organization stand in its walk toward its enterprise architecture destination? In so doing, it allows for the answer to be presented in terms of enterprise architecture management strengths and weaknesses at both a single point in time and over a period of time, and for groups of enterprises to be assessed, represented, and compared ... it allows the user to apply his or her own set of criteria, or to use multiple sets of criteria. In this regard, our reports have represented the application of the framework in three different ways: (1) requiring all core elements at a given stage to be met in order to achieve that stage of maturity; (2) requiring all core elements at a given stage to be at least partially met to achieve that stage of maturity; and (3) not using the maturity stages, and instead describing what portion of the core elements was met or partially met across all stages or within one or more critical success attributes.”

This flexibility is actually not inconsistent with the CMMI® approach. The SCAMPI appraisal method allows for applications in both Staged and Continuous representations. An appraisal using the Staged representation enables an organization to achieve what SEI calls a ‘maturity level’ by satisfying all elements up to, and including, that maturity level. An appraisal using the Continuous representation enables an organization to select a specific set of process areas (or all process areas) and to achieve what SEI calls ‘capability levels’ – this does not require the concept of satisfying all elements up to, and including, a given maturity level and thus may be said to partly resemble GAO’s application type (2) described above.

Taking account of the flexibility, discretion, and possible differences in interpretation, this pilot test of an audit methodology proved to be an efficient way to efficiently but comprehensively assess FRA’s efforts in enterprise architecture.

Final findings do suggest that FRA’s implementation of enterprise architecture reflects a very high enterprise architecture management maturity, and that FRA is well-positioned to support future initiatives such as the widely-discussed development of high-speed rail in the US and in its increasingly complex coordination with many constituencies including the railroad industry, other federal agencies, state and local government railroad agencies, and the public-at-large, to help realize the benefits of enterprise architecture, all while dealing with rapid change, value, agility, standards, risk, and transformation.
ABOUT THE AUTHOR

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REFERENCES


FRA: Enterprise Architecture (Annual Report & Transition Plan), v. 3.2. Appendixes are provided in a companion document (2010).


Book Reviews

Chief Editor’s remark: I am very pleased to bring you reviews of my two favorite books in enterprise architecture published recently: A novel by Chris Potts, an English corporate strategist, and a rapid-firing manifesto by Sharon Evans, a Canadian enterprise architecture coach. These are two absolute must-reads for everyone interested in enterprise architecture.

RecrEAtion: Realizing the Extraordinary Contribution of Your Enterprise Architects

Chris Potts, Technics Publications, New Jersey, 2010, 226pp

REVIEW BY PAUL HARMON

I review a lot of books about process and architecture and I have fallen into making some assumptions. First, people who write about enterprise architecture usually assume that it is an IT discipline. Most will make a bow to the importance of trying to understand what the business is about, but, ultimately, they will focus on trying to define the IT resources needed by the organization. Second, presenting technology in a novel format is not a good idea. It usually just means having a character in a story give lectures to someone else about technology, and it is not an efficient way to present information. Relying on these assumptions, when I got RecrEAtion in the mail I didn’t expect to spend much time with it. To be honest, I planned to skim it in the course of an hour on a Tuesday morning and then move on to more pressing matters. As a matter of fact, I started reading RecrEAtion at 9.00 in the morning and proceeded to spend the rest of the day reading it, taking notes, and grabbing other books to follow up on tangents. I haven’t thought this hard about a book, or been as stimulated by one, in several years.

The book is well written and the author actually manages to communicate information in rather dramatic conversations that carry the reader forward quickly, as a novel is expected to do. As I started into the first chapter, the protagonist, Simon, a British enterprise architect, newly hired by a US company, arrived at the New York headquarters of the firm for his first day of work. His new boss, the Chief Technology Officer of the firm, took him to meet the CEO. Simon’s initial conversation with the CTO and then the CEO convinced me that at least my first assumption was correct. Simon believed he was there to figure out how he could develop a good technology map of the new firm. He told the CTO about his disappointment with his last firm that had moved enterprise architecture to the Strategy group, and wondered aloud about business executives who think they understand IT well enough to really make enterprise architecture decisions.

This went on just long enough, and was believable enough, that I was about to put the novel down, when, during the second CEO interview, his boss explained that he was the enterprise architect of the company, but he would be glad to have Simon’s assistance. The CEO could have been a former IT executive, but in fact he wasn’t. He simply meant what he said: The CEO is responsible for structuring the organization, determining goals, and deciding what kinds of investment to make. To deliver on his promise, a week later the CEO asked Simon to accompany him on a trip to visit the Tokyo subsidiary with him. And, once on the plane, he gave Simon the financials of the subsidiary and asked him what he thought their problems were. This would be an interesting test for any enterprise architect – give the architect the operating results shown on page 48 of RecrEAtion and see what he or she would make of them. Simon probably showed more knowledge than most would and reformatted the various numbers into two ratios: Revenue/Dollar of Operating Cost and Profit/Completed Transaction. Without looking at these ratios, since the gross numbers kept going up, one probably wouldn’t have noticed that both had peaked and were beginning to slowly decline. The productivity and profitability of the Tokyo subsidiary was going down, even as their gross income continued to grow. This is the point where I grabbed my Financial Management textbook and started doing some subsidiary reading.

The analysis of ratios is, of course, something that is taught in every MBA program and it is the heart and soul of what bankers do when they think about lending money to a business entity. Rarely, however, do financial analysts follow through from specific ratios to an analysis of business performance problems and then
to specific suggestions about how to improve business processes.\(^5\) That’s exactly what Simon’s CEO proceeded to do. Simon became so flustered that his CEO stopped their discussion, and told Simon that the choice was his: Did Simon want to come with the CEO to meet the Japanese CEO and talk about the performance of the subsidiary and its ‘architectural problems’, or would Simon prefer to meet with the Japanese firm’s IT head and discuss their IT systems? After a bit of hesitation, Simon elected to meet with the CEOs and thus begin his real career as an enterprise architect.

At another point, when Simon was trying to explain to his CEO what he did, he mentioned that he put quite a bit of emphasis on business processes. The CEO said that he did too – but primarily on the customer’s processes. This threw Simon, who explained that this was the inverse of the way he was used to thinking about process. As someone who focuses primarily on process, I was impressed. Focusing on customer processes is cutting-edge thinking among process specialists. Many of the process professionals I know wouldn’t have known exactly what the CEO was talking about, even though the ideas have been getting more and more attention in process circles since at least 2005.\(^6\)

RecrEAtion is full of interesting ideas like the ones I have mentioned. I found myself making notes and pulling other books off the shelf in an effort to understand the implications of the ideas being presented. Simon ends up going to several different subsidiaries, discovering new performance measures, and gradually developing a methodology that relies on a high-level performance analysis as a way to diagnose problems and suggest solutions. RecrEAtion describes enterprise architecture as it ought to be practiced. Enterprise architecture should be grounded in an analysis of the business, its current performance, and the relationship between its business processes and its performance. One ought to proceed to technology only in order to better understand or to improve those business processes. Unfortunately, this isn’t what typically happens, although to be fair, few enterprise architects have a CEO as bright and flexible as Simon’s fictional bass. (Certainly one good way to use this book is to give copies to the business executives you work with.)

Over the years I have largely given up on the term ‘enterprise architecture’, believing that it has become so strongly associated with IT architecture that it has little to offer non-IT managers. In the past few years I have tended to refer to my own concerns as either ‘Business Process Architecture’ or simply ‘Business Architecture’.\(^7\) Chris Potts has given me hope, however, and I think I am ready to see if I can get used to using the term enterprise architecture again. This year IRMUK is holding a conference that will be, in effect, a co-meeting of its annual enterprise architecture conference and its annual BPM conference. I noticed that Chris Potts is giving a day-long tutorial, Driving Business Performance with Enterprise Architecture, and I plan to be in attendance.\(^8\) Maybe business process practitioners and enterprise architects are ready to initiate a new dialog.

Meanwhile, this is an important book. Although I’d hardly recommend it as a novel, it is a fast and dramatic way to present some important ideas, it works quite well. But what I really like, however, is the way it introduces and supports the idea that enterprise architects should be primarily focused on the performance of the firm. They should be positioned to help the CEO organize and then improve the company. The technical details, like the ratios used to analyze process performance, are interesting, as is the methodology that is developed in this book – but more than anything else, this book represents an inspired effort to define the role of the enterprise architect. If you are an enterprise architect, or someone who has to manage one, and can only read one book about enterprise architecture this year, make it Chris Potts’ RecrEAtion. It will certainly make you think, and it just might change your idea of what enterprise architecture is all about.

Paul Harmon is the Executive Editor of www.bptrends.com, the Chief Methodologist of BPTrends Associates, and the author of Business Process Change (2nd Ed.). In the 1990s he wrote the Enterprise Architecture Strategies newsletter for Cutter Consortium.

**REVIEW BY LEN FEHSKENS**

This is a very different book about enterprise architecture. You can see that immediately from the cover; it depicts something that looks like an explosion, and the title is rendered in an odd mix of upper and

\(^5\) A good exception is the work of the Supply Chain Council – a consortium of supply chain executives -- and their SCOR architecture. The SCOR methodology provides a way of mapping multi-company supply chains, and a scorecard for tracking performance. Moreover, SCOR provides a set of specific ratios that member organizations can apply to evaluate the performance of a supply chain. For more information on the SCC, visit www.supply-chain.org. For a description of the SCOR methodology, see Peter Bolstorff and Robert Rosenbaum’s Supply Chain Excellence (AMACOM, 2007).

\(^6\) For an excellent introduction to the idea of starting an analysis with the customer process, see James Womack and Danie Jones Lean Solutions: How Companies and Customers Can Create Value and Wealth Together (Free Press, 2005). An overview of this approach is available at www.bptrends.com if you search for “Model the Customer Process”.

\(^7\) For a recent article I wrote from this perspective, go to www.bptrends.com and search for “What is a business architecture”.

\(^8\) For more information on the June 8-10, 2011 IRMUK EA-BPM joint conference, go to www.irmuk.co.uk/bpm2011 or to www.irmuk.co.uk/eac2010/index.cfm.
lower-case characters, with the ‘ea’ in the middle in a larger font than the rest of the title. The title itself is ambiguous, as it might mean recreation in the sense of playful diversion, or recreation in the sense of creating again. If you get what this book is saying, you’ll see that both meanings apply.

The book is apparently a sequel of sorts to an earlier book titled “fruITion”, but not having read that precursor, I can assure you that this volume stands quite successfully on its own. It’s a quick, easy read, but if you’re not already ‘on its wavelength’ you may mistakenly dismiss it as irrelevant to enterprise architecture as you know it.

At face value, this is the self-narrated story of one Simon Rathbone, newly hired as the VP of Enterprise Architecture for an unnamed company in an unnamed business, headquartered in New York City, but with facilities all over the world. In his first few weeks with his new employer, Simon travels extensively, and successive chapters of the book describe his encounters with his colleagues in a succession of cities. This story serves as a sort of parable or allegory, though more explicit and rather less momentous than, say, The Pilgrim’s Progress. In case you might not get the message, each chapter ends with a set of concise ‘Observations’, and it is these observations that are the real substance of the book.

That the business of Simon’s new employer is left unspecified says something telling about both Chris Potts’s concept of enterprise architecture and the way he thinks it is best shared with the reader. I happen to agree with much of that concept of enterprise architecture, but if I didn’t, I’m not sure that the way Potts presents it would change my mind. More than just the nature of the unnamed company’s business is left unsaid; almost all of Simon’s insights are out-of-the-blue ‘ah hahs!’ or revealed truth gleaned from a colleague’s remark. Why these things ought to or must be the case is left to the reader to figure out. The model that Simon develops, EEAA (Establish, Explore, Activate, Apply), with each of the four steps having four primary focuses, struck me as a bit arbitrary and perhaps contrived. I also thought the language got a little too wooly in places; e.g., when Simon concludes that enterprise architecture should be: “centered on the structure and space we give people for their enterprise to flourish”; I think I know what he means, but it would have been helpful to get some confirmation. This is a book, not a conversation, and I can’t reply to Simon: “so, what you’re saying is …."

I don’t want these quibbles to detract from the fact that this book articulates what an increasing number of enterprise architects believe to be a properly business-centric, rather than IT-centric, concept of enterprise architecture. The collection of ‘Observations’ that express this concept and some of its consequences is itself worth the price of the book and the time it takes to read it. Highly recommended, with the reservation that if you’re certain enterprise architecture is about IT, it may read like a lot of New Age blather.

Len Fehskens is the Vice President, Skills and Capabilities for The Open Group. He is responsible for The Open Group’s activities relating to the professionalization of the discipline of enterprise architecture.

**Zoom Factor for the Enterprise Architect: How to Focus and Accelerate Your Career**

*Sharon C. Evans, Firefli Media, Winnipeg, 2010, 368pp*

**REVIEW BY PAUL KURCHINA**

I highly recommend this book by Sharon Evans as a great career excellence guide that is targeted at three distinct groups – would-be architects, new IT architects, and architects who are new in their chosen architecture specialty in enterprise architecture. The book begins by describing the use of the roadmap and the various pit-stops along the way to gain critical information and expedite career advancement opportunities in this exciting field.

The book includes very good tips and techniques, including shortcuts and methods with references to links and templates, are presented throughout the book, as well as a downloadable workbook to offer a curriculum and tools for the reader’s journey. The book covers a variety of distinct knowledge areas that are common to architects who possess traits of excellence and are presented in a precise order, with opportunities and decision points along the way.

The first section describes the basic ‘gate’ of information and skills an architect would need to excel at as an IT practitioner in various fields and areas in which they started their career. Topics such as changes to their current skills that got the reader to a position to even consider architecture is addressed. Modeling, engineering, research, and analysis and the different approaches from an architecture perspective are included.

Moving to section two, the reader gets an abridged guide to information they need about the architecture process. Critical information they would need to apply it to any of the confusing and daze of various architecture methodologies prevalent today is reviewed. Abstract and
pattern thinking are included, and a deep discussion on
the mapping and blueprinting activities that great
architects use in their everyday work is included. This
section covers the skills needed to compartmentalize
and organize chunks of information and requirements
into systems and solutions.

Section three is about mastering the use of critical soft
skills and, major crossroads here – one in which the
architect may decide to further his/her career as a lead
project architect or choose to follow a path in enterprise
architecture. Here a few soft skills such as leadership,
politics, consulting, and specific communication methods
are key. The book describes the critical knowledge
needed, and ways in which the reader could gain
experience from various project assignments they may
engage in to get such experience.

In section four, architecture perspectives, such as vision
and big picture thinking, are introduced. The concept of
using roadmaps to broach the subject of moving from
current to future state is addressed, from both a project
architecture and a larger-scaled enterprise view. The
book offers ways to use realist filters to test
recommended solutions, and show the budding
architects how they can gain credibility as an expert by
using checklists to ensure solution integrity. The section
is concluded by a lengthy area on team design,
construction, and leadership, as it is the number one
reason that a company would call in an enterprise
architecture coach.

The final section includes subjects that must be
mastered to attain full excellence and recognition as a
Chief Architect or Chief Technology Officer. The topics
and specific activities such as a strategic planning and
alignment between business and IT are included, as well
as discussion of the various components to an
engagement of this activity. The book includes
techniques to include and prove quality in the
architecture through metrics and portfolio planning.

The appendices and resource sections include sample
resumes and tips for inclusion of key project and focus
areas. Book-sized checklists and several reference
maps and charts are sprinkled throughout the book.

The book succeeds in introducing the architect to key
business areas of knowledge they must strive to learn in
order to gain the respect and work side-by-side with
business experts.

The book is currently available in print, and soon as a
digital book.

Paul Kurchina (paul@kurchina.com) runs KurMeta Group out
of Calgary, Canada. He has co-authored several books,
including In Pursuit of the Perfect Plant – A Business and
Technical Guide. Paul is also the Americas SAP User Group
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