An Approach for Developing Business Architecture, an Essential Enabler for Business and IT Alignment

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Abstract

The business and Information Technology (IT) alignment issue has become one of the top ten IT management issues since 1980. Since then IT has strived to achieve alignment with business goals and objectives through many efforts. Enterprise Architecture (EA) to provide the foundation of IT in an organization and has been extensively covered in the past two decades with most of the efforts focusing on Technology Architecture, Information Architecture and Application Architecture and less emphasis on Business Architecture (BA). This research developed an approach with supporting methodology to develop a comprehensive BA, and to address and improve business / IT alignment following a qualitative research methodology. The research was based on 1. the proposition that a comprehensive BA is required to enhance Business IT alignment, and 2. that the BA should be developed before the Information Architecture, Application Architecture, and Technical Architecture. The key deliverable of the research project is the conceptual solution of the BA Development Approach encompassing the BA principles, BA viewpoint (and sub-viewpoint), BA framework, BA process model, BA methodology and BA Tool. The conceptual solution was demonstrated by means of a case study performed in a real world manufacturing company which convincingly validated the research propositions. The key contribution of this research is that it has demonstrated that the business can greatly benefit from the development of the BA which provides improved alignment of business and IT life cycle processes. The improvements are mainly attainable in the communication and partnership perspectives. It was also demonstrated that significant value is obtained by implementing the BA before the other architectures.

Keywords: Business and IT Alignment, Business Architecture Development Approach, Business Architecture Framework, Business Architecture Process Model, Case Study

1. INTRODUCTION

For the past few decades, Information Technology (IT) has been supporting enterprises in performing business processes, transactions and activities. It is widely believed that an enterprise can have better performance when the IT systems are aligned to the business expectations, goals and objectives. Thus, business and IT alignment has been one of the top concerns of senior management in the enterprise for many years (Luftman, Bullen, Liao, Nash, & Neumann, 2004). Ross, Weill and Robertson, (2006), state that business rely on IT

to execute the company strategy, and that the top priority is to build the foundation of execution, namely the IT infrastructure and digitized business processes that automate the core capabilities of the enterprise.

Enterprises have prioritized architectural viewpoints of technical/infrastructure, information and application since they are more IT-driven. This emphasis in part contains architecture complexity, and makes it easier to conceive the benefits once the architectural viewpoints and blueprints are developed. However, the core of an enterprise is the business processes, no matter what kind of industry the enterprise is in. Thus, there is an emergent need for studying business processes. Therefore, the development of blueprints to model business processes (i.e. business architecture) captures a lot of attention of Enterprise Architects in recent years (Infosys, 2005; Harmon, 2010).

Clearly, research is required to fully understand the value of BA towards improved alignment between business and IT, and how to develop it in an organization.

1.1 Research Questions

To research BA, the investigation addressed the following questions:

1. Does a comprehensive BA improve IT and Business alignment?
2. How can a comprehensive BA be developed?
3. What is the role and relevance of BA in relation to the Enterprise Architecture (EA)?
4. What inputs are needed to create a comprehensive BA?
5. What models are encompassed in the BA that can guide other architecture viewpoints in the EA?
6. When is the best timing for the BA to be in place?
7. Who are the stakeholders in an organization concerned with the BA?
8. Does BA inform IT during the development of the IT strategic plan?
9. Does BA let IT understand what the key concerns are from the business perspectives?
10. Does BA help IT stakeholders to understand the business side of the organization?
11. Could a comprehensive BA apply to the small-medium businesses?

1.2 Research Propositions

These questions have been considered and have lead to the following propositions:
1. A comprehensive BA is a requirement to improve Business - IT alignment
2. Development of BA should be done before the Information Architecture, the Application Architecture, and the Technical Architecture.

2. RESEARCH STRATEGY

To examine the research problem and develop a possible solution, an Inductive - Hypothetic research strategy (Graaff, 2001; Meel, 1994; Sol, 1982; Vreede, 1995) has been adopted.

Figure 1 shows an adaptation of this strategy for this research project.

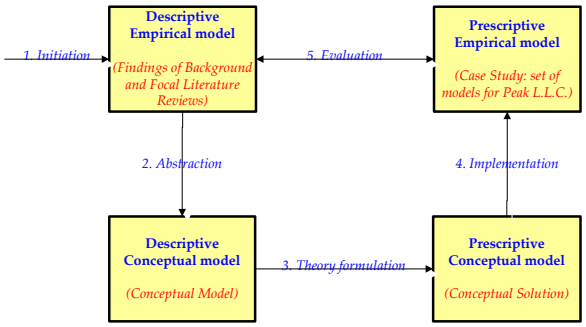

Figure 1: Research Strategy (adapted from (Graaff, 2001; Meel, 1994; Sol, 1982; Vreede, 1995)

The *Initiation* step involved an extensive literature review related to the research problem. The findings revealed that understanding of the business is a key factor to achieve business–IT alignment, and that EA is a way of achieving this goal. As part of the *Abstraction* step, the researchers reviewed the theory and practice of the EA domain and concluded that the development of an EA requires the adoption of four main elements: EA Principles, EA Framework, EA Process Model, and EA Methodology. The researchers also reviewed strategic alignment models, alignment perspectives, and current development models of BA. Thus a conceptual model which illustrates the research problem domain was developed.

The *Theory Formulation* step resulted in the synthesis of insight derived from own knowledge and experience with the literature findings. Since this research focused on the understanding of

the business and role of BA, the conclusion of this step was to propose a BA Development Approach which includes BA Principles, BA Framework, BA Process Model, BA Methodology and BA Tool.

During the *Implementation* step the researchers elaborated the conceptual solution at a real company, Peak L.L.C., and developed the set of BA models following the proposed BA Development Approach.

In the *Evaluation* step, the outcomes of the research project were evaluated in terms of the research questions and propositions identified in Section 1.

3. LITERATURE REVIEW

The literature review used key words such as business, IT, architecture, business and IT alignment, as well as BA, to determine literature in the background theory and applications and focal theory and applications. An overview of the literature is shown in Figure 2.

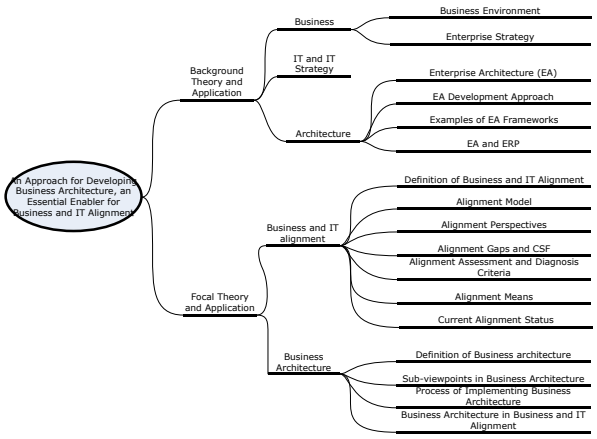

Figure 2: Overview of Literature Topics

3.1 Background Theory and Applications

The background literature review enhanced understanding of aspects of business, IT and EA as a whole, and is summarized below.

- The business environment is changing very fast and IT could help to respond to the changes (Boar, 1999), (Friedman, 2006). The role of IT has been changing from a supportive role to a strategic one (Luftman et al., 2004).

- Enterprise strategy is the allocation of the resources in the enterprise to achieve enterprise goals in the future (Nykryn, 1970). This makes enterprises different from each other (Porter, 1996). The Five Forces Model of Porter considers an enterprise strategy for competitive advantage from five perspectives: customers, suppliers, competitors, potential entrants, and substitute products or services (Porter, 1980)

- IT is "the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware" (Information Technology Association of America, 2009). IT strategy is a set of decisions made by IT management that enable the business strategy. It does not only concern the technologies or infrastructures deployed in the enterprise, but is also about the relationship of technology choices to business strategy. These choices allow the enterprise to become more competitive (Luftman et al., 2004).

- Various definitions of EA were found as follows: EA concerns both corporate strategy and technology (United States Department of Commerce, 2007), (Perks & Beveridge, 2003), (Schekkerman, 2008). EA may incorporate the suppliers, partners and customers (The Open Group, 2009a). EA is a knowledge repository to host related architectural artifacts (Zachman, 2000), (United States Department of Commerce, 2007). EA has a process model that guides the EA development (United States Department of Commerce, 2007). In general, EA consists of Business Architecture, Information Architecture, Application Architecture and Technology Architecture (Schekkerman, 2004), (Perks & Beveridge, 2003), (Schekkerman, 2008), (The Open Group, 2009a).

- In order to develop an EA, the GERAM (Generalised Enterprise Reference Architecture and Methodology) framework was proposed by (IFIP-IFAC Task Force, 1999). It organizes all enterprise integration knowledge, develops an overall definition of a generalized architecture, and defines concepts for designing and maintaining

enterprises for their entire life history. Leist and Zellner (2006) proposed an EA development method of five elements for developing EA descriptions: the meta model, procedure model, technique/modeling technique, role and specification document. Schekkerman (2007a) believes components for developing an EA should include goals and objectives, framework, standards, tools, technique, and process (Schekkerman, 2007a). Steenkamp and Kakish (2004) concluded that an architecture approach should include architecture principles, architecture framework, architecture process model, and architecture methodology. Based on these authoritative sources, the researchers determined that the Architecture Development Approach should include the following components:

- **Architecture principle**: Architecture principles are guidelines for developing the EA to ensure consistency, commonality and durability of the architecture within the organization (Steenkamp & Kakish, 2004). It is "A qualitative statement of intent that should be met by the architecture, which has at least a supporting rationale and a measure of importance" (The Open Group, 2009a).
- **Architecture framework**: For Schekkerman architecture frameworks provide a consistent overview and approach, and share a common concern for the different components in the enterprise to be captured and analyzed. It also provides a holistic way to integrate business, information, application and technology architectures to align enterprise strategy, goals and objectives (Schekkerman, 2005a). This is supported in several well-known architecture frameworks such as the Zachman Framework, The Open Group Architecture Framework (TOGAF) and Extended Enterprise Architecture Framework (E2AF)
- **Architecture process model**: An architecture process model structures the architectural processes into interrelated development life cycle stages, and provides guidance for developing the EA (Steenkamp & Kakish, 2004). There are a variety of architecture process models, such as the Enterprise Architecture Process of Federal Enterprise Architecture (FEA) (Chief Information Officer Council, 2001), Win-Win Spiral Architecture Process Model from (Schekkerman, 2001), The Steenkamp, Avant and Li (2007) Architecture Process Model, and TOGAF's Architecture Development Method (ADM) (The Open Group, 2009a).
- **Architecture methodology**: According to Steenkamp and Kakish (2004), "Architecture methodology provides steps to be followed in the life cycle stages, representation schemes, modeling notations, deliverables to be produced as well as documentation templates for the integrated set of models" which is complementary to the architecture process model.
- **Architecture tool**: Architecture tools can save time and efforts for an enterprise developing EA. They can "analyze and optimize the portfolio of business strategies, organizational structures, business processes / tasks and activities, information flows, applications, and technology infrastructure" (Schekkerman, 2007b).

3.2 Focal Theory and Applications

The focal literature review provided insight of business and IT alignment and the role of BA, as follows.

- IT and business alignment implies utilizing IT to aid decision-making and implementing the strategy with minimal resources. IT strategy, infrastructure and processes should support business strategy, organization structure and processes in order to optimize the value chain, which provides products or services to the customers (Chan & Reich, 2007), (Strassmann, 1997), (Henderson & Venkatraman, 1993), (Kaplan & Norton, 1996), (Weill & Broadbent, 1998), (Luftman, Papp, & Brier, 1999), (Aerts, Goossenaerts, Hammer, & Wortmann, 2004), (Benson, Bugnitz, & Walton, 2004).

- The Strategic Alignment Model proposed by Henderson and Venkatraman (1993) provides the concept of business and IT alignment. It includes four domains: Business Strategy, IT Strategy, Organization Infrastructure / Process, and IT Infrastructure / Process. Here alignment is

based on Strategic Fit and Functional Integration. Strategic Fit recognizes the need for any strategy to address both external domain and internal domain. Functional Integration refers to the strategic integration between business and IT strategy, and the operational integration between the organization and IT infrastructure / processes. Thus, to achieve alignment, both Strategic Fit and Functional Integration must be addressed simultaneously.

- Alignment perspectives that explain how business and IT alignment occurs were introduced along with the Strategic Alignment Model by Henderson and Venkatraman (1993). They identified that Business Strategy and IT Strategy are the two drivers for alignment, with four alignment perspectives: Strategy Execution, Technology Transformation, Competitive Potential and Service level. In his research on alignment perspectives Papp (2001) has found that in addition to Business strategy and IT Strategy, IT infrastructure and business infrastructure could be the alignment drivers as well. Thus, eight further alignment perspectives are identified.

- To achieve alignment, the gaps must be identified mitigated. The following gaps were identified based on the following studies (Luftman et al., 1999), (Luftman & Brier, 1999), (Jahnke, 2004), (D'Souza & Mukherjee, 2004), (Basu & Jarnagin, 2008):
  - Lack of business engagement, which includes senior executive support and different mind-sets of businesspersons
  - Lack of IT understanding business, including lack of understanding of business strategy, the priority of IT initiatives and fulfillment of business requirements
  - Failure to evaluate IT's return on investment (ROI)
  - Failure to manage impacts introduced from IT, including fast-changing technologies, core competency adjustment according to IT, and organizational change.

- The organization is able to understand its alignment status through an alignment assessment exercise. Some assessment criteria are in place. Chan and Reich (2007) propose that alignment should be addressed from five dimensions: strategic, organization structural, the relationship between business and IT, the commitment to business goals, and enterprise culture. Luftman (2003) states that alignment should be addressed from six categories: communication between business and IT, the value of IT, IT governance, business and IT partnership, IT architecture and infrastructure and IT skill set (Luftman, 2003). Weiss and Anderson (2004) believe alignment should be addressed from three dimensions: business strategy, organizational infrastructure and processes, and the IT strategy.

- BA "is used to describe the business strategies, operating models, capabilities and processes in terms that are actionable for business technology" (Hoque, 2008). It "defines the business strategy, governance, organization and key business processes" (The Open Group, 2003), and "describes the current and target business environments, focusing on the business processes and operations of the enterprise" (Metastorm, 2007).

- Ganesan and Paturi (2008) performed a comparison regarding BA on eight different enterprise architectural frameworks (Ganesan & Paturi, 2008), and found that no one framework provides all answers for the role of BA. They have proposed that BA should be addressed from 12 attributes: Business Motivation, Business Situation, Business Commitment, Business Role Player, Business Organization Unit, Business Location, Business Event, Business Resources, Business Information, Business Behavior, Business Functions, and Business Offering.

4. CONCEPTUALIZATION OF SOLUTION

4.1 Conceptualization of Research Domain

The researchers developed a conceptual model which organizes major components of the current state of the research domain as a class model shown in Figure 3 using UML 2.0 notation (Rumbaugh, Jacobson, & Booch, 2005), (OMG, 2009). It shows the enterprise entities as classes and sub-classes, and their relationships. Together they form a meta representation of EA tying the business and IT together, the relationship between EA and BA, and how the EA is developed.

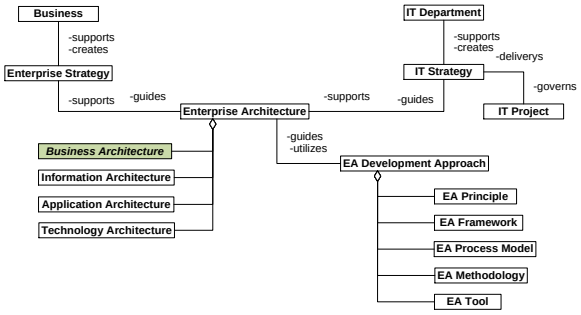

Figure 3: Conceptual Model of Research Domain

4.2 Conceptual Solution of Research Problem

Analysis of the literature reviewed resulted in the notion of a systematic method to develop the BA in order to bring business and IT into the desired alignment, which currently is missing. Therefore, the researchers propose a systematic method to develop BA, called the BA Development Approach in this research, and a BA Process Reference Model (BAPRM), as a taxonomy to aid the BA Development Approach, as presented in Figure 4.

The relationship "BA Development Approach references BAPRM" depicts that the BA Development Approach utilizes BAPRM as a reference during the development of BA. The relationship "BA Development Approach *guides* Business Architecture" depicts how the BA Development Approach is associated with BA. The proposed BA Development Approach is a systematic approach to develop BA. A systematic approach is a step-by-step approach to solve a problem methodically.

Based on the literature review in Section 3.1, EA consists of Business Architecture, Information Architecture, Application Architecture and Technology Architecture as viewpoints and the approach to develop EA includes EA Principle, EA Framework, EA Process Model, EA methodology and EA Tool. Therefore, the researchers proposed the BA Development Approach consisting six parts: BA Principle, BA Viewpoint (and Sub-viewpoint), BA Framework, BA Process Model, BA Methodology and BA Tool. The six components are addressed in the following sub-sections.

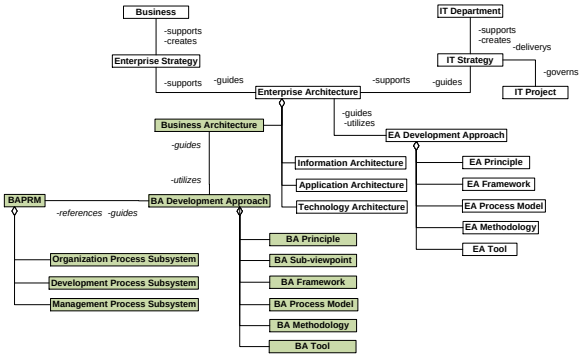

Figure 4: Conceptual Solution of Research Problem

4.2.1 BA Process Reference Model (BAPRM)

In this research the SEPRM (Software Engineering Process Reference Model) (Wang & King, 2000) was adopted to develop the BAPRM along with the proposed BA Process Model stated above. The process reference model provides the formalization of process modeling and a description of algorithms that establishes a formal foundation for the BA processes. In addition, it enables quantitative benchmarks to be performed according to each base process activity of the model.

In BAPRM, the researchers classified processes into four domains: subsystem, category, process and practice. In order to provide a formal identification for each activity defined in this reference model, the indexing and naming convention used are given in Table 1. Here *i* is the number of PS; *j* is the number of PC; *k* is the number of PROC; and *m* is the number of BPA.

Taxonomy	Subsystem	Category	Process	Practice
Process scope	Process subsystems (PS)	Process categories (PC)	Process (PROC)	Base process activities (BPAs)
Size of domain	3	7	15	70
Identification	PS[i]	PC[i,j]	PROC[i,j,k]	BPA[i,j,k,m]

Table 1: Process Hierarchy and Domain of BAPRM Model

The high-level hierarchical structure of BAPRM is shown in Figure 5. A subsystem is displayed as PS_i, e.g. PS_1 means Organization Process Subsystem. A category is displayed as $PC_{i,j}$, e.g. $PC_{2.2}$ means BA Development Environment. A process is displayed as $PROC_{i,j,k}$, e.g. $PROC_{1.2.1}$ means Internal Interface Process. Any base process activity is displayed as $BPA_{i,j,k,m}$, e.g. $BPA_{2.1.2.6}$ means Identify process improvement opportunities.

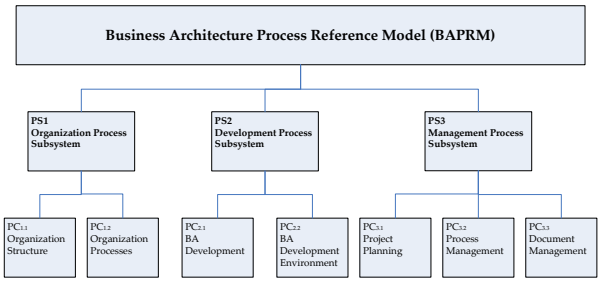

Figure 5: Hierarchical Structure of BAPRM

4.2.2 BA Development Approach

BA Principles

Principles are concerns and aims of one or more stakeholders and must be adopted and implemented when developing the component architecture of the EA (Steenkamp & Kakish, 2004), (The Open Group, 2009a). The BA principles establish the basis for a set of rules and behaviors to be observed by the architects when developing the models of the BA. They should be translated into guidelines to address and mitigate stakeholders' concerns. A coherent set of principles are important when developing architecture models of the EA. There are a number of principles mentioned in TOGAF (The Open Group, 2009a) classified into three levels: strategic, tactical and operational level.

Strategic level business principles require that everyone in the enterprise must observe the defined principles without exception. The principles relating to benefits to the enterprise are the first to be considered and may not be disputed. In addition, the enterprise should comply with government regulations, laws and policies.

Tactical business principles include, for example 1) No duplicate or similar applications should exist in the enterprise; 2) There should be only one application support unit for similar business functions across the enterprise; 3) Maintaining quality information is everyone's responsibility; 4) Protecting intellectual property is both IT and business responsibilities.

Operational level business principles include, for instance 1) Keep the business running if the information service is down temporarily, such as providing a mirror server or a backup database; 2) The service orientation concept should be embedded into developing IT solutions in order to achieve business agility and boundary-less information; 3) IT is responsible for owning and implementing IT solutions that meet user requirements; 4) Services should be provided promptly, and in a cost-effective way.

BA Viewpoint (and Sub-viewpoints)

Informed by the literature review researchers propose that BA be developed systematically from the structure, behavior and information perspectives, referred to as sub-viewpoints, of the business.

- **Structure sub-viewpoint**: Conveys understanding of the components that make up the business such as the organization layers, the context of departments, the locations of the business operations, the service and product catalog provided by the business, the existing business systems supporting the business, and so forth.
- **Behavior sub-viewpoint**: The ways that the business operates such as its value chain, its business processes, its business information flows and transformations, and so forth.
- **Information sub-viewpoint**: The collection of meta data regarding the business including the data, facts, information or knowledge resources of the business such as the business direction, business requirements, politics, regulations, economic situation and standards related to the business.

BA Framework

A BA Framework provides a conceptual frame of reference when thinking about the BA. The proposed BA Framework here aims to address the sub-viewpoints identified earlier. In order to illustrate these sub-viewpoints, the researchers propose the following sub-view portfolios in the BA Framework, shown in Appendix 2. The rest of this section provides a description of each of the view portfolios in the BA Framework.

The following view portfolio presents an analysis of the BA from the "Structure" sub-viewpoint by means of representation schemes of models for the sub-viewpoint:

- **Organization Chart**: A diagram displaying the physical structure of the organization.
- **Business Location Diagram**: A diagram of all locations where the business carries out the operation.
- **Service & Product Catalog**: A list of products or services provided by the business.

- **Five Forces Model**: A diagram showing the industry analysis of the business including its position relative to its suppliers, buyers, existing competitors, new entrants and new substitute products or services (Porter, 1980).
- **External Relationship Diagram**: A diagram showing the business and its relationships to the external environment such as economic systems, government, and resources markets (Harmon, 2007).
- **Business Systems Diagram**: A diagram illustrating the relationships between business systems.
- **Business Function Decomposition**: A hierarchy diagram displaying the detail of functionalities of the business functions.
- **Tiered Business Systems Architecture**: A diagram of the hierarchy of business systems. It further displays the sub-systems within the high-level systems.

The following view portfolio presents the BA from the "Behavior" sub-viewpoint:

- **Value Chain**: A diagram consisting of a series of activities that create value (Porter, 1985). It enables the identification of the major value-added activities within the business.
- **IS Business Process Diagram**: A diagram depicting the current state ("As – Is") view of the existing business processes. It includes the sequential flow of activities and information, the flow of control between activities, and the ownership of activities by means of a swim lane notation such as BPMN (Business Process Management Notation) (OMG, 2011).
- **COULD Business Process Diagram**: A diagram which is similar to the IS Business Process Diagram, but describes the possible alternatives and future business processes.
- **SHOULD Business Process Diagram**: A diagram which looks like the IS Business Process Diagram, but illustrates the preferred future state of business processes.
- **Business Scenarios**: A description explaining a business process in some more detail, as well as the business environment, the people who execute the scenario and the desire outcome of proper execution.
- **Business Information Flows**: A diagram showing the information flows between functions or processes in the business.

The following view portfolio presents the BA from the "Information" sub-viewpoint:

- **Role/Responsibility Matrix**: A matrix showing a list of roles (the actor who performs the business behavior), a list of responsibilities and their mappings.
- **Performance matrix**: A matrix used to manage and measure business process. It contains goals / measures, design decisions and management tasks for each level (activity, process and organization) of the company.
- **SWOT Analysis**: A textual analysis of the business' internal and external environment. It includes an analysis of the strengths, weaknesses, opportunities and threats of the business (Wikipedia, 2011).
- **Gap Analysis Worksheet**: A worksheet that includes the results of the comparison between the current and target business architectures (Harmon, 2007).
- **Business Entity Diagram**: A diagram displaying the business entities and relationships between entities for a given business area.
- **Business Glossary**: A list of definitions of terminologies specific to the problem domain, and explains terms that may be unfamiliar to the reader.
- **Business Information Requirement**: A Requirements document defining all information including the sources of data, the information as input to a process or the information as output to a process needed to support one or more business functions or processes.
- **Fact-Rule Table**: A list of rules that further explain business processes and business requirements (Steenkamp, Avant & Li, 2007).
- **Business Systems / Information Requirements Mapping**: A list containing the mapping between business systems and information requirements.

BA Process Model

A process model structures the architectural process into interrelated life cycles stages to depict the tasks that the BA development team should perform in the BA stage. A conceptual process model for developing the BA, based on the literature reviewed on the background and focal theories and applications and own insight, is proposed and shown in Figure 6. It includes the following phases:

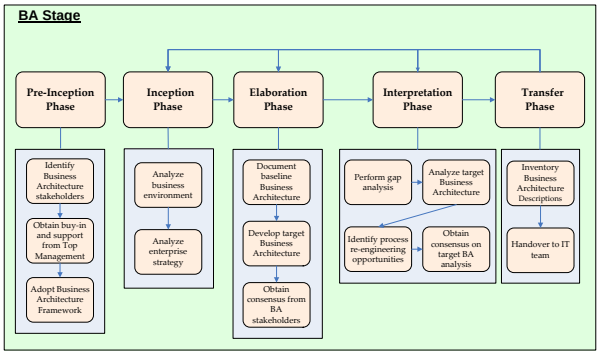

Figure 6: Conceptual BA Process Model

Pre-Inception Phase: It is very important to involve all BA stakeholders such as the CEO, CIO, and senior management from both IT and business units. Developing the BA of the company is not only the IT's responsibility, but also concerns the business, and it is required to have approval and buy-in from all stakeholders for BA tasks to proceed. In addition, once consensus is reached, it is better to adopt a BA Framework because the framework is the reference when developing a BA. Figure 7 depicts the inputs, steps and outputs of the Pre-Inception Phase.

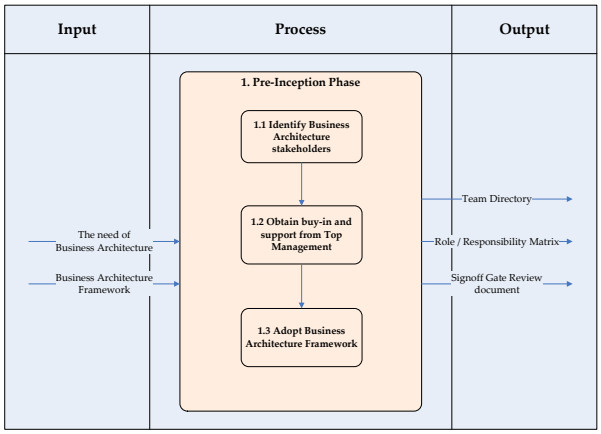

Figure 7: Input and Output for Pre-Inception Phase

Inception Phase: In order to develop the architecture for the business, one must understand the business. Therefore, we address it from the business environment and enterprise strategy perspectives. Figure 8 depicts the inputs, steps and outputs of this phase. The first step is reviewing the business environment from both external and internal points of view.

The second step is analyzing the enterprise strategy because it defines the goals of the entire enterprise, and then structuring the strategy in a manageable way in order to reach the stated goals.

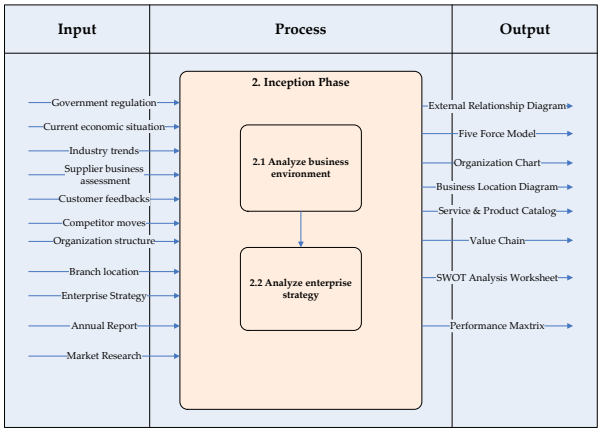

Figure 8: Inputs and Outputs of Inception Phase

Elaboration Phase: In order to attain the business' goals, we need to know the current status, and hence the first step in this phase is to document the current business situation as the baseline BA, such as the business process, function and structure of the enterprise. Next, according to the goals, we need to envision what the future BA should look like. Accordingly a target BA is developed based on the analysis provided by the conceptual BA Framework presented earlier. At this point it is important to review the target BA with all stakeholders and revise it based on their inputs. Finally, it is necessary to have consensus from all stakeholders on the proposed BA in order to proceed to the next phase. Figure 9 depicts the inputs, steps and outputs of the Elaboration Phase.

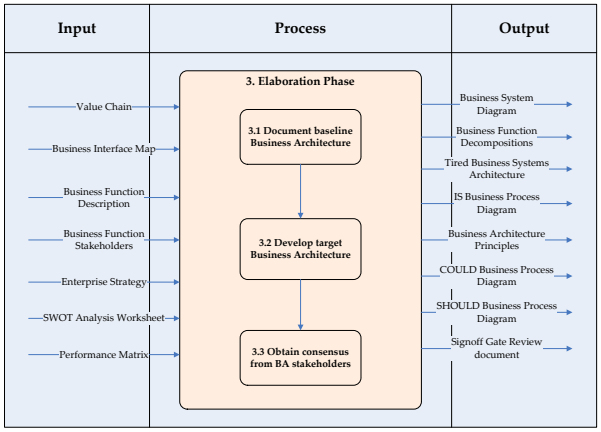

Figure 9: Inputs and Outputs of Elaboration Phase

Interpretation Phase: With the baseline BA and target BA developed, a gap analysis should be performed to identify the workload to achieve the final desired state. The next step is analyzing the target BA in great detail. During the analysis, it is a good opportunity to assess whether any process could be improved for better performance. The analysis results will then be reviewed with all stakeholders to obtain agreement and consensus before moving forward. Figure 10 depicts the inputs, steps and outputs of the Interpretation Phase.

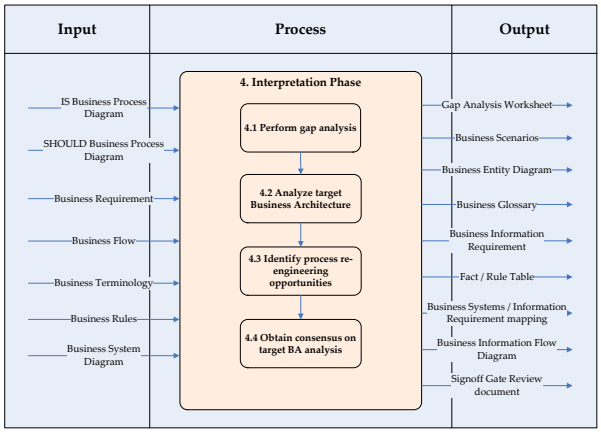

Figure 10: Inputs and Outputs of Interpretation Phase

Transfer Phase: In this phase we need to finalize the BA by crosschecking the target BA against the enterprise goals, making formal documents for the results of the gap analysis, the understanding of target BA, and so forth. Then we can create the BA Definition Documents including the view portfolios and deliverables discussed earlier in Section 4.2.1 on the BA Framework and BA Methodology, and inventory them in the architecture repository. The final step is preparing and transferring them to the IT team. Figure 11 depicts the inputs, steps and outputs of the Transfer Phase.

BA Methodology

Architecture methodology provides steps to be followed in the development of the architecture process model. Informed by the review of the background and focal theories and applications, the proposed conceptual BA methodology is presented in Appendix 1. It illustrates the steps, view portfolios, and deliverables in detail for each phase in the process model.

BA Tool

Tools can help to save time and efforts during BA development. Many business process management systems (BPMS) adopt modeling languages such as UML 2.0, BPMN (OMG, 2011) or ArchiMate (The Open Group, 2009b) in order to document BA Definition Documents.

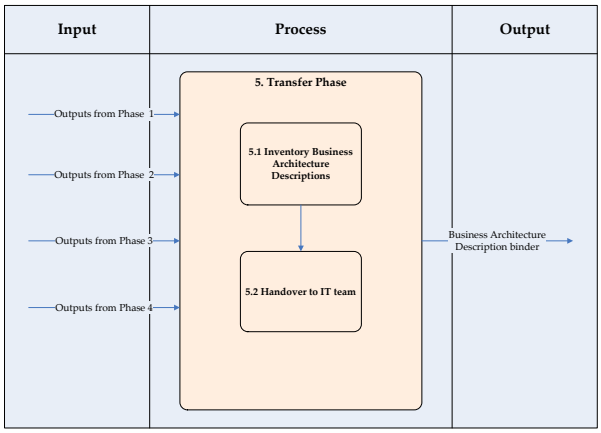

Figure 11: Inputs and Outputs of Transfer Phase

5. DEMONSTRATION OF CONCEPT

To demonstrate the conceptual solution, i.e. the BA Development Approach, the researchers worked with an actual manufacturing company to illustrate the development of the BA in the form of a case study. The intent was to demonstrate the value of the BA Development Approach to the company, named Peak L.L.C. to retain confidentiality of the actual company.

Peak L.L.C., a global auto part supplier, is a medium size company with a strong regional orientation because of its history of acquisitions. As a result, many business units still utilize their own operations and business processes. The IT systems of the enterprise have been neglected during the past few years, and there are a large number of disparate systems. Currently the IT spending only accounts for 0.6 percent of the revenue where the industry average is around two percent. The business people in each business unit do the best they can to obtain the information they need in order to keep the business running. Due to the acquisitions there are many disparate business processes used around the world, and this has resulted in roadblocks during the pursuit of Business Intelligence solutions. During the project it became clear that a logical BA would provide a sound understanding of the business systems and their roles in the company. Mindful of the

time constraint for the project, the case study focused on the development of BA on the Financial Consolidation Process (FCP), an accounting process, which allows the company to summarize operation data from all subsidiaries into a single set of financial statements so that investors can understand the performance of the company in a full scope. Twenty six BA deliverables were created based on the proposed BA framework, BA process model, BA methodology, as described in (Li, 2010a; Li, 2010b).

One of major problem Peak L.L.C. has is having disparate business processes which results in disparate systems. Therefore, it is necessary to understand its business processes as a whole and then conclude a standard system to support business needs. The proposed solution, BA Development Approach, provides a systematic method to help IT to understand the business processes thoroughly and recommend the best solution to meet the business requirements.

During the process of developing the BA for the company it was found that Peak L.L.C. lacked a method to interpret its enterprise strategic plan, and an approach to create understandable documents of the company from the business perspective. The case confirmed that the IT department had been neglected for many years. The evaluation of the alignment level of strategic alignment maturity (Luftman, 2003) is at either Level One (initial or ad hoc process) or not above Level Two (committed process). In view of the findings, the researchers have recommended that Peak L.L.C. should constitute a permanent team, adopt the proposed BA approach and apply it to all business units in order to develop a complete BA for the company. The Peak L.L.C. senior management team has reacted very positively on the evaluation of the case study that was conducted. They are at the time of writing launching a global G/L consolidation system (SAP/BPC), and developing plans for process and system changes starting in 2011. They indicated that the BA guiding principles that were established and documented in the case study continue to be relevant, and provide guidance for planning and prioritization. In the IT organization they have established an architect position that will incorporate the recommendations from the case study, and plan on adopting the software tool suite (OpenText Provision Workbench) that was used in the case study to develop the BA. The intent is to accept the recommendations of this research and to continue to develop EA definitions, descriptions and models for Peak L.L.C. and store all architecture artifacts in the EA repository.

6. CONCLUSIONS

In analyzing the problem of business and IT alignment the goal of this research was to develop and test an approach, a framework and a methodology for creating a BA, to support the propositions proposed in Section 1:

"A comprehensive BA is a requirement to improve Business - IT alignment" and "Development of the BA should be done before the Information Architecture, the Application Architecture, and the Technical Architecture"

The research findings show that developing the BA can improve business and IT alignment and provide inputs to other architectures, i.e. information, application and technical.

It was demonstrated that the BA has improved communications between Business and IT. A well-defined BA enables IT to understand the business activities and requirements in greater detail, and it allows the business to increase their knowledge of IT issues. This improvement to communications will encourage business and IT departments to share common goals of the company. During the development of the BA deliverables, the business and IT members worked closely together as a cohesive team of partners, and the knowledge of the business is now shared with the IT counterparts. As a result, the BA serves to strengthen the IT enablement of business, while enhancing IT understanding of the business priorities and the potential of improved Business–IT partnerships. Therefore, the former inhibitor of lack of a close relationship between IT and business has been alleviated.

6.1 Contributions

The contributions made by this research include the expansion of industry understanding of the BA in the context of EA, and filling the gap of the imbalance regarding the development of different viewpoints of EA (Schekkerman, 2005b). This was achieved by a conceptual solution which consisted of a systematic BA Development Approach, to develop the BA in an organization, and to demonstrate that not only can large enterprises afford to develop and benefit from the BA, but also a medium size

company. It was demonstrated that the development of BA can improve business and IT alignment from the communications and partnership perspectives, and confirmed findings of Luftman (Luftman, 2000).

6.2 Recommendations

Most organizations face significant pressures to develop competitive advantages in order to survive in the fast changing business environment. They believe IT can be a significant enabler to achieve competitive advantage. However, IT departments should not be placed in the role of a firefighter to resolve and fix technology problems as there are occurring. Utilizing IT departments for strategic development of a comprehensive IT plan that is aligned with the enterprise strategic plan and business objectives is highly advantageous in providing companies with competitive advantages. A comprehensive BA can help business and IT departments understand each other and form a good team to enable the organization to succeed and survive.

This research strongly recommends performing BA projects by following the proposed BA Development Approach to all business units in order to inventory related knowledge of the organization from the business perspective. In this way IT can obtain the best understanding for the business and have the most appropriate IT strategic plan to stay in alignment with the business direction.

6.4 Future Research

Potential directions of future work include addressing BA from the business perspective, and exploring BA beyond the EA field.

Other future research directions of particular interest include:

- The need to involve large size organizations with significant supply chains.
- The need to include different industry sectors in performing the research.
- The need to include organizations with different strategic alignment maturity levels.

Noted is the fact that the BA field is relatively new. The proposed BA Development Approach, i.e. BA Principles, BA Viewpoint (and Sub-viewpoints), BA Framework, BA Process Model and BA Methodology is expandable and may be updated as the BA field matures.

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Appendices and Annexures

Appendix 1: Conceptual BA Methodology

BA Stage		
Process Model Phase	**Steps**	**View Portfolios / Deliverables**
Pre-Inception Phase	Identify BA stakeholders Obtain buy-in and support from Top Management Adopt BA Framework	- Team Directory - Role / Responsibility Matrix - Gate Review – Signoff document
Inception Phase	Analyze business environment - Analyze the context of the enterprise - Analyze external relationship - Identify major activities - Perform SWOT analysis Analyze enterprise strategy - Develop Business Goals & Measures	- Organization Chart - Business Location Diagram - Service & Product Catalog - Five Forces Model - External Relationship Diagram - Value Chain - SWOT Analysis Worksheet - Performance Matrix
Elaboration Phase	Document baseline BA Develop target BA - Develop BA Principles - Develop alternative target BA - Decide target BA Obtain consensus from BA stakeholders	- Business System Diagram - Business Function Decompositions - Tiered Business Systems Architecture - IS Business Process Diagram - BA Principles - COULD Business Process Diagram - SHOULD Business Process Diagram - Gate Review – Signoff document
Interpretation Phase	Perform gap analysis Develop target BA in detail Identify process re-engineering opportunities Obtain consensus from BA stakeholders on target BA analysis	- Gap Analysis Worksheet - Business Scenarios - Business Entity Diagram - Business Glossary - Business Information Requirement - Fact / Rule Table - Business Information Flow Diagram - Business Systems / Information Requirement mapping - Gate Review – Signoff document
Transfer Phase	Inventory BA Descriptions Handover to IT team	- BA Description binder

Appendix 2: Conceptual Solution - BA Framework

Sub-viewpoint (Structure, Behavior, Information)	**View Portfolio**	**Purpose** (Informing, Deciding, Designing)	**Concern/Principle**	**Stakeholder**	**Modeling Language**	**Content** (Overview, Coherence, Detail)	**Layer** (Business, Application, Technology)	**BA Architecture Phase** (Pre-Inception, Inception, Elaboration, Interpretation, Transfer)	**View / Model type** (Conceptual, logical, physical)	**Standard**	**Tools**
Structure	Organization Chart	Informing	Optimal collaboration between partners	Strategist	System diagram	Overview	Business	Inception	Physical	Enterprise	Visio
Structure	Business Location Diagram	Informing	Understand the spread of business	Architect Business Analyst	System diagram	Coherence	Business	Inception	Physical	Enterprise	Visio
Structure	Service & Product Catalog	Informing	View of service or product business provide	Strategist	List	Detail	Business	Inception	Physical	Enterprise	MSWord
Structure	Five Forces Model	Designing	Understand the position of business	Architect Business Analyst	System diagram	Overview	Business	Inception	Conceptual	Enterprise	Visio
Structure	External Relationship Diagram	Designing	View of business environment	Architect Business Analyst	System diagram	Overview	Business	Inception	Conceptual	Enterprise	Visio
Structure	Business Systems Diagram	Designing	Relationship between business systems	Architect Business Analyst	System diagram	Detail	Application	Elaboration	Logical	Enterprise	Visio
Structure	Business Function Decomposition	Informing Designing	Functionality of business systems	Architect Business Analyst Developer	Hierarchical model	Detail	Application	Elaboration	Logical	Enterprise	Visio
Structure	Tiered Business Systems Architecture	Designing	Hierarchy of business systems	Architect Business Analyst	System diagram	Detail	Application	Elaboration	Logical	Enterprise	Visio
Behavior	Value Chain	Designing	Major activities of business	Architect Business Analyst	System diagram	Overview	Business	Inception	Logical	Enterprise	Visio
Behavior	IS Business Process Diagram	Informing	Current state of business	Architect Business Analyst	BPEL	Detail	Business	Elaboration	Logical	BPEL ISO/IEC12207	PVW Visio
Behavior	COULD Business Process Diagram	Deciding	Alternative state of future business	Business Analyst	Business Flow Diagram	Detail	Business	Elaboration	Logical	UML2	Visio
Behavior	SHOULD Business Process Diagram	Designing	Future state of business IT enablement	Business Analyst	Business Flow Diagram	Detail	Business	Elaboration	Logical	UML2	Visio
Behavior	Business Scenarios	Designing	Business process description	Business Analyst User Developer	Text	Coherence	Business	Interpretation	Physical	Enterprise	MSWord
Behavior	Business Information Flows	Informing	Information input and output	Architect Business Analyst	Information flow diagram	Detail	Business	Interpretation	Physical	Enterprise	PVW
Information	Role/Responsibility Matrix	Informing	Appropriate allocation of responsibilities	Business Analyst Developer	Matrix	Detail	Business	Pre-Inception	Logical	Enterprise	MSWord
Information	Performance Matrix	Informing	Understand the purpose of business existence Identify goal and measurement	Strategist Architect Business Analyst	Matrix	Detail	Business	Inception	Physical	Enterprise	MSWord
Information	SWOT Analysis	Deciding	Understand the pros and cons of business	Business Analyst	Text	Detail	Business	Elaboration	Physical	Enterprise	MSWord
Information	Gap Analysis Worksheet	Deciding	Gap analysis	Business Analyst User	Text	Detail	Business	Interpretation	Physical	Enterprise	MSWord

Sub-viewpoint (Structure, Behavior, Information)	**View Portfolio**	**Purpose** (Informing, Deciding, Designing)	**Concern/Principle**	**Stakeholder**	**Modeling Language**	**Content** (Overview, Coherence, Detail)	**Layer** (Business, Application, Technology)	**BA Architecture Phase** (Pre-Inception, Inception, Elaboration, Interpretation, Transfer)	**View / Model type** (Conceptual, logical, physical)	**Standard**	**Tools**
Information	Business Entity Diagram	Informing	High level view of business information entities	Business Analyst User	Class Diagram	Detail	Business	Interpretation	Contextual	UML2	Visio
Information	Business Glossary	Informing	Business vocabulary definition	Business Analyst Developer User	List	Detail	Business	Interpretation	Physical	Enterprise	MSWord
Information	Business Information Requirement	Informing	Strategic / Tactical level of information	Architect Business Analyst Strategist	List	Detail	Business	Interpretation	Physical	Enterprise ISO/IEC15288	MSWord
Information	Fact-Rule Table	Informing	Business rules	Architect Business Analyst Developer	Table	Detail	Business	Interpretation	Physical	Enterprise	MSWord
Information	Business Systems / Information Requirements Mapping	Informing Deciding	Sound service strategy	Architect Business Analyst User	Table	Coherence	Business	Interpretation	Logical	Enterprise	MSWord