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Effect of Retiring Custom Web Applications on Business and Information Technology Alignment

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BA, Nizam College, Osmania University, 1989

MS, Champlain College, 2005

Dissertation Submitted in Partial Fulfillment

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Abstract

Web applications provide the information technology (IT) implementation of business and align IT with business. Retirement of IT applications should ensure stability of business and IT alignment. The current study investigated the alignment gaps created between business and IT resulting from retiring IT software applications. The purpose of this study was to identify IT integration points with business and provide a process-based solution that sustained IT alignment with business after retiring IT applications. The theoretical framework strategic alignment model aided in identifying 3 IT domains as the IT integration points with business: enterprise architecture, configuration management database, and service-level agreement. The research methodology was grounded theory method. A process-in-operation facilitating application retirement generated the data. The grounded theory approach revealed the core category as IT and business alignment and established that the identified IT domains enabled IT alignment with business. The research findings revealed that structured decommissioning, timely repository updates, and 2-way communication between IT and business ensured continued accuracy and reliability of the repositories so business made valid interpretations. The findings may enable employees to realize their self-worth and dignity, leading to increased collaboration and coordination. The positive social change implications of these findings are in the increased alignment between IT and business, resulting in improved overall employee performance.

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Chapter 1: Introduction to the Study

Application development, either web-based or traditional stand-alone software, enables the automation and optimization of business functions and processes, in addition to producing processed output using user inputs and business rules (Maizlish & Handler, 2005). In the current global economy and marketplace, web-based applications are vital to businesses as they enable businesses to extend beyond geographical boundaries and time zones. Web applications are complex web-based database systems that execute programs on both clients and servers (Nathan-Regis & Nasira, 2014). The role of a web application is diverse and ranges from providing customers with a firsthand user interaction to generating revenue for a business. Defined more precisely, web applications are web-based software programs that interact with back-end database systems to accomplish specific actions or functionalities (Pauli, 2013). The specifc focus of this study was web applications, which I will refer to as *applications* going forward.

New applications and the automation of core businesses improve growth and productivity, and provide the competitive advantage for businesses (Capgemini & HP, 2010). Information technology (IT) aligned with business ensures the realization of competitive advantage. Vu and Micliuc (2010) emphasized that business and IT align when IT strategies translate, implement, and support business objectives. Applications thus emerged as effective enablers and IT implementations of business. Therefore, business leaders are always ready to invest in the development and upkeep of applications. Researchers at Forrester Research predicted that businesses in 2007 would spend 25% of their IT investment on new projects (as cited in Shaw, 2007).

Applications in operation deliver results that help realize business goals. Therefore, continuous development and maintenance of these applications requires a constant flow of funds. The total cost of operation therefore includes the continuous investments made on the application during its lifetime, which includes acquiring (idea generation to development), activating (deployment), and keeping it running (maintenance to decommissioning the application) (Piedad, 2014). Researchers at Gartner reported that during an application's life cycle, 30% of the total cost of operation is from maintenance and management of the application (as cited in IBM Global Services, 2003), and researchers at Forrester Research indicated that 67% of IT budgets go toward maintenance of applications alone (as cited in IBM, 2009). Such high investment requires a definition of the value of an application. The business value of an application is the value an application provides to a business and its users by addressing a function of a business problem (Applimation, 2009). Therefore, if the value realized by a business is higher than the investment, then the application delivers business value. However, the changing nature of business goals diminishes the business value delivered by applications (Info-Tech Research Group, 2011). Such deterioration is usually a prime driver to retire applications. Business value derived from applications ensures IT and business alignment and is a measure of IT investment. Thus, an application is an asset, and like any other asset, it undergoes continuous assessment for benefits and cost.

Applications are software assets and undergo constant evaluation to assess the returns. The continual evaluation of software assets enables business leaders to determine future investment on the asset (Chappell, 2008a). The continuous process of aligning IT with business requires application managers to evaluate the business value of applications in operation constantly (Info-Tech Research Group, 2011). Vu and Micliuc (2010) stated that changes in business strategies drive changes in IT strategies and processes, ensuring continued alignment. In turn, business strategy should reciprocate favorably when IT strategy drives a change. In response to changes in business goals, legacy application stops delivering business value leading to the eventual retirement of these applications. However, retiring such applications does not ensure alignment between IT and business.

Although applications help to fulfill some business goals, retiring applications requires erasing all traces of the retired application to ensure business and IT alignment is not cross-mapped between newer and older applications. Henderson and Venkataraman (1999) stated that IT strategy can be explained through external and internal domains, with information systems (IS) architecture, IS processes, and IS skills constituting internal domain. Alignment aids business in maximizing IS investments by synthesizing business plans and IT strategy (Tan & Gallupe, 2006). Mooney, Gurbaxani, and Kraemer, contended that the implementation of technology occurs at operational levels, and measuring the impact of IT investments should occur at the lower operational process levels (as cited in Tallon and Kraemer, 1999)). Business strategies supported and executed by IS processes include a wide range of managerial and operational processes (Porter, 1985; Henderson & Venkataraman, 1999). Tallon (2008) stated that alignment should result from pursuing a correct fit that includes processes or activities that comprise business strategy. According to Porter’s (1985) typology, immediate demands on IT occur mostly at operational or managerial levels. Therefore, as most processes occur at these levels, effective balance between strategic initiatives and immediate demands on IT leads to tactical alignment (Info-Tech Research Group, 2012) or operationalizing alignment (Tallon, 2008).

The following chapters include a broad introduction to the study, discussions of specific aspects of the study, and a background section including a description of the application retirement stage and associated activities. Additionally, I have included an overview of the application retirement process (ARP), as well as the limitations and constraints of the process. The subsequent sections constitute the purpose of the study, the problem statement, the significance of the study, and the resulting positive social change. Supplementing these components are descriptions of gaps from previous research, the nature of the study, and the associated research questions that drove this research. Through the conceptual framework, I introduce the area of study, followed by the assumptions, scope, delimitations, and limitations of the research.

Background

Some IT activities have limited visibility in an organization even though they are critical and vital to business. The extent to which its visibility is limited depends on the phase within the application life cycle management (ALM). However, the IT activities with limited visibility can still have a significant impact on business. In such scenarios, processes developed around the activity enable communication, facilitate data movement, and connect the outcome of the activity with other components in the IT and business realms. Information technology processes promote and implement business processes that use IT, which aids in revenue generation or executing a business goal. Such key processes enable operationalizing and sustaining IT and business alignment. The alignment established at operational level indicates tactical implementation of the strategic alignment.

Application decommission is one such activity that includes specific IT tasks that significantly affects business but is separate from the rest of the IT and business infrastructure. Organizational leaders often center business decisions on stale or nonexistent data increasing the probability of misalignment between IT and business. As applications are outcomes of strategic plans, the ALM is a tool to monitor application-specific investment. Organizations usually plan and follow three-step approach towards application lifecycle: “build, deploy and maintain” and the fourth step, end-of-life is overlooked (Capgemini & HP, 2010, p. 9). Of these, the build, deploy, and maintain steps are integral to ALM. The fourth stage, retire, is usually a clean-up activity instead of a stage within the ALM process. Application retirement is not a one-time activity but occurs every time someone develops a new application (Capgemini & HP, 2010). Therefore, application retirement should be a planned ongoing activity.

In order to ensure alignment, IT leaders create new applications after gathering business requirements, creating new data structures, and forging relationships between IT and business unit. Similarly, application decommission involves specific activities such as data migration for future use or data archival, as stipulated by data retention regulations such as Sarbanes-Oxley Act, HIPAA and PCI. These regulations require business to retain data for specific periods of time (Herge, 2013). Preservation of the business context for data retrieval and access to the stored data are the final steps before shutting down an application (IBM, 2009). Vendors such as IBM, Capgemini and HP, and Solix Technologies have developed tools to decommission applications (Applimation, 2009; Capgemini & HP, 2010; IBM, 2009; Solix, 2008). The application retirement tools support one or more of all three functions.

The three steps in application decommissioning are specific IT activities that have clear defined boundaries and therefore have limited visibility. Consequently, when an application decommissioning occurs, business alignment with IT is disturbed. Henderson and Venkataraman (1993) defined alignment as the degree of fit and functional integration among business strategy, IT strategy, business infrastructure, and IT infrastructure. The goal of strategic alignment is to maximize IT investments and gain competitive advantage (Henderson & Venkataraman, 1999). Application retirement limited to IT infrastructure will widen the business and IT alignment gap and thereby defeat the goal of strategic alignment. Tallon and Kraemer (1999) warned that IT and business leaders together should continuously evaluate changes to IT resources against business capabilities to prevent misalignment. Therefore, for every decommissioned application, the business strategy and infrastructure should undergo review for potential gaps in alignment. Sledgianoswski and Luftman (2005) recommended using IT assets enterprise-wide to extend the reach of limiting activities in response to the misalignment arising from decommissioning (as cited in Chan & Reich, 2007). Information technology capabilities, defined as a portfolio of interrelated processes, provide businesses the differential impact required to respond to competitive environments (Gray, 2011). Thus, IT processes are assets that are part of IT infrastructure capable of extending the reach of any limiting activity and serving as a thread connecting IT and business infrastructure.

The premise of this dissertation is a process developed around application decommission. I investigated data from the process, and the investigation led to the development of a theory that answered the research questions. While the ARP is successful, it lacks the ability to align business and IT in its current state. As part of this study, I identified gaps in the current processes that led to misalignment between business and IT. I closed these gaps by identifying and discovering IT domains that interface with business. I proposed a theory ensuring that retiring an application will not disturb the existing business and IT alignment.

Application Retirement Process

Overview

Application life cycle consists of planning, deployment, maintaining, and retirement or end-of-life (Capgemini & HP, 2010). Forrester analyst Cary Schwaber defined ALM as the thread that tied together all the phases of development lifecycle (Shaw, 2007). Application decommission has a series of steps that serve as building blocks for retiring an application. The decommissioning steps involve migrating, archiving, and securely accessing legacy data (Applimation, 2009). Leading vendors such as IBM, Solix Technologies, and Applimation have developed tools that help secure access to retired data, data archiving, and data migration. The tools automate the activities associated with the retirement but they have no process to support the activities. The ARP serves to fulfill this requirement. The ARP provides a process framework that interacts with IT resources associated with an application. The process can be adapted to suit the organizational setup of any organization.

Application retirement is an ongoing practice that requires a methodical approach, and is therefore, considered part of operations (Capgemini & HP, 2010). While the end-to-end steps may vary from business to business, all application decommissions follow the same core practice. Organizational leaders who hope to realize long-term benefits from application modernization require a structured process to retire applications. Structured processes notify all IT groups and departments directly or indirectly impacted by the retiring application, gather related data and metrics, and archive or migrate data before decommissioning the application. Logical execution of the steps within such processes ensures timely communication, aiding in computing cost savings, measuring technology transfer, and releasing potential resources for future strategic projects.

The development of the ARP occurred in response to the need in a U.S. federal organization for a structured process to decommission applications. There was a demand for a structured process based on a business need to reduce source code and modernize the application landscape on an ongoing basis. The main drivers influencing process design were the organizational setup, the metrics, and the business demands of the federal organization.

The development of the ARP occurred after conducting a thorough *as-is* analysis, identifying gaps in the current practice, and defining the future process. An IT organization within a unit of a federal organization was the main stakeholder of the process. A deadline to retire the identified 14 applications within the fiscal year provided only 6 months for the process development. The aggressive timeline limited the scope of the process. To ensure a structured and successful application removal, the process scope included only the IT groups directly affected within the IT organization.

Process Development

As-is analysis. An initial as-is analysis of the legacy practice of software asset decommission revealed several huge gaps in design, communication, and documentation. The legacy practice was known, visible, and accessible to only a few individuals involved in the decommission process. The existing practice documented the details of the candidate application, notified related stakeholders such as the infrastructure team that removed the application from the servers, archived data, and notified end users. The result was an updated application inventory. The development of the procedure took place on the job and was an outcome of trial and error.

Gaps identified. The lack of a structured process that followed best practices resulted in the same personnel raising and executing the request to retire applications. Confirmations of application removal did not follow decommission requests to the infrastructure and data services teams. Communications did not occur after the completion of tasks by the respective teams. Hence, updates to the application inventory followed requests to the teams. As most applications are database driven, data archival always precedes application removal. The sequence of executing activities, though known to all stakeholders, lacked prior planning and monitoring. The documentation trail included only application details, the date of removal, and any associated comments. These gaps resulted in data that were inconsistent and inaccurate. Such inconsistencies led to the application inventory flagging applications as retired while they were still available and accessible to users. Lack of timely communication resulted in application removal dates differing from the actual decommission dates. Absence of standard practices led to marking incomplete tasks as complete.

To-be process. Series of interviews and meetings helped identify requirements that would close the gaps in the legacy procedure. The new organization structure provided the potential interfaces for process integration with other groups. The potential interfaces set the scope for the process. The logical sequence provided the structure required for methodical execution of the process. In addition to the organizational structure, assigning personnel to specific tasks ensured the timely communication and completion of tasks. The new process had checkpoints that closed other identified gaps such as a documentation trail of sign-offs on intermediate tasks incorporating authorizations and approvals, built-in metrics to ensure intermediate data were not lost, aiding timely and accurate communication.

Process Description

The ARP has been in operation at the organization studied since fiscal year 2011. Thus far, more than 40 applications are successfully retired at the US federal organziation. The diagram in Figure 1 is the conceptual model of the ARP.

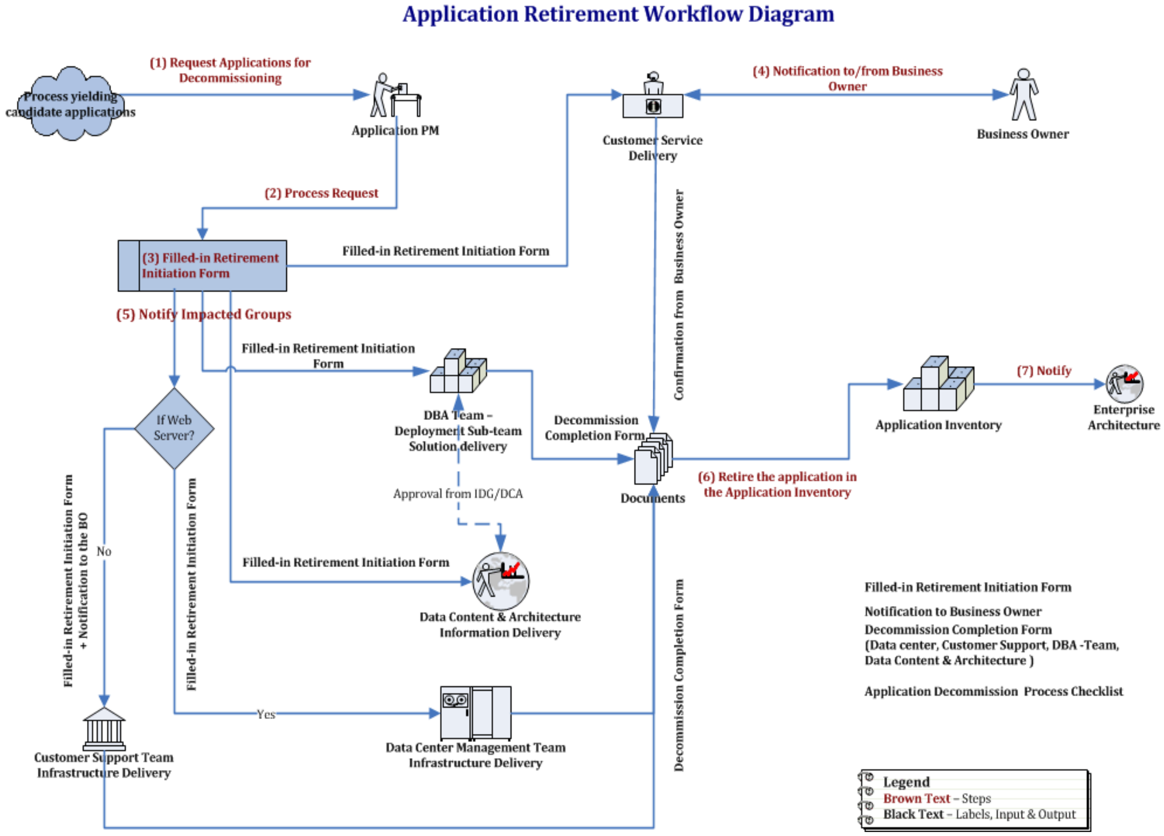

Figure 1. Application retirement process.

In the diagram in Figure 1, the teams referenced are part of the organizational setup of the U.S. federal organization studied. The applications identified for retirement served as inputs to the process. The Application Retirement Initiation Form (ARIF) captures details needed for initiating and recording retirement details. These details include the business reason for retiring the application, the development platform, the location of source code, and the presence of sensitive information such as personally identifiable information (PII) data. The filled-in ARIF provided the customer-facing group (customer service delivery), with details required to notify the end users. Based on the architecture of the application, which was either client-server (customer support team) or web-based (data center management), the appropriate teams received notification of the upcoming retirement. In accordance with the customer's request, the database team either archived or migrated the database. The database team followed the necessary protocol and regulations associated with destroying any PII data. Managers of the three teams completed the decommission completion form (DCF) that recorded the completion of the decommission task. The DCF included related data such as computing and workforce resources reclaimed and resources and time taken to decommission the application. Receipt of the three DCFs, resulted in flagging the application as retired in the application inventory. The data from the three DCFs served to compute costs savings, measure process efficiency, and transfer technology.

The ARIF and the DCFs ensured an adequate documentation trail for each application retirement. On completion of the ARIF, the teams received emailed notifications of the upcoming application retirement, and the related stakeholders received the filled-in ARIF. This timely communication helped the teams to plan their activities so that the retirement of the application occurred by the requested date. The resource performing the decommissioning task recorded their details in the appropriate data fields on the DCF. On completion of the task, the manager of the team signed on the DCF. These steps of recording the resource's details and the manager's approval implemented process governance. The completed DCFs provided evidence of completion of the respective decommissioning tasks. The signatures of the team managers on the DCFs represented the authorizations and approvals required for process governance. The receipt of the three DCFs served as a stage gate that initiated the update of the application inventory. This verification ensured the accuracy and integrity of the application inventory.

At the U.S.federal organization, the choice of process automation tool was Microsoft sharepoint. The logical sequence of the tasks, the events triggering communication and the built-in metrics are conducive to process automation. Hence, any process automation tool can serve to implement process automation. The core function of the process is to retire applications by performing the tasks in the identified logical sequence. Therefore, any organization can choose to deploy the ARP to retire applications after tailoring it to its organizational setup.

Limitations and Constraints

The ARP is a process that initiates application decommissioning for identified candidate software assets. Identifying assets for decommissioning is not a function of the process. Business justifications for retiring applications are not part of the process and thus not recorded. The ARP process facilitates the logical execution and completion of all tasks associated with application decommissioning. However, the description or successful execution of each task is a function of the respective IT groups and therefore is beyond the scope of this process. The ARP is a process within IT and hence the end-users of the application do not interact with the process. Similarly, IT groups responsible for IT security and compliance with PII regulations address issues in these areas. Therefore, these issues were not part of the process scope and design.

Problem Statement

Organizations that strategically aligned IT with their business strategy have effectively proven to employ IT capabilities (Yayla & Hu, 2012). Thus, organizations proposed or developed new applications with the main purpose of aligning IT with business. However, decades later, retiring the same applications resulted in gaps in IT alignment with business. Denstad and Bygstad (2012) defined alignment gap as the difference between expectations and capability of IT to deliver business value and benefits. The general business problem studied was an uninformed organization that resulted from the gap in alignment between IT and business after retiring applications. The lack of proper processes or standard practices for application retirement has often caused business leaders to overlook the alignment gap created by decommissioned applications. The specific business problem addressed through this research was if application decommissioning affected IT and business alignment.

The final goal of IT rationalization should result in closer alignment between IT and business (Capgemini & HP, 2010). The business side of IT, which includes IT infrastructure, IT architecture, and IT services, enables business leaders to make informed decisions. The U.S federal organization used the ARP to retire more than 40 applications successfully, but it lacks integration points to business-facing IT components. This disjointed functioning of business and IT leads to misalignment, which increases exponentially with time. To optimize operationally, IT organizations employed IT processes that systematically improved current situations by using existing resources and knowledge in an improved manner (Bot & Renaud, 2012). Processes served as a locus of alignment, demonstrating operational alignment between IT and business (Tallon, 2008). Analyzing the research available on IT and business alignment led me to infer that a process-level approach to IT and business alignment was yet to evolve. Through this study, I endeavored to close the gap in previous research by providing a process-based solution of my recommendations.

Purpose of the Study

The purpose of this qualitative grounded theory was to develop recommendations that ensured alignment between IT and business when retiring applications. Data generated by the process in operation, the ARP, served as the initial sample. Information technology and business alignment refers to the degree to which IT components such as applications, infrastructure and organization, along with business strategy and processes enable and nurture the alignment, including the process to realize the alignment itself (Silvius, 2007). The application life cycle serves as an IT application roadmap for realizing business goals. While application goals translate to business goals either individually or cumulatively, application retirement is a stage that disengages business and IT from the same goal. Recording and communicating the effect of application retirement on business will ensure future decisions are accurate, timely, and realistic. This stage resets or enables a new alignment between IT and business. Hence, after application retirement, it is important to assess the impact of the retirement on business. Therefore, to achieve the goal of this study, the first step was to identify business-facing IT components affected by application retirement. Following the identification of the IT components, I evaluated the consequence of the effect of the gap on IT and business alignment. The outcome of this study contributes to the fields of management and IS management, as well as to the area of application retirement. The increased employee self-worth, pride, and performance originating from the implementation of the recommendations demonstrated the positive social change brought on by this study.

Significance of the Study and Social Change

The significance of this study was that it highlighted the need for strategic planning to include application retirement and its impact from an IT and business alignment perspective. Additionally, the process-based solution demonstrated how IS processes can implement IT and business alignment. Therefore, this study contributes to the field of management, IS management, and, within IT, application retirement.

One of the potential contributions of this research is in the field of management. Through this research, I highlighted the need to include application retirement as part of strategic management plans. The goal of IT alignment with business is to implement business strategies successfully while maximizing IT investments (Info-Tech Research Group, 2012). To maximize IT investments, business goals drive IT goals, resources, and fund allocations. Therefore, realization and success of business goals determines and measures the business value of IT investments. Hence, the strategic alignment of IT and business demonstrates the ability of business to realize value from IT investments (Tallon & Kraemer, 1999). As applications support business goals and help implement business rules, application development and transformation are part of strategic planning. Application development injects new energy into businesses, leading to saturating the application landscape with a variety of applications. When the business goals change, related applications are retired. While management always makes strategic plans in advance, management does not plan application retirement in advance, even though it is inevitable. Therefore, the significance of this study was that it highlighted the impact on IT and business alignment when management excludes application retirement from strategic plans.

Within my study in the field of IS management, I highlighted the need to recognize the area of application retirement as a critical stage in the ALM rather than it being an operational activity. New applications enable or improve IT and business alignment. Retiring applications disturbs the alignment, which leads to gaps. Most organizations consider application retirement to be a part of IT portfolio maintenance (Maizlish & Handler, 2005) and an operational activity to declutter their application landscape (Capgemini & HP, 2010). The focus of application retirement is either to eliminate or reduce the cost of maintenance of legacy applications or to refresh with new applications as part of a new strategic plan. In the process, business leaders fail to recognize the strategic imbalance caused by application retirements. A major factor for this imbalance is the lack of standard operating procedures or best practices in the area of application retirement. This research therefore contributes to the area of IS management by raising awareness on lack of formal procedures and practices in the area of application retirement, affecting IT and business alignment.

The most important significance of this research is in the area of application retirement. This research draws practitioners' and researchers' attention to augment research and literature in the area of application retirement. The lack of literature and peer-reviewed journal articles on application retirement has been a major limitation to the study. This research augments and contributes to research and literature in the area of application retirement. Additionally, this research closes the gap identified by Tallon in the area of process-oriented IT and business alignment (Tallon, 2008). My implementation of the findings is a process-based IT alignment with business. The implementation and the associated literature is my contribution to close the gap in previous research. Thus, this research augments the literature and research in application retirement as well as process-based IT alignment with business.

Another impact of this research made was in creating and sustaining the positive social change that the current ARP initiated. The employees realized a new sense of self-worth and pride when they observed the extent to which they had contributed to the organization over the years. Through the ARP, the employees were able to view their work in a new, more meaningful light, as they were able to appreciate the impact of their roles at an enterprise level. The positive atmosphere triggered a social change in the working culture of the organization. This social change prevailed upon teams to work in harmony, which led to increased coordination and collaboration. In a siloed organization, cross-functional coordination and collaboration are celebrated accomplishments.

Through this research, I endeavored to extend the effect of positive social change to business groups. The proposed revised process, as an outcome of this research, will help the employees and users of the proposed process realize the positive ways in which they can contribute to business. This realization will further augment the employees' self-worth and respect for themselves and their colleagues' work and expertise. The mutual respect and pride may foster collaboration and coordination that result in an improved work environment that will ensure an increase in employee involvement with the organization.

Gaps From Previous Research

Several vendors such as Applimation, Solix, and IBM have developed tools that perform retirement-related activities (Applimation, 2009; Solix, 2008; IBM, 2009). These tools may perform data migration, archiving, backing up, and data destruction. As their designers specifically designed them to execute the tasks, the tools do not interact with other IT groups or business components. The ARP already addresses this gap by linking these groups to other IT groups and by ensuring a logical execution of tasks. However, the process does not interact with the business components, so business repositories remain unrefreshed. I focused on closing that gap.

Although an association exists between application retirement tools and the end-of-life stage of the ALM, the activities related to IT and business within this stage are not part of any tool scope. Although automated ALM tools extend from idea generation to retirement, application retirement is more of a final milestone, and the software development life cycle process forms the core of any ALM tool (Chappell, 2008b; Shaw, 2007). Application life cycle management and ALM tools (Capgemini & HP, 2010; Chappell, 2008a, 2008c; Shaw, 2013) focus on all the stages prior to application retirement. Therefore, another gap that this study addressed was application retirement as a critical part of ALM and the effect of retirement-related activities on IT and business.

As the bridge between IT and business, ALM is a thread that ties the development life cycle together. Although applications serve as an outcome and drive IT and business alignment, strategic plans help to establish the alignment. Extensive research exists on IT and business alignment and on the role of new applications in implementing the alignment. However, there is not enough research on the effect on the same alignment after application retirement. Through this study, I contribute literature discussing the effect of application retirement on IT alignment and provide insight into this area of the ALM. I investigated the effect of application retirement on IT and business alignment and proposed an improved process to facilitate structured application decommissioning without disturbing the alignment between business and IT.

Tallon (2008) contended that whereas processes serve as a locus of alignment, process-level alignment simplifies the challenge of translating business strategy plans to IT requirements. However, Tallon conjectured that analysis focused on controls and a single line-of-business would serve better in eliminating any potential bias. Similarly, I focused on a single line of business and a specific stage of the ALM. Tallon urged future researchers to develop measures that determined how IT supported activities within processes using process-level IT and business alignment. Through this research, I demonstrated the use of IT for different activities within a process, which in turn augmented the IT business value. Tallon indicated the limited literature and research on process-level IT and business alignment. This research is my attempt to support that research by contributing to the overall process-level IT and business alignment body of knowledge.

Nature of the Study

The method of inquiry for this study was qualitative analysis. My aim was to identify gaps and develop a process within defined concepts. Creswell (2007) noted that the aim of grounded theory is to “generate or discover a theory” (p. 63). Strauss and Corbin (1998) emphasized that in grounded theory method, theory development is an outcome of data and participants’ experience in the process (as cited in Creswell, 2007). Additionally, Creswell shared the idea about the qualitative research design grounded theory, wherein an explanation of a process is an outcome of the views and experience of a large pool of participants involved in that process. The basis of this research was data gathered from an existing process that I analyzed iteratively to uncover underlying themes. The themes thus discovered led to the research findings that resulted in a revised process. Therefore, the chosen research methodology was grounded theory. The approach to data collection was organizational objectives supported by demands of concepts and guidelines as defined within that specific area of IT.

As part of this study, I evaluated the current process to measure success and to identify gaps. I proposed a revised process that, while conforming to defined concepts within IT, closed the gaps identified in the current process. The data variables gathered from the current process served as the initial sample and formed the basis for the research questions. The theoretical samples served as the purposeful sampling for conducting data analysis. The research findings resulted from constantly comparing and categorizing theoretical samples based on the initial sample, followed by iterative analysis. The research design adhered to the data analysis techniques defined in the grounded theory method. As a result, the research findings were an outcome of applying open coding, axial coding, and selective coding. The outcomes demonstrated that the qualitative mode of inquiry and grounded theory method as the research design were the appropriate choices for this research. I am the process engineer of the current process, as well as a key witness to its success. The data from the process and the process design provided the required input for this study. The conceptual framework set the scope for the study. The gaps identified in the current process resulted in the research questions for this study.

Research Questions

A set of questions that challenged and examined the current practices related to software application retirement served as the driver for this study. The research questions for this study were as follows:

1. How does application decommissioning effect IT business components?
2. What is the effect on the existing business and IT alignment from decommissioning applications?
3. What is the effect on future strategic decisions if the business stays uninformed of decommissioned applications?
4. How do the research findings close the gaps in the ARP process?

I anticipated that the data gathered from the current process, the ARP, and the research in the area of IT and business alignment would lead to a need to review associated theory. The recommendations from the theory I propose provide answers to the research questions and a solution to close the identified gaps in the current process.

Conceptual Framework

This study rests on the well-known and popular strategic alignment model (SAM) advocated by Henderson and Venkataraman (1989). The model is a combination of strategic fit and functional integration (Henderson & Venkataraman, 1989). Henderson and Venkataraman noted that researchers who used strategic fit "examined the relation between strategic formulation and its implementation" (p. 3) while functional integration defined the "dynamic relationship between IT and business strategies" (p. 3). The following section includes the assessment of the most influential models that led to the selection of SAM as the conceptual framework for this study.

Evolution of Alignment Models

Researchers have conducted extensive research on the strategic relationship between IT and business (Henderson & Venkatraman, 1989; Henderson & Venkataraman, 1999; Luftman, Papp, & Brier, 1999; Luftman & Brier, Achieving and Sustaining business-IT alignment, 1999; Luftman J. N., 2000; Avison, Jones, Powell, & Wilson, 2004; Chan & Reich, 2007; Chatterjee, 2007; Luftman & Ben-Zvi, Key issues for IT executives 2009: Difficult economy's impact on IT, 2010). For over two decades, IT and business alignment has been the foremost concern of senior executives (Chan & Reich, 2007). The earlier models date back to the 1980s and several models have evolved since that time. The brief history of alignment model evolutions includes a focus on the reasons for selecting SAM as a conceptual framework for this study.

The initial model developed at the Massachusetts Institute of Technology (MIT) in the 1980s included IT as a strategic function (Chan & Reich, 2007). Developers of the model advocated having alignment among strategy, technology, management, processes, and individuals and roles to harness the strategic power of IT and benefit from IT investments (Sloan School of Management at MIT, 1991). Influenced by the MIT model, Henderson and Venkataraman developed the SAM model, which has four components: business strategy, IT strategy, organizational infrastructure and processes, and IS infrastructure and processes (Chan & Reich, 2007; Henderson & Venkataraman, 1999).

Two building blocks comprise the basis of the SAM model: strategic fit achieved when business strategy addresses external and internal domains and functional integration achieved with an integrated business and IT strategy (Henderson & Venkataraman, 1999). One shortcoming of the model that Chan and Riech (2007) shared is that the outcome of the model is dependent on the degree of the firm's IT capabilities. This limitation of the SAM led researchers and practitioners (such as Avison et al., 2004; Goedvolk et al., 1997; Luftman, 1993) to improve and extend the SAM by developing a variety of extensions of the SAM (as cited in Chan & Reich, 2007).

A new domain and a third dimension extended the SAM model. The redefined model's alignment included design and architecture. The modified SAM included an information/communication domain and an architecture and structure dimension (Maes, 1999; Maes, Rijsenbrij, Truijens, & Goedvolk, 2000). Chan and Reich (2007) noted that the basis of the MacDonald model was MIT's 1990s framework, which focused on external influences on clients, vendors and business sectors. Chan and Reich further shared that Baets developed a model based on the MacDonald model. Baets incorporated "competition, organizational change, human resources issues, global IT platform, and IS implementation processes" (as cited in Chan & Reich, 2007, p. 304).

The MIT framework has received credit as being the initial alignment model. The SAM is the most evolved model; although researchers developed extensions of the SAM to suit specific scenarios or industries, they are not evolutions of the model. Therefore, SAM is the most applicable alignment model that suits the current marketplace and economy.

The Strategic Alignment Model

The two assumptions, referred to as building blocks, that comprise the basis of the SAM are strategic fit and functional integration. Henderson and Venkataraman (1999) defined alignment as organizational leaders' ability to leverage technology to gain competitive advantage. Competition results in businesses imitating each other, and as technology is disruptive, Henderson and Venkataraman emphasized that strategic alignment is not a one-time achievement but a continuous process. Therefore, Henderson and Venkataraman defined strategy as the formulation of decisions and policies that related to the marketplace. Implementation of the strategy involved choosing the appropriate technology. Strategic fit refers to a strategy articulated in terms of external and internal domains. External domains include the competition differentiators of the business such as competitive edges, partnerships, and alliances. Internal domains include the IT and support infrastructure such as the design of business processes, product development, customer service, talent management, and administrative structure. Henderson and Venkataraman contended that a fit strategy resulted only if internal domains strongly support an external domain. Functional integration in the SAM refers to a combination of strategic integration and operational integration. Strategic integration, according to Henderson and Venkataraman, refers to the capability of IT functionality to drive and support business strategy providing strategic advantage to businesses. Operational integration is the coupling "between organizational infrastructure and processes and infrastructure structure and processes" (p. 476) that indicates the capability of the IS function to deliver organizations' requirements.

The model consists of four domains: business strategy, IT strategy, organizational infrastructure and processes, and IS infrastructure and processes. Each domain consists of three components. The business strategy and organizational infrastructure and processes domains represent business, while the IT strategy and the IS infrastructure and processes domains represent IT. According to this model, the more components work together, the higher the degree of alignment achieved between IT and business (Coleman & Papp, 2006).

Applying the concepts of the SAM, Henderson and Venkataraman (1999) indicated that within the model, the business and IT strategy represented external domains and organizational infrastructure and processes, and IS infrastructure and processes represented the internal domains. Coleman and Papp (2006) emphasized that strategic fit occurred if strategy determined the infrastructure of the business. Therefore, the interrelationships between external and internal domains implement strategic fit (Avison, Jones, Powell, & Wilson, 2004). Functional integration, as Coleman and Papp (2006) explained, is the ability of business to leverage IT to gain competitive advantage.

Therefore, integration between business and technology domains implements functional integration (Avison et al., 2004).

The developers of the model, Henderson and Venkataraman (1999) noted that tight coupling between all 12 components results in the highest degree of alignment. However, Henderson and Venkataraman affirmed that issues of business and IT strategy as a bivariate fit "has been argued to be dysfunctional" (p. 477). Therefore, the model includes a third premise, alignment perspectives. Alignment perspectives result from multivariate or cross-domain relationships.

Multivariate relationships rest on the premise that any change to one domain affects at least two of the remaining three domains in some measure (Avison et al., 2004). Avison et al. (2004) further explained that any alignment perspective consists of three domain types: anchor, pivot, and affected. The anchor domain is the initiator of change, which has maximum requests for IT resources, has strong representation at the executive level, and therefore is the strongest domain. The pivot domain changes by realignment and therefore is the weakest domain (Coleman & Papp, 2006). The effected domain is the domain highly affected by the change initiated by the anchor domain (Avison et al., 2004). A tabulated summary of the eight alignment perspectives of the SAM as described by Coleman and Papp (2006) appears in Table 1.

Table 1

Alignment Perspectives of the Strategic Alignment Model

Alignment perspective	Goal of the perspective	Anchor	Pivot	Impacted
Strategy execution	"Focuses on IT planning or transformation of business" (p. 245) IT architecture undergoes changes due to changes in business processes	Business strategy	Business infrastructure	IT infrastructure
Technology potential	Focus on IT measured on basis of its contribution to a business product or service	Business strategy	IT strategy	IT infrastructure
Competitive potential	Focuses on role of emerging technologies, in influencing and enabling new business strategies	IT strategy	Business strategy	Organization infrastructure and processes
Service level	Focuses on how IT improves delivery of products and services through improved business processes	IT strategy	IT infrastructure and processes	Organizational infrastructure and processes
Organization IT infrastructure	Goal of this perspective is to "process improvements from IT and application of value to business processes" (p.245)	Organization infrastructure	IT infrastructure	IT strategy
IT infrastructure strategy	Focuses on "improving IT strategy based on the implementation of emerging and existing IT infrastructure" (p.245)	IT infrastructure	IT strategy	Business strategy
IT organization infrastructure	The business visions and processes are executed using IT.	IT infrastructure	Organizational infrastructure	Business strategy
Organizational infrastructure strategy	Focuses on enhancing business strategy by exploiting capabilities to enhance products and services, influence strategy and build new relationships	Business infrastructure	Business strategy	IT strategy

Role of Alignment Perspectives in This Study

Each alignment perspective is unique, as the anchor, pivot, and impacted domains are different. Anchors initiate change, while the impacted domain undergoes the change. The pivot domain undergoes a realignment to incorporate the change. Within the context of the ARP, focusing on alignment perspectives with anchors in IT or business and on affected domains in IT or business can aid in achieving IT alignment with business. An analysis of the alignment perspectives revealed that the alignment perspectives strategy execution, service level, and IT infrastructure strategy would enable closure of the alignment gaps identified in the current ARP.

Assumptions

The ARP process was the basis for the premise of this study. The ARP process successfully retired more than 40 applications. The forms ARIF and DCFs from the ARP provided the data that form the initial sample. Therefore, based on the metadata information of those retired applications, the assumptions for this research were as follows:

- Business strategies drove the development of applications selected for retirement.
- Applications are IT implementation of business services
- Business and IT align.

Scope and Delimitations

The focus of this study was a process that interfaces with both IT and business. This process is part of the last stage of the application life cycle: the retirement stage. The scope of the study was the retirement process, the activities within the retirement stage, and the impact of these activities on business and IT alignment.

Application retirement may affect several other aspects of IT and business. However, a limitation of this study was the process-level effect on IT alignment with business after application retirement. The goal of the study was to evaluate the effect on business and realign IT and business. The realignment was from an IT perspective; therefore, the study did not include modifications to strategic and other business plans.

Although I evaluated the effect of the post retirement of applications on business in the study, the reasons for and the process of selecting candidate applications for retirement were out of scope for this study. Application retirement is the last stage of the ALM, and so this study references the ALM, but the ALM or the tasks associated with each stage were out of scope for this study. Studying the affect of IT domains interfacing with business was important for this study; however, a detailed discussion of each of those components was beyond the scope of the research.

An analysis of the data fields in the ARIF and DCFs generated by the ARP led to the research questions. As the values gathered by the process for each of the data fields did not affect the research, the values were not part of the research. Hereafter for this research, the use of the word *data* refers to the data fields and not the values for the fields.

Limitations

While extensive research exists on IT and business alignment, limited literature is available on most of the topics related to this research. Limited availability of such resources limits the guidelines and the benefit of prior research and outcomes. The limitations to this study were as follows:

1. Limited availability of research specifically on process-level IT and business alignment. There are very few peer reviewed journal articles on process-level IT and business alignment. I used documents such as white papers, reports, and articles from professional magazines to compensate for the scarcity of research material.
2. The literature and research in process-level IT and business alignment are not within recent years.
3. Application retirement is another area of research that lacks peer-reviewed articles and literature. Most literature sources that have any discussion on application retirement, is more as an outcome of ALM rather than as a process. I therefore, used my findings from the industry and supporting documents from acclaimed journals, periodicals, and magazines.

Summary

Chapter 1 set the stage for this study. The focus of Chapter 1 was the purpose of the study, the research questions that led to the study, the nature of the study, the assumptions, the scope, and the various limitations of the study. In this chapter, I presented a background on application retirement and introduced a process developed to retire applications. I also identified IT and business alignment gaps in the process design, which indicated theory development might aid in closing the identified gaps in the current process.

This chapter included an introduction to the conceptual framework: the SAM. The model served as the framework and set the scope for the study. The alignment perspectives served as drivers in identifying the IT domains aligned with business to achieve IT and business alignment. I indicated that integrating the identified alignment perspectives with the process-level IT alignment led to the revised process. The model served as the conceptual framework required by the grounded theory research methodology. The interpretation from the data within the context of the SAM enabled me to arrive at the proposed theory. Therefore, in this chapter, I discussed the framework, introduced the ARP, and presented the research questions that led to theory development.

I continue discussion on the SAM in Chapter 2. The chapter includes a detailed literature review of the model, its components, and the identified IT domains to elaborate upon the relevance of the problem. In Chapter 3, I discuss my justifications for selecting the qualitative mode of inquiry and grounded theory method as the research design. Additionally, I share the data sample and analysis according to the research design. In Chapter 4, I share the results of my analysis and the research findings that answer the research questions. Opportunities for future researchers, recommendations, and the social change triggered by my solution appear in Chapter 5.

Chapter 2: Literature Review

This chapter includes a review of the literature that aided in answering the research questions. The topics reviewed in this chapter provide context for the study and are supportive of assessing the effect of application retirement on IT and business alignment. The topics reviewed aid in addressing the research questions:

- Literature sources on application retirement highlight gaps in literature and the need for the study
- IT and business alignment set the context to answer Research Questions 1 and 2
- SAM alignment perspectives explain the process leading to the identification of the business-facing IT domains
- Enterprise architecture (EA), configuration management database (CMDB), and service-level agreements (SLA) answer Research Questions 2 and 3

Researchers have studied IT and business alignment extensively, and using a variety of perspectives (Tallon, 2008; Tan & Gallupe, 2006), they developed several models (Chan & Reich, 2007; Maes, 1999; Maes et al., 2000) and investigated frameworks (Maur, Walbeek, & Batenburg, 2009; Weiss & Anderson, 2004). Despite the extensive research, IT and business alignment has been elusive (Info-Tech Research Group, 2012) and the topmost concern to executives (Luftman & Ben-Zvi, 2010). The research thus far; however, does not include the effect of decommissioned applications on IT and business alignment.

The objective of this research was to identify the IT areas that affect business after retiring applications. I adopted a process-oriented approach of evaluating IT and business alignment. The ARP described in Chapter 1 set the context and scope for this research, with the goal being evaluating the effect on IT and business alignment. I applied the alignment perspectives of SAM to the process to identify the IT components that need addressing to either realign or maintain the existing IT and business alignment. I further identified the IT domains within the context of the process to demonstrate their effect on IT and business alignment. I also explored existing research on the identified IT areas to understand their respective roles and influence on IT and business alignment after retiring applications and to understand the subsequent effect of nonrefreshed resources of the IT areas on the alignment.

Literature Review Strategy Overview

Information technology and business alignment is a vast subject. Examination of existing literature on IT alignment resulted in the immense research work done in this area. Although extensive research exists on IT and business alignment, there is a lack of research on the subjects of application decommission and a process-oriented approach to IT and business alignment. This research is a product of selected literature on alignment models, processes, ALM, and application decommission.

The alignment perspectives of the SAM conceptual framework underwent analysis to identify the perspectives that aided in closing the gaps in the ARP. The identified alignment perspectives then underwent assessment to identify the IT domains that aligned with business within the context of the ARP. I examined the literature on these IT domains and their effect on IT and business alignment to evaluate if the IT areas affected IT and business alignment. The literature review revealed the contribution and the effect of the IT domains on IT and business alignment.

Literature Search Strategy

The search strategy used to conduct this literature review included researching online databases, peer-reviewed journals, and research companies. The review also included sources such as professional magazines, books, and white papers. Online databases included EBSCO, ScienceDirect, and ProQuest Central, and peer-reviewed journals were mainly from ACM Digital Library, IEEE Xplore Digital Library, and Google Scholar. Gartner Inc. and vendor sites were the sources for industry-specific white papers and research. The review included books and publications to reference research design and qualitative methods. Professional organizations such as Info-Tech Research group, TechRepublic, Harvard Business Press, and MIT Sloan Management Review were sources of recent articles in IT and business.

The search for relevant literature included the usage of keywords such as *IT/business alignment*, *role of IT and business alignment*, and *challenges and benefits of IT alignment* using Google Scholar, peer-reviewed journals, and online databases. Key words such as *strategic alignment model*, *EA and business alignment*, *benefits of EA*, *role of EA in business/IT alignment, CMDB and business alignment*, *benefits of CMDB*, *role of CMDB in business/IT alignment*, *SLA*, *why use SLA*, and *SLA and IT* were terms used frequently to research articles and journals using Google Scholar, Gartner, Info-Tech Research Group, and Tech Republic.

As the search for literature on the topic for this study generated few existing research material, especially in terms of peer-reviewed journal articles, I relied on white papers from vendors, magazines, and books from leading IT professionals and on articles from professional organizations and vendors. I used my experience in the industry and field to aid my efforts in locating the relevant and required literature.

Literature Sources on Application Retirement

Application retirement currently involves data retention, archiving, and migration of retired data. Although businesses continue to retire applications, a formal process or procedure to perform the activity is yet to be developed. Several times during this research, the dearth of literature on application retirement was apparent. Although white papers, blogs, or articles exist on application retirement that document the current practices or tools, peer-reviewed journals on this topic are yet to become a reality. This section includes a review of the articles and resources currently available. An analysis of these resources revealed the need for research in this area.

Guidelines and Practices

Several resources exist that include guidelines that are mostly high level and leave details about the task of decommissioning to organizations. The researchers of an article titled “Top Five Considerations When Retiring Legacy Applications” recommended conducting pre-retirement activities such as vendor support, application complexity and support tickets followed by transitioning users to new applications and finally a project plan including a cost budget (Executive Brief, 2009). The article has no reference to effect on IT and business alignment or tactical implementation to sustain existing IT alignment. Hanbal (2011) had a similar thought process and provided a high-level overview of the steps in application retirement. Hanbal referenced a step called “execute decommission task” (p. 6) but failed to explain what the step involves. The article included instructions regarding how to select applications for retirement and develop a decommission strategy that includes dependency evaluation, data retention, archival guidelines, and drivers of application decommission. However, the article lacked any discussion on the impact of application retirement on IT alignment with business.

Some organizations such as the Bureau of Land Management have shared their practice of application decommissioning, which is a plan that includes communication and resource utilization templates for data migration, archival, and decommissioning (Bureau of Land Management, 2014). The plans do not include any reference to or communication with business. The article “Application Retirement: The long good bye” (Info-Tech Research Group, 2014) includes a discussion on application rationalization methodology. The phases in the methodology include “Application Disposal” (p. 5), which is again a high-level guideline. The article includes extensive data on costs toward application maintenance, building a case for application decommission, and identifying applications for decommissioning.

Application decommissioning is a phase that concerns both organizations and practitioners. However, the articles and practices reviewed in the above paragraphs revealed a lack of discussion on the impact of application decommissioning on IT and business alignment. The lack of discussion clearly indicated that IT practitioners and business leaders perceived application decommissioning only as an operational activity.

Application Retirement Tools

In addition to practices, automated tools are available that facilitate application retirement. Most of these tools include functionality to migrate and archive data as well as data stores to store the retired data. In this section, I have reviewed application retirement tools from leading vendors with a goal to determine their extent of support to IT and business alignment.

The criterion for the tools to support IT and business alignment is that the tools should interact and communicate with business. Informatica's solution for application retirement and Applimation's Informia product suite, like most application retirement tools, provide a repository for compressed and archived data from retired applications; preserve the business context of the retired application, support data retention, and allow users to access to archived data (Applimation, 2009; Informatica Corporation, 2014). Although Informatica's solutions provide a centralized store for data storage, Applimation's product provides tiered storage. Hence, the tools provide similar facilities but neither of the two tools interact with business or help sustain business and IT alignment. IBM's Infosphere server and Optim support application retirement activities such as storing and archiving data from retired mainframe applications (IBM, 2014a). The tools also allow users to access archived data but does not interact or communicate with business.

Other resources on application decommission include a variety of tools that aid with application decommission activities. Among those tools, the focus of HCL's Mainframe Application decommission service for retiring mainframe applications is identifying mainframe applications, interface mapping, and data migration. The tool has a primary focus on IT functions and does not interact with business components (HCL, 2014). Makware, a business engaged in developing mainframe productivity tools, includes a tool for mainframe application retirement (Makware, 2012). The tool includes detailed steps on retiring applications within a mainframe environment. Mainframe application retirement was out of the scope of this research and the article does not include any discussion on impact of retirement on business. Similarly, the University of Illinois offers a paid service to analyze client application portfolios and retire applications using tools selected by their clients (University of Illinois, n.d.). The service only includes recommended applications to retire and peforms only removal of identified applications. Capgemini and HP's collaboration in the area of application rationalization resulted in providing solutions that include templates and test scenarios for application retirement from Capgemini, while HP provided project and portfolio management, data management and archiving, and test automation (Capgemini & HP, 2010). This life cycle solution extends to include infrastructure but does not include any business component. Gartner's report on structured data archiving and its role in application retirement includes a discussion on most of the leading vendors such as tools in their product inventory to support data archival and migration activities (Landers, Dayley, & Childs, 2014). The report is part of Gartner's popular magic quadrant feature that compares leading tools based on performance in data archival and migration areas.

The outcome of the review of application retirement tools was that the tools either supported decommissioning activities or performed migration and archival of data. All the tools reviewed lacked any interaction with business and the functionality included IT-related activities only. Therefore, the application retirement tools had no role in sustaining IT and business alignment.

Application Retirement Methodology and Framework

Application rationalization is a process that facilitates or initiates application retirement. This section includes a review of solutions that aid in rationalizing application landscapes and portfolios. My goal was to discover literature pertaining to the impact of application retirement on IT and business alignment.

Application rationalization involves using solution sets that serve as either predefined frameworks or methodology tailored to the needs of organizations. The focus of Application Analysis Framework, an integral part of Cap Gemini's proprietary methodology for application rationalization, is on identifying applications for retirement. The final selection of the application is an outcome with low impact in the areas of functional (service ticket and change request volume, interdependency), business (regulatory, criticality, and user volume), and risk mitigation (technology obsolesce and age of the application) factors (Capgemini Worldwide, 2013b). Another Capgemini methodology, Application Retirement Methodology, provides a list of artifacts across four stages: decide, plan, design, and implement (Capgemini Worldwide, 2013a). Capgemini claims these four stages aid in identifying applications for decommissioning, evaluate the financial benefit of decommissioning the identified applications, investigate dependencies among the applications for prioritization purposes, and generate the artifacts. The methodology does not provide guidelines or directions on conducting retirement or its subsequent impact on IT alignment with business. Neither the methodology nor the framework from Capgemini interact with business or include a discussion on IT alignment with business.

Resources available on application retirement are application retirement tools, procedures, or practices. Additionally, some articles include the experience and thoughts of practicing professionals on application retirement. The most common thought across all the resources was identifying applications for retirement, cost-benefit analysis, or listing application retirement activities. Some of the articles included topics including data archival, data migration, and data retention practices and issues. These articles lacked any discussion on interactions with business and the impact of application retirement on IT and business alignment. The tools, practices, and experiences were specific to IT, and the activities discussed in these resources pertained to IT only. This inference led me to recognize the need for research in the area of application retirement. Additionally, the impact of application decommissioning on IT and business alignment emerged as a specific area that required a contribution from practitioners and researchers.

IT and Business Alignment

Information technology has become a strategic partner that delivers a competitive advantage to business. As a result, chief information officers (CIOs) and business executives experience constant challenges to collaborate with business (Elzinga, 2008). Chan and Reich (2007) explained that collaborating with IT involves “ensuring congruence between the business and IT strategy” (p. 297) to achieve successful alignment. A survey of 300 chief executive officers (CEOs), CIOs, and other business leaders conducted by researchers at the Society of Information Management revealed that since 1980, IT alignment with business has been a topmost concern. From 2003 onward, with the exception of 2007, IT and business alignment has ranked a number-one concern by business leaders (Luftman & Ben-Zvi, 2010). Luftman and Ben-Zvi (2010) reported that in 2009, IT and business alignment moved down in rank to the second position.

Successful alignment leads to maximizing IS investments by focusing on the strategic use of IT and leading to increased profitability and performance (Chan & Reich, 2007; Tan & Gallupe, 2006). Additionally, Weiss and Anderson (2004) indicated that successfully aligned organizations realized cost savings up to “17% on IT per user” (p. 2). The unique nature and the demands of business do not allow the development of a standard approach to achieve successful business and IT alignment. However, maximizing enablers and minimizing inhibitors of business and IT alignment aids in achieving IT alignment maturity (Luftman, 2000) and leads to eventual success. Research and survey data from 1992 to 1997 included six enablers and inhibitors of successful business and IT alignment (Luftman, Papp, & Brier, 1999). Luftman et al. (1999) indicated that the same key areas served as enablers, inhibitors, or both based on the support that they provided for a successful business and IT alignment. The enablers and inhibitors of business and IT alignment as identified by Luftman et al. (1999) are as follows:

Enablers: Senior executive support for IT, involvement of IT in strategy development, IT understands of business, IT and business partnership, prioritization of IT projects and IT leadership.

Inhibitors: lack of close relationsip and understanding between IT and business, low prioritization of IT, lack of leadership in IT and support from senior executives, IT fails to deliver

Recent research has revealed (Luftman & Ben-Zvi, 2010; Vu & Micliuc, 2010) a strong correlation between an increased IT alignment maturity and an improved performance of the organization. Assessing and sustaining business and IT alignment requires using the enablers and inhibitors in an optimal manner (Luftman, 2000). An analysis of the enablers and inhibitors reveals any shortcomings or areas for improvement in an alignment but does not measure the alignment. Therefore, to assess, evaluate, and measure an organization's alignment, Luftman developed the Strategic Alignment Maturity Model (Luftman, 2000). The model, based on the capability maturity model, has five levels of strategic alignment maturity with six alignment criteria.

A summary of the criteria is in Table 2 and a summary of the five levels of strategic alignment maturity appears in Table 3.

Table 2

Strategic Alignment Maturity Criteria

Criteria	Purpose
Communication	Measures information exchange between IT and business to determine understanding of business by IT and vice versa
Value	Business metrics, IT metrics, and metrics for assessing IT and business to determine the contribution of IT and business
Governance	Determine authority to make decisions and processes to use at different levels to procure IT resources
Partnership	Measures mutual trust, consensus in goals, business awareness of IT, and relationship between IT and business
Scope and architect	Measures the ability of IT organization to provide infrastructure, emerging technologies, and facilitating business processes
Skill	Measures practices related to hiring, retention, training, and organization's readiness to leverage new ideas

Note. Data are from (Vu & Micliuc, 2010)

Table 3

Strategic Alignment Maturity Level

Level	Meaning
Initial or ad-hoc processes	IT–business alignment does not exist, communication is poor, and IT is a cost center and back office.
Committed processes	Limited business and IT understanding, IT is viewed as a technical and cost center, absence of IT and business metrics and interaction between IT and business is transaction based
Established, focused processes	Improved and emerging IT and business communication, IT is viewed as an asset, some dashboard metrics exist, and relevant processes integrated across organization
Improved, managed processes	Close alignment between IT and business, IT infrastructure leveraged to gain competitive advantage, IT and business share risks and rewards
Optimized processes	IT and business alignment is optimized, IT leverages organization's partners and customers and organization shares metrics with partners, and customers

Note. Data are from Luftman (2000) and Vu and Micliuc (2010)

SAM Alignment Perspectives

The SAM includes alignment perspectives that include achieving alignment as their focus. Simultaneous assessment of strategic fit and functional integration results in these alignment perspectives (Coleman & Papp, 2006). Each alignment perspective results in a domain realigned due to the domain driving the change (the anchor) and the domain impacted by the change. Within the context of the ARP, alignment perspectives that include business and IT interaction might aid in identifying the gaps in the IT and business alignment. Therefore, perspectives wherein the anchor is business and the impacted domain is IT or vice versa are the perspectives applicable to closing the gaps identified in the ARP. The SAM's alignment perspectives strategy execution, service level, and IT infrastructure strategy meet this criterion.

Strategy execution occurs when the anchor is business strategy and the impacted domain is IT infrastructure. Coleman and Papp (2006) interpreted this perspective as changes in business processes driving changes to the IT architecture. The goal of the perspective is to design and implement IS infrastructure efficiently and effectively (Henderson & Venkataraman, 1999) to reduce delays and effort, improve services, and increase savings (Coleman & Papp, 2006). The Clinger-Cohen Act defines IT architecture as "evolving or maintaining existing information technology and acquiring new information technology to achieve the agency's strategic goals and information resources management goals" (Op't Land, Proper, Waage, Cloo, & Steghuis, 2009, p. 33). When applied specifically to the application landscape, this definition refers to enterprise architecture (EA). Enterprise architecture aids in relating architecture components to business goals and objectives (Finneran, 1998) by mapping business processes and data thus improving agility, savings, and profits (Weill, 2007).

Service level is another perspective with IT strategy as the anchor and organizational infrastructure as the impacted domain. Henderson and Venkataraman (1999) indicated that this perspective ensures the effective use of IT in delivering products and services. Business leaders predetermine metrics that measure services, called service-level agreements (SLAs). Service-level agreements serve as organizational targets that IT partners with business to achieve as well as measurement criteria to measure the effective use of IT (Greiner & Gibbons Paul, 2013). This perspective also focuses on the use of IT to improve business processes (Coleman & Papp, 2006). The service-level alignment perspective results in a realignment of the IT infrastructure domain. Therefore, as SLAs measure services, any changes to the services require EA, which is part of the IT infrastructure that needs updating accordingly.

The IT infrastructure strategy is the third alignment perspective that has IT infrastructure as the anchor affecting the domain, which in this case is business strategy. This alignment perspective results in re-aligning the IT strategy domain. The focus of the operations of IT infrastructure is “on business requirements” (Messioneo & Ryder, 2008, p. 1). The IT infrastructure can be successful in supporting business if IT department leaders are aware of their environment and can control, manage, and improve them according to the business’s needs. Success of such support to business requires a full-fledged configuration management system that maintains a logical model of the IT infrastructure (BMC Software, 2013). The obvious solution for managing configuration items of the IT infrastructure is to use a CMDB. Messioneo and Ryder (2008) indicated that businesses aligned with IT have set up a CMDB, which is an information repository, to help manage the alignment. Therefore, any changes to the data stored in a CMDB directly affects IT and business alignment. Likewise, changes to business strategies requires appropriate updates to the CMDB.

Applying the SAM alignment perspectives revealed that the IT domains that interact with business are EA, SLA, and CMDB. The three IT domains, while part of IT, stored data in business-readable form so that business could understand IT. A literature review of these areas enabled further discussion of their roles and impact on IT and business alignment.

Enterprise Architecture

History and Frameworks

Organizational leaders use EA to help their organization achieve its current and future business goals. Enterprise architecture emerged from a need to manage the growing system complexity, reduce spiraling costs, and improve alignment between business and IT (Xionwei, 2008). In 1987, Zachman introduced EA in an article in the *IBM Systems Journal* (Sessions, 2007). Enterprise architecture has since evolved into a model-based tool that helps organizational leaders make business and IT decisions in a systematic and holistic manner (Plazaola, Flores, Silva, Vargas, & Ekstedt, 2007). Plazaola et al. thus defined EA as a set of models that represents the current organization and the proposed future state of the organization. As a result, EA is continually updating the architectural components connected to business goals and objectives to ensure the visibility of the business reasons for data and business processes (Finneran, 1998). Hence, EA is an ongoing process that constantly updates the current state and future state to ensure organization readiness for the proposed future.

Designing and managing an enterprise's architecture is a complex and continuous process. Enterprise architecture frameworks provide tools, procedures, and practices that enable practitioners to create, manage, and maintain architecture systems. Zachman noted that a holistic and multiperspective approach to architecting systems, called an EA framework, would help realize business value and agility (Sessions, 2007). Enterprise architecture frameworks are therefore enablers of business and IT alignment as the frameworks manage IT assets, people, projects, and operations (Xionwei, 2008). Xionwei (2008) further shared that maximizing enterprise resources leads to successful alignment and improved performance. The creation of several EA frameworks has occurred since the mid-1990s. However, the dominant frameworks used are Zachman Framework for Enterprise Architectures, the Open Group Architecture Framework, the Federal Enterprise Architecture, and the Gartner/Meta model (Xionwei, 2008).

The artifacts generated using EA frameworks are in repositories that both business and IT leaders reference and use for their respective activities. A continuously refreshed and updated EA repository ensures constant benefits to an enterprise. The following section includes a discussion on the many areas that benefit from EA.

Benefits of EA

An updated EA repository serves to encourage using metrics to communicate and measure IT productivity. Enterprise architecture provides value by improving business–IT alignment through strategic requirements, which leads to efficient, cost-effective, and flexible engineering solutions (Chatterjee, 2007). Responses combined from operational and informational data enable leaders of businesses with EA implementations to make informed and confident decisions (Finneran, 1998). Additionally, Finneran (1998) highlighted that EA metrics "measure quality and quantity of business processes supporting IT productivity" (p. 3). Thus, EA metrics measure the use of IT and the business value of IT across an enterprise.

Enterprise architecture benefits disciplines across the software development life cycle by storing business and IT metadata to ensure project leaders and managers have sufficient information regarding business goals. This leads to accurate project prioritization and resource allocations. The relationships and definitions set up in an EA repository help project managers accurately assess the impacts of change requests to a project (Finneran, 1998), thus contributing to delivering maximum business value by increasing efficiency and reducing costs (Sessions, 2007). Encouraging the use of reusable components that further improve developer productivity, eliminate tedious tasks, and reduce development time helps achieve these goals (Finneran, 1998). Enterprise architecture aids in reengineering applications and business processes in response to new business needs. This adaptability aspect of EA is the benefit most pursued by business leaders (Chatterjee, 2007).

As noted above, EA maximizes the business value of IT by measuring IT use, increasing cost savings, and eliminating waste. Thus, EA metrics ensure the current state drives enterprise leaders to reach the future state through the efficient use of IT to realize business goals. However, the degree of alignment between business and IT and EA's role in fostering the alignment determine the success of EA.

EA and IT Alignment

Business and IT alignment has been elusive and continues to be so, even in the modern era. A harmonized IT infrastructure, closely coupled business processes with integrated systems, is a result of a tight business and IT alignment (Kallela, Saarikorpi, & Lahdenpera, 2007). Only a well-articulated EA aids in designing and realizing an enterprise's organization structure, business processes, IS, and infrastructure (Xionwei, 2008). Therefore, EA has often been a platform that "bridges the business and IT strategies effectively" (Chatterjee, 2007, p. 1). Xionwei (2008) indicated that as EA captures a wide variety of information, establishes relationships between architectural components, and stores the information in an accessible repository, EA frameworks are ideal management tools that tightly align business and IT. Hence, an EA framework that connects business, systems, and technology should also support business and IT alignment (Xionwei, 2008). Architectural components stored within an EA repository therefore translate as models for business while serving as blueprints to IT.

As a modeling tool, EA can translate, map, and represent the complexities within a business to its IT organization. The hierarchy of architectures in EA enables organizational leaders to align business goals with IT investment (Buchanan & Soley, 2002). Buchanan and Soley (2002) highlighted that the hierarchy extends from business strategy level to IT implementation level. Thus, EA is instrumental in translating an organization’s strategy to IT programs and projects by successfully executing its strategy (Op't Land et al., 2009). Enterprise architecture achieves the transformation by aligning IT with business strategy (Wang, Zhou, & Jiang, 2008). When viewed as an IT management process, EA communicates IT vision and value, influences IT investments, and thereby drives business and IT changes (Wang et al., 2008). As a result, EA serves as a “planning and steering instrument” for transforming business strategy into business value (Op't Land et al., 2009, p. 35).

Embedded between enterprise strategies and operating environment, EA has the dual responsibility of translating and communicating information between the two entities in a language the entities understand. Wang et al. (2008) shared that enterprise strategy translated and articulated using EA terminology to deliverables that IT personnel understood and the EA deliverables in turn served to “guide IT investment and design decisions” (p. 743). Additionally, Wang et al. (2008) emphasized that business and IT collaboration fostered changes in both business and IT. Enterprise architecture accomplishes business and IT alignment through its four architectural disciplines. The scope of the architectural disciplines considered subsets of EA are business architecture, application architecture, data and technology architecture (Wang, Zhou, & Jiang, 2008). Wang et al. (2008) explained that business architecture included business strategy, key business processes, governance and organization, while application architecture provided models, which depicted the relationshsips and interactions between business processes.

Data architecture referred to the logical and physical models of databases and related and technolofy architecture focused on software architecture (Wang, Zhou, & Jiang, 2008).

The relationships between the architectural components, application data, and technology architecture represent the IT architecture, which demonstrates the workings of IT along with the costs and benefits (Xionwei, 2008). This representation of EA enables business leaders to assess and align their IT investments with operational efficiency derived from IT. Xionwei (2008) emphasized that business architecture, applications, and data architecture together provide opportunities for improvements to business processes and their subsequent automation. Enterprise architecture closely aligns business and IT by facilitating redesign and improvement of business processes. Enterprise architecture makes it easier for business leaders to understand the scope and financial impact of business changes while implementing new strategic initiatives (Xionwei, 2008). Xionwei (2008) further emphasized that the EA subsets of business architecture, applications, and technology architecture facilitate opportunity creation, which promotes business and IT alignment. Information technology costs widen the gap between business and IT. Enterprise architecture helps reduce this gap by reducing IT costs. Technology and data architecture, aid business by defining and realizing infrastructure changes, gaining benefits from emerging technologies, and “managing data as an asset” (Xionwei, 2008, p. 4).

Enterprise architecture is the initiation center for “business initiatives requiring IT support” (Finneran, 1998, p. 4), but a relationship also exists between business processes and data. This relationship provides opportunities for IT-enabled business process improvement (Finneran, 1998). Enterprise architecture enforces business and IT alignment by continuously ensuring that the selected technology fits with the business initiatives (Chatterjee, 2007). Business and IT alignment occurs only when EA continuously updates its models and metadata to ensure accurate representation of changes to technology and IT infrastructure so that business can achieve its objectives

Configuration Management Database

History

Components of IT infrastructure and the relationships between them are stored in a CMDB repository. A CMDB is an integral part of the configuration management system (Roy, 2013), a part of the IT Infrastructure Library (ITIL), "a framework for best practices in Service Management" (Behnia, 2006, p. 124), and a trusted source of truth of the IT infrastructure. A CMDB is a repository representing an information system (Pharro, 2011). The repository is a logical model of IT configuration items, their attributes, and their relationships in the IT environment (Behnia, 2006; Pharro, 2011). The configuration management system therefore ensures change control of configuration items of the IT infrastructure (Messioneo & Ryder, 2008). Therefore, a CMDB is a trusted source of data on IT infrastructure and should always be accurate, valid, and reliable.

In addition to serving as a repository, a CMDB also includes the dependencies and relationships of assets to the services they support. Change control ensures the CMDB continues to be "an authoritative source of an organization's inventory of applications, products, technologies, and computing platforms" (Jensen, Knowles, &

Scott, 2009, p. 2). A CMDB is a solution, as its capabilities include “auto discovery and dependency mapping, dynamic service modeling, inventory and configuration management, [and] dashboard and process orchestration” (Roy, 2013, p. 3). As the IT landscape expands, the degree of complexity increases. For an organization to either consider IT alignment or sustain an existing alignment, it is critical to understand and maintain an accurate representation of the underlying infrastructure.

Benefits of CMDB

Treated and viewed as a solution, a CMDB provides numerous benefits to IT and business. Autodiscovery and dependency mapping introduce greater visibility and transparency of IT infrastructure, thereby enabling business to chart out actionable strategies (Jensen et al., 2009). The authors emphasized that a CMDB provides accurate data and metrics on asset utilization, better control of IT operations, and an updated status of IT assets by constantly monitoring and tracking the IT infrastructure. A CMDB provides a rich set of relationships between configuration items contributing to a service or an application (Baldree, Bhupal, & Widen, 2009). The configuration items include assets, resources, processes, services, and computing platforms. The relationships establish the value of IT and align IT efforts with business.

Business is the biggest benefactor of the relationship between configuration items. The primary advantage that business derives is the impact of business changes on IT and the impact of issues on business (Roy, 2013). This impact analysis prior to the implementation of changes has reduced risks to the production environment (Jensen et al., 2009). Jensen et al. (2009) also shared that a monitored change control ensures the accuracy of the attributes of the configuration items to provide better service to the business through improved environmental stability. Additionally, Roy (2013) shared that effective configuration management ensures the deployment of accepted standard configuration items only, which further reduces risks to the production environment. Jensen et al. (2009) indicated process orchestration enables CMDB to support business service management and IT service management initiatives. Roy (2013) asserted that dashboard and predictive analysis supports management in leveraging the information in the CMDB, which enables IT to align its efforts with business needs. Thus, CMDB ensures business has greater control of the delivery and management of IT, which results in more manageable and predictable results.

CMDB and IT Alignment

Configuration management database represents a baseline of the configuration items of the enterprise by tracking and managing all discoverable IT infrastructure components. For organizations to succeed in establishing a thriving business and IT alignment, implementation of cross-functional integration is critical (Weiss & Anderson, 2004). Additionally, business and IT alignment is an ongoing process, as business, IT or both may trigger changes, but mutual adjustments are necessary to sustain the alignment (Henderson & Venkataraman, 1999). However, siloed IT and business constrain most organizations (Pharro, 2011). The silos restrict and limit data collection and related operational metrics (Nugent, 2004). Nugent (2004) warned that this limited visibility restricts interpretation of the data and metrics in the broader context of a business's relationship with business-critical objectives and services, which leads to a loss of "a holistic view of IT services that support business objectives" (p. 3). Therefore, a timely exchange or sharing of information between IT and business prevents an organization from slipping into a misaligned state. A CMDB aids in providing a common platform for IT and business to share information effectively (Behnia, 2006). Additionally, Behnia (2006) emphasized that the shared information and the relationship between configuration items enabled IT to be proactive in problem identification and subsequent prevention, rather than requiring a reactive response. Thus, CMDB is an enabling technology that synchronizes and integrates structured IT data from a variety of silos to generate analytics and reporting that provides businesses accurate, valid, and reliable data.

Any inability in business and IT interaction hampers the successful communication of business strategy to IT, which leads IT to a lack of preparation for responding to business needs proactively. Weiss and Anderson (2004) emphasized that a lack of business and IT interaction increases the inability of a business to measure the contribution of IT. Easy access to accurate IT infrastructure data solves this inability. Information technology is an enabler of business transformation provided business and IT leaders translate business strategies to actionable plans that IT can implement (Messioneo & Ryder, 2008). Messioneo and Ryder (2008) highlighted that the CMDB is instrumental and effective in defining and executing strategy by providing operational data, metrics, and a supportive environment to management. Thus, a CMDB provides a shared vision to both business and IT while permitting a separate interpretation to achieve the shared vision.

Although logically representing an enterprise's IT, CMDB delivers value only when the data supports both business and IT. The measure of alignment success is the degree to which IT is working with business (Nugent, 2004). Functional boundaries are necessary to define an organization's structures, and diverse IT teams and functions unify and collaborate effectively by sharing information (Pharro, 2011). Available and updated information allows the identification of resources to plan and deliver IT services, thus maximizing the business value of the infrastructure (Nugent, 2004). Nugent (2004) further contended "a centralized configuration and asset management repository" aids in mapping infrastructure components to business services, which results in a prioritization of services, projects, and resources that meet business needs and demands. Behnia (2006) emphasized that a central repository of authorized IT configuration items enables leaders of IT organizations to make informed decisions and respond proactively and efficiently to business needs. A CMDB supports business and IT alignment by providing a business-centric view of the IT infrastructure. Information technology resources and components mapped to business-critical applications and services, result in a demonstration of the business and organizational value of IT (Baldree et al., 2009). This shared view enables IT to prioritize projects and resources based on business needs to ensure a higher ROI from IT.

As a repository of operational IT data and the interrelationships, CMDB must constantly undergo changes to serve as a trusted source of information on IT infrastructure. The database provides organizations the ability to map their IT resources to the IT services that they support and deliver (Baldree et al., 2009). The relationships provide instant visibility of IT architecture and operations to business, thereby increasing the value of IT (Messioneo & Ryder, 2008). The constant changes to the infrastructure driven by either IT or business threaten the accuracy and relevance of dependency mapping. However, a controlled change management of the configuration of the IT infrastructure ensures the integrity and accuracy of the CMDB. Additionally, the act of deploying approved standard configuration items improves and strengthens "the viability of IT to support business and therefore, the viability of the business itself" (Messioneo & Ryder, 2008, p. 8). Hence, changes to IT assets demand an immediate update to maintain the accuracy of the CMDB, but when the changes occur within the framework of the change process, they ensure the CMDB's integrity.

Service-Level Agreements

History

Changing business priorities makes it challenging to IT to fulfill user expectations. Information technology caters to an environment that is continuously changing, which creates competing priorities (Enterprise Management Associates, 2009). Hence, SLAs are formal contracts written jointly by an IT service provider and its customer or end-users (Leopoldi, 2002). Service-level agreements have been around for some 20 years and their objective was primarily to measure performance within a specific system (Albright, 2013). Albright (2013) further shared that SLAs began as central processing unit measurements stored and analyzed in spreadsheets that evolved over time into metrics demonstrating IT value and performance to business. Current SLAs are more business driven with technical details regarding business goals for the benefit of business units positioning IT as a strategic partner at the same time (Matlus, 2004). Service-level agreements are therefore contracts that communicate and set expectations of the service delivery and include metrics that measure the delivery.

Service-level agreements comprise a definition of services and a mechanism for managing the execution of those services. The service element includes the services provided, the availability, the performance levels, the responsibilities of each party, the escalation procedures, and the cost of the service (Greiner & Gibbons Paul, 2013; Leopoldi, 2002). Greiner et al. (2013) shared that the management element of any SLA should include “definitions of measurement standards and methods” (p. 1), processes for reporting, dispute resolution procedures, and change management procedures. As business priorities change, IT goals change, which leads to adjustments to associated SLAs. Hence, the SLAs are living documents that need reviewing on an ongoing basis to ensure they reflect the status of business and technology (Leopoldi, 2002). This implies that, for ceased IT services, associated SLAs need terminating to ensure the accuracy of the SLA metrics.

Service-level agreements are the keys to the success of service-level management initiatives. Therefore, SLAs should be simple, measurable, actionable, realistic, and time bound (Albright, 2013). Simple, measurable, actionable, realistic, and time-bound SLAs ensure a successful partnership only if the SLAs communicate objectives and expectations in simple words and are time bound with actions assigned to measurable metrics.

Benefits of SLA

Well-articulated SLAs foster and improve IT–business communications. A 2009 Society of Information Management survey noted that 25% of the 243 U.S. respondents ranked IT and business communications second among all IT and business alignment activities (Luftman & Ben-Zvi, 2010). As SLAs are documents that are immediately accessible and visible to business, "useful business metrics which demonstrate the value of service" are the key to successful SLAs (Matlus, 2004, p. 1). Best practices in SLAs recommend recasting short, simply worded technical metrics into business-driven and customer-centric metrics (Katanasho, 2008). Katansho (2008) also strongly recommended reviewing and adjusting the SLAs periodically to ensure the SLAs are current date with business objectives and technological changes.

Traditional SLAs focus on infrastructure-supporting applications, but they do not include the applications. Service-level agreements are emerging as tools that "measure and optimize business critical applications" (Sevcik, 2008, p. 1). Applications provide business services that increase the revenue and productivity of the business. Sevcik (2008) contended that application-specific SLAs measure application performance in terms of resource allocation, increased productivity, and support to business goals. The combined SLAs support long-term business objectives by providing an accurate mapping of resources and dependent infrastructure services (Baldree et al., 2009). Thus, application-specific SLAs, in conjunction with traditional SLAs, provide the overall capability and value of IT.

Service-level agreements are effective tools that can demonstrate IT as an asset. Service-level agreements set the stage and norms for the delivery of quality service, measuring and communicating performance, quality, and compensation (Chen, 2008). Established properly, SLAs serve as measurements and indicators of partnership performance and are important to the success of service-level management. The presence of SLAs elevates the alignment maturity of an organization. When organizational leaders spread IT across an organization and establish focused processes, a level in alignment maturity is reached that leads to improved understanding between IT and business management (Vu & Micliuc, 2010). Service-level agreements translate this understanding into measurable technical and business metrics.

SLA and IT Alignment

Business leaders realize a competitive advantage when IT investments contribute to the achievement of business goals. In turn, IT needs to monitor and map various resources such as databases, applications, utilities, servers, and networks to the services offered to the business (Baldree et al., 2009). Service-level agreements enable usage measurements of IT resources assigned to these services, which cumulatively deliver the business value of IT.

Partnership maturity is one of the alignment criteria that determine alignment maturity. A 2009 Society of Information Management survey revealed that 30% of 243 U.S. respondents ranked their IT–business relationships high, which indicated this relationship is a high-priority alignment activity (Luftman & Ben-Zvi, 2010). To achieve a mature business and IT alignment, the relationship should evolve so that “IT enables and drives changes to business processes and strategies" (Luftman, 2000, p. 4). Verified supporting facts and data aid in measuring and evaluating the partnership (Mishra, 2011). Service-level agreements provide that key by measuring and setting expectations in the partnership. Mishra (2011) also observed that SLAs serve as effective tools for CIOs to manage their partnerships with customers and service providers. Therefore, SLAs serve as a bridge between business and IT. Matlus (2004) explained that the implementation of SLAs fostered business and IT alignment as metrics though technical "reflected business measurements" (p. 2). The metrics connected business goals at an enterprise level to the individual deliveries of personnel dealing with applications or infrastructure. Thus, SLAs aid in implementing business and IT alignment at strategic and tactical levels.

Clearly defined business and IT goals drive the impact of SLAs with metrics that measure the delivery of business goals and the use of IT resources. Best practices for establishing SLAs recommend, "defining objectives and targets along with baselines and benchmark[s]" (Katanasho, 2008, p. 1) to prioritize and monitor IT resources to align with business. Additionally, this practice supports the service-level management initiative of managing IT services to ensure delivery at the agreed service levels (Enterprise Management Associates, 2009). Service-level agreements therefore outline IT factors that influence business outcomes, aid with root-cause analysis during crisis, and provide metrics that support analytics and reporting.

Constantly monitored, reviewed, and improved SLAs ensure SLAs are current and efficient. Service-level agreements that are business-oriented, include validated and realistic metrics, and that are competitively priced will be well received and supported by both business and IT (Katanasho, 2008). However, in the absence of periodic reviews, SLAs can become outdated and irrelevant to the business, which leads to misalignment between business and IT (Greiner & Gibbons Paul, 2013). Therefore, IT and business together should suspend or terminate SLAs that are not relevant or applicable. Such terminated or decommissioned SLAs may be available for audit or administrative purposes but should not be available for operational purposes (IF4IT, 2009). Decommissioned applications or services initiate the termination of the associated SLA. Terminating SLAs for decommissioned applications or services ensures a continued alignment between business and IT.

Conclusion

The literature review presented in this chapter highlighted the lack of focus on IT and business alignment within application retirement tools, procedures, frameworks, and methodologies. Therefore, to discover if application retirement affected IT and business alignment, it was necessary to identify specific business-facing IT components. The application of SAM alignment perspectives resulted in identifying the IT domains that interacted with business. The literature also provided insight into the roles of the IT domains EA, CMDB, and SLA in sustaining or establishing a closer business and IT alignment. To summarize, the EA framework captures a wide variety of business and IT information to enable analysis of component relationships and interactions, therefore bringing business and IT in closer alignment (Xionwei, 2008). The CMDB, as the repository of all configuration items related to the information system, provides key insight into IT operations. This insight is critical to business, as it provides greater control over the management of IT delivery, which leads to predictable business results (Pharro, 2011). Additionally, when IT and business develop new applications, they define SLAs to measure and support while keeping business informed and prepared (Sevcik, 2008). Thus, the three IT components provide common ground to business and IT to enable information interchange and communication.

The three components serve as bridges between IS and business. The data, relationships, and interactions support and inform business and IT. Therefore, after application retirement, updating the three domains keeps business informed about developments in IT and vice versa. The updated data improve and augment business and IT communication, prepare IT to anticipate future business requirements, and position IT to support business efficiently and effectively (Peak, Guynes, & Kroon, 2005). Lack of or latency in updating the data in the three domains can result in alignment gaps because of delayed communication, the lack of availability of current data, or a misinformed business. Information technology, then, would not be a strategic partner of business but only an operational facility.

The ARP process does not interact with any of the three identified components, which indicated that the process design lacked a mechanism to communicate with business. This deficiency in the process has failed to keep business informed and provide insight into IT operations, which has resulted in a complete shutdown of communication between business and IT. Therefore, a feedback mechanism between business and the IT groups would enable sustainment of the alignment or ensure the control of alignment gaps. The process design lacks alignment planning and so is contributing to alignment gaps, which disturbs business and IT alignment.

Summary

Chapter 2 was a review of literature on business and IT alignment. Considering the vast research available on business and IT alignment, the focus of the chapter was only on areas supporting this research. Chapter 2 began with a demonstration that justified the selection of the IT areas that supported business. The SAM's alignment perspectives were the appropriate tools that aided in identifying the areas in IT that supported business. The subsequent literature review in the chapter included a discussion of these areas and their roles in supporting business and IT alignment.

The identified IT areas, EA, CMDB, and SLAs, formed the core of Chapter 2. The chapter included a detailed literature review of each of these areas. The discussion of the identified areas included the business and IT perspective, the benefits derived, and how the areas aided in aligning business and IT. Enterprise architecture, CMDB, and SLAs are evolved areas of IT that command an integral place within IT. Therefore, there is extensive research and literature available on these domains. The aim of this research was to study the impact of application decommission on business and IT alignment. Therefore, the goal of this research guided the discussion in Chapter 2. The literature review in Chapter 2 revealed that the selection and the discussion of the literature were limited to and supportive of this research goal.

The three domains EA, CMDB, and SLA directly interact with business and IT. These three areas receive and provide data to business and IT. A lack of communication is a well-known and accepted barrier to alignment. Communication that is incompatible with rapid changes to business and IT add to the complexity and create ongoing challenges to sustaining alignment. The domains serve as enablers of business transformation by translating business language to IT and vice versa. These domains provide plans, data, and agreements that lead to a common understanding between business and IT. These products from the three domains eliminate the communication barrier and foster IT and business understanding, but they do not address the changes. The disruptive nature of both entities is not supportive of the continuous engagement required for a successful alignment. A continuous feedback mechanism facilitates making adjustments and responding to rapidly changing business requirements or technological developments. The EA, CMDB, and SLA domains provide a communication bridge that enables the timely implementation of changes, which in turn helps sustain the alignment. The feedback should be timely so business decisions are accurate and so IT has the necessary time to make the changes.

In addition to identifying the IT domains that interacted with business, I investigated current tools and framework that either supported or used to conduct application retirement. I studied reports from leading research organizations such as Gartner and investigated application retirement tools from leading vendors such as IBM, Capgemini, HP, Informatica, and Applimation. I also noted that the tools used in current practice primarily supported data migration and archival activities. Application retirement received support as part of either application rationalization or life cycle solution activities. The tools, therefore, neither interacted nor communicated with business.

Evaluation of the five qualitative approach methodologies (narrative, phenomenology, case study, ethnography, and grounded theory methods) resulted in case study, grounded theory method, and phenomenology as potential research designs for this research. The fact that this research involved generating theory and that I grounded the research in data indicated grounded theory method was the appropriate research design. Additionally, a detailed and deep analysis of case study and phenomenological studies resulted in recognizing that while the research designs qualified, they addressed broader areas that dealt with either personal experiences of participants or issues within a broader context. As neither of the scenarios was a core requirement of this research, I did not pursue the case study and phenomenological research designs.

Identifying the IT domains and the conceptual framework set the direction for this study. The IT domains bridged the missing link in any application retirement, while the SAM provided the framework that aids in sustaining business and IT alignment or identifying requirements for realignment. However, to establish an evolving theory as valid and reliable while conforming to the conceptual framework, a research design is required. Chapter 3 includes the nature of the study and the methodology used to develop the recommendations that answered the research questions.

Chapter 3: Research Method

This chapter includes details of the mode of inquiry and research design used for this research. Chapter 2 included a discussion regarding the need for research and for an increased focus on the effect of IT and business alignment after application decommission occurs. This chapter includes a discussion on the research design, data collection, and analysis, including reliability and validity issues related to this research to answer the research problem.

Qualitative Analysis

Overview

Boeijee (2010) noted that the purpose of research is to ask and answer questions through a detailed investigation and examination. To answer the questions, it is important to have a research plan to guide the study in a structured manner. The research plan should share the methodology, the data gathered and analyzed, the ethics, and the findings (Boeijee, 2010). This plan then becomes the research design. The type of research drives the design. Based on the form of inquiry and inductive reasoning, the research type of this study was qualitative analysis.

A theory built from empirical data from inductive reasoning defines qualitative research (Boeijee, 201; Richards & Morse, 2013). Creswell (2007) shared that qualitative analysis helps to develop theories when existing theories do not adequately answer the problem under study or its complexity. Qualitative research, as a system of inquiry, informs a researcher's understanding and is holistic and narrative (Dennis Hale, 2011). Richards and Morse (2013) highlighted that the qualitative analysis research design is progressive, as each stage builds on the previous stage. Richards and Morse (2013) also emphasized that theory developed from data serves as a platform for a future inquiry.

Creswell (2007) emphasized that in qualitative analysis, the researcher plays a critical role in data collection. Researchers in qualitative analysis do not use instruments developed by others but use their own instruments or personally gather the data they require to conduct the research. The samples are usually small, but they generate a lot of information that represents "a wide range of perspectives and experiences" (Boeijee, 2010, p. 36). Researchers always collect the data for qualitative analysis on-site in natural settings where observers or researchers "experience the issue or problem under study" (Creswell, 2007, p. 37). Creswell (2007) further explained that the inductive analysis of collected data leads to themes that serve assumptions. The assumptions undergo further assessment using a theoretical lens and using any of the five qualitative methods.

The five approaches in qualitative analysis are narrative research, phenomenology, grounded theory, ethnography, and case study. Creswell (2007) defined narrative research as a qualitative study with a focus on stories and events narrated by individuals and recorded (Burden & Roodt, 2007) chronologically about a specific chosen context. Phenomenology is a research design used to describe the experiences of several participants "as they experience a phenomenon" (Creswell, 2007, p. 58). Grounded theory involves generating or developing a theory or framework of a process, action or interaction (Strauss & Corbin, 1998) based on the views and experiences of the participants in the study. Harris described ethnography as a research designed to study a "culture-sharing group" (as cited in Creswell, 2007, p. 68) to study, learn, and interpret “behaviors, beliefs and language” (as cited in Creswell, 2007, p. 68). A case study, Creswell (2007) explained, is an exploration of one or more cases pertaining to an area or system to study an issue or problem.

Grounded Theory as the Choice of Inquiry

Initial analysis of the qualitative approaches based on their definition and direct application resulted in eliminating ethnography from the pool of approaches for this study. I analyzed in detail the remaining three approaches, phenomenology, grounded theory, and case study, to select the best qualitative approach to conduct this research. Researchers of grounded theory and phenomenological studies analyze data gathered from participants or groups to explore real-life situations (Gelling, 2011). A comparative study conducted by Reiter, Stewart, and Bruce (2011) noted that both the approaches “are appropriate for management studies” (p. 40). However, Reiter et al. (2011) further elaborated that grounded theory emerges from systematic comparative analysis grounded in fieldwork, whereas phenomenological studies are reflective description of the lived experiences of the participating individual or group of persons. Gelling (2011) contended grounded theory involves employing analytical reasoning and constant comparison of data supported by external data sources that contributed to the emerging theory, whereas phenomenological studies include a rich description of experiences obtained from the lived experience of participating individuals. The literature review clearly indicated that phenomenology was not the applicable inquiry for this research.

As the basis for this research is a premise, the ARP, the possibilities increase for case study research as the mode of inquiry. Shuttleworth (2008) explained case study research is an in-depth study of a broad field of interest narrowed to specific scenarios. This explanation indicates that the broad field of interest is a known variable, and researchers identify the specific scenarios observed through identified case studies. Creswell (2007) defined case studies as exploring an issue or problem "through one or more cases within a bounded system" (p. 73). Therefore, case study research involves investigating specific occurrences within a broader phenomenon to arrive -at results that researchers cannot generalize. This research, based on the ARP data, underwent analysis to identify the phenomenon that will be a part of the emerging theory. Hence, the definitions of case study research and the variables that comprised the basis for this research eliminated case study research's candidacy as a potential research approach. As I proposed a theory based on the data gathered from an existing process and related literature that augmented the research, the qualitative approach for this research was the grounded theory method.

Analytical reasoning supported or based on data is fertile grounds for studies in IT systems and processes. Therefore, inductive analysis supported and arising from data is a core requirement for any research in IT. Matavire and Brown (2008) emphasized that emergence, comparative analysis, and theoretical sampling were the three key principles of grounded theory method. The principle of emergence requires the hypothesis to emerge from data and is not predecided (Matavire & Brown, 2008). Matavire and Brown did not identify the research question for their study earlier on; rather, it evolved from the analysis of data. Analysis of the initial sample involved iterative comparative analysis, which demanded inclusion of theoretical sampling. Constant comparative analysis refreshed the data sets, thereby revealing the underlying themes (Mavetera & Kroeze, 2009). This process of iterative comparative analysis using theoretical samples to reveal the core category clearly signaled the grounded theory method as the most appropriate research methodology for this research.

Grounded Theory Methodology

Overview

Grounded theory is a qualitative research method that is popular for its ground-up theory based on data. Bitsch (2005) defined grounded theory as a methodology based on the systematic collection and analysis of data to develop inductive theories. This research method is novel in its approach. Unlike most research methods that involve testing existing concepts to arrive at new theories, the focus of grounded theory is on generating new theory from data (Birks & Mills, 2011). Bitsch explained that grounded theory comprises stages that are interdependent and iterative. Bitsch further explained that data collection, analysis, interpretation, and theory development are the common steps within each stage. Burden and Roodt (2007) emphasized that grounded theory did not evolve as a result but emerged during the research process as an outcome of “continuous interplay between analysis and data collection” (p. 12).

The need for a scientific way to analyze qualitative data led to inventing grounded theory method. Anselm Strauss and Barney Glaser received credit for the invention, as well as with popularizing the grounded theory method (Calin & Weiss, 2011). Refinements by the pioneers of this method closely followed the invention of the method in the 1960s (Birks & Mills, 2011). Calin and Weiss (2011) shared that Strauss and

Corbin were instrumental in evolving grounded theory method, including validation criteria and a systematic approach to data sampling. Like many developments, grounded theory method has also undergone several adaptations since its inception. However, Strauss and Corbin were crucial to the development of the method's analytical techniques that demystified the method for novice researchers (Heath & Cowley, 2004). Heath and Cowley (2004) agreed with Glaser and Strauss's claim that researchers will arrive at their findings through continuous data gathering and analysis but will do so in a progressive manner, taking into consideration other factors that influence the study.

Grounded theory is an outcome of the inductive analysis of systematically collected data (Bitsch, 2005). The theory evolves through an iterative comparison and analysis of data that leads to uncovering new theories within the context of a larger phenomenon. An elaborate data analysis involves using techniques prescribed by this method until theoretical saturation occurs (Bitsch, 2005). Theoretical saturation led to the integration of my theoretical sensitivity and existing theoretical frameworks, providing theoretical elaboration that helped develop the final product (Burden & Roodt, 2007). In the last stage, theory construction occurs using theoretical integration and advanced coding (Birks & Mills, 2011). My recommendations, therefore, are outcomes of integration of my inferences from literature review and findings from data analysis.

Data Analysis and Theory Development

Data analysis in the grounded theory method is an iterative process. The process consists of categorizing data from an initial sample, generating data concurrently with data analysis, and constructing a theoretical proposition (Birks & Mills, 2011). Birks and

Mills (2011) shared that the iterative process involves collecting data to support new categories or to test a theoretical hypothesis emerging from inductive analysis and resulting from “successive comparative analysis” (p. 11). A researcher’s analytical capabilities and ability to apply and integrate experiences and represent data in theoretical terms were important to this approach, which Glaser called theoretical sensitivity (as cited in Bitsch, 2005). Bitsch (2005) further emphasized that theoretical sensitivity should progress with increased interaction between data and emerging theory. Constant comparisons between emerging theory and data ensure that researchers do not determine samples ahead of the research but develop them during the research process. Samples thus developed are theoretical samples (Birks & Mills, 2011). Theoretical sampling involves collecting data in support of an evolving theory (Goldkuhl & Cronholm, 2010). The new data thus collected are “analyzed, compared, and contrasted to discard, refine, generate and enable theory development” (Dennis Hale, 2011, p. 208). Grounded theory lends support to discovering new concepts or relationships because of theoretical sampling.

Data coding and analysis in grounded theory includes three techniques: open coding, axial coding, and selective coding (Strauss & Corbin, 1998). Bitsch (2005) explained open coding as a technique that identifies and develops the initial categories and their properties. Therefore, open coding is the initial data analysis activity that occurs at the beginning of the study to generate the initial sample. Analysis of this sample and of pertinent research questions uncovers potential theories or relationships that subsequently lead to theory development. Strauss and Corbin defined open coding as an analytical process that analyzed data to identify concepts and their properties (as cited in Burden & Roodt, 2007). Researchers examine the categories identified through open coding closely and reassemble data based on logical interactions between categories (Dennis Hale, 2011). Strauss and Corbin defined this intermediate "process of relating categories to their sub-categories" as axial coding (as cited in Burden & Roodt, 2007, p. 15). Bitsch (2005) explained that during axial coding, a researcher introduces cases that contradict the emerging theory, which increases sampling variance. During open coding, researchers break data down to compare them for similarities and differences, while in axial coding, researchers reconnect data based on a concept or theme, which leads to theory development (Birks & Mills, 2011; Bitsch, 2005).

Comparative analysis, which is fundamental to grounded theory, alternates between open coding and axial coding and leads to refining the data. This process leads to identifying a core category or central concept. Selective coding, the third technique of data analysis, is a higher, abstract level of data analysis that integrates categories and subcategories and validates their relationships (Burden & Roodt, 2007). Bitsch (2005) explained that sampling at this stage is "deliberate and detailed" (p. 79) to test variation, add additional detail, and answer final questions. Researchers achieve theoretical saturation when theoretical sampling generates no new information or data in support of the evolving theory (Burden & Roodt, 2007). Selective coding supported by theoretical sampling, aids in filtering the selected core category that relates to the emerging theory.

Concurrent to the data analysis, researchers record their thought processes, termed theoretical memos. Calin and Weiss (2011) explained that theoretical memos capture the analysis and relationships between codes as deciphered by a researcher during data analysis and collection. These memos are dynamic, ongoing, intense recordings of the researcher's experiences and thought process during a grounded theory. Therefore, the memos reflect the theoretical sensitivity of the researcher. The theoretical memos transform over time into "grounded theory findings" (Birks & Mills, 2011, p. 10). These grounded theory findings aid researchers in identifying theoretical codes.

Grounded theory generates new theories from data, but within the context of a specific concept or phenomenon. As a final step, researchers achieve theoretical integration by advanced coding (Birks & Mills, 2011). Advanced coding involves constructing the theory using storyline technique (Birks & Mills, 2011). Hernandez (2009) emphasized that in the absence of theoretical coding the emerging theories remained mere themes. Hernandez further explained that a theoretical code is the conceptual model or framework through which the core category relates to its subcategories or properties. Therefore, theoretical codes extracted from existing theories add explanation and provide a framework that integrates the evolving theory and data with the body of knowledge (Birks & Mills, 2011). Theoretical codes serve as bridges between exisiting theories and practices and the emerging theory.

The diagram in Figure 2 highlights the stages of data analysis in grounded theory method. Though the largest box includes purposeful sampling, initial coding, concurrent data generation and collection, theoretical sampling, constant comparative analysis, and category identification, it is the simplest stage that generates and refines data (Birks & Mills, 2011). Birks and Mills explained that the next stage, while relatively smaller in scope, refines the study and involves taking the analysis to higher levels and closer to the final product. Concepts and techniques such as theoretical sensitivity, intermediate coding, selecting a core category, and theoretical saturation are part of this stage. The final stage, which includes advanced coding and theoretical integration, is instrumental in integrating the theory and data analysis to produce the final output of the grounded theory method (Birks & Mills, 2011).

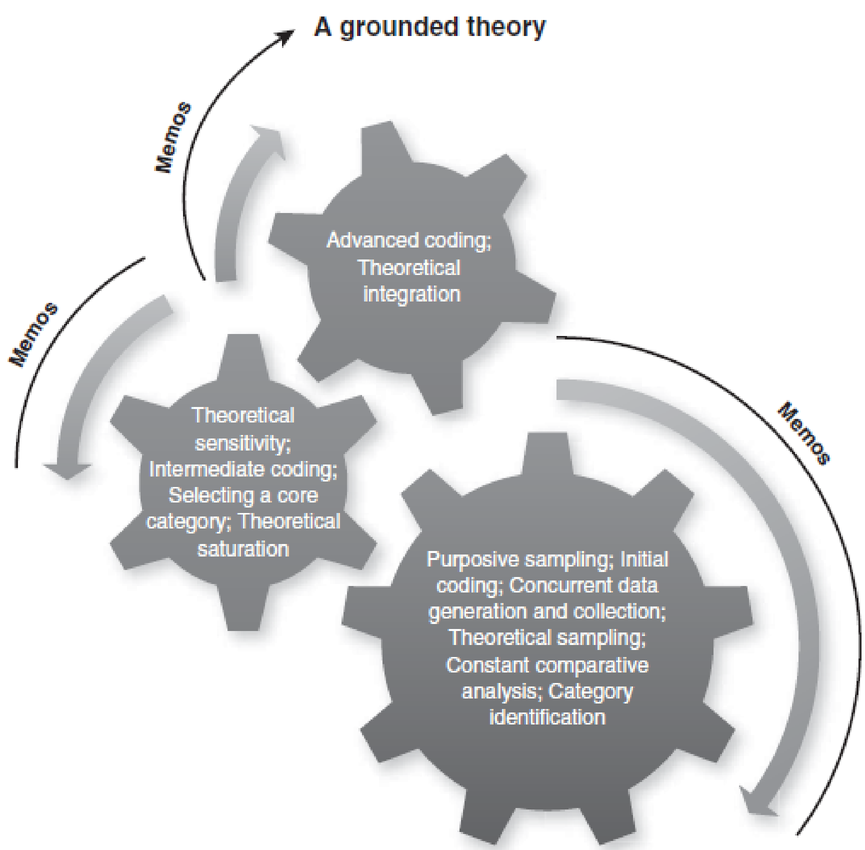

Figure 2: : Essential grounded theory method. From *Grounded Theory: A Practical Guide* (p. 13), by M. Birks and J. Mills, 2011, Thousand Oaks, CA: Sage. Copyright 2011 by SAGE publication. Adapted with permission

Validity and Reliability

Researchers have opposing thoughts on the topics of validity and reliability. Whereas Patton noted that all qualitative researchers should confirm the validity and reliability of their research to ensure the quality of the studies, some researchers question the need for validity in qualitative research (as cited in Golafshani, 2003). Golafshani (2003) emphasized that triangulation served as a strategy test to enhance the validity and reliability of research findings.

The basis of the grounded theory method is an iterative comparative analysis of data. This continuous process of data collection, analysis, and comparison aims at eliminating any bias (Esteves, Ramos, & Carvalho, 2002). Furthermore, Esteves et al. (2002) contended that continuous data comparison, coupled with theoretical sampling, ensures the emerging theory fits with the existing body of knowledge to allow practitioners in the field to manage the phenomenon more effectively. Although theoretical sampling aids in theory development, theoretical coding is instrumental in theoretical integration, which ensures the emergent theory is conducive to future research and assessments. This progressive development increases transparency, thereby lending increased credibility to the emerging theory. Goldkuhl and Cronholm (2010) noted the "traceability between data, categories, and theory" (p. 190) in grounded theory demonstrates transparency in the method and increases the credibility of the study.

Analyzing multiple sources of information and performing a detailed literature review ensures the emergent theory is reliable and valid (Esteves et al., 2002). Grounded theory includes data and theory triangulation. Theoretical memoing allows theory triangulation to begin shaping the construction of the emerging theory. The data analysis and concurrent comparison validates or adds credibility to the emerging theory. Thus, grounded theory evolves from an intense comparison and leads to continuous adding, refining, and discarding. A theory that evolves from constant intense validations through data comparison and analysis and concurrent refining by theoretical sampling and sensitivity is likely to be reliable and valid.

Grounded Theory and IS Research

An IS "focuses on integrating IT solutions with business processes to meet the information needs of business and other enterprises, enabling them to achieve their objective in an effective, efficient way" (ACM, AIS, & IEEE-CS, 2005, p. 14) . An IS also refers to a system that includes persons, data records, and activities that manages and processes information generated by computer-based data (Shamekh, 2008). Thus, IS is a multidisciplinary field that generates information for business and IT and relies on data for its solutions. Practitioners of this field develop IT solutions and implement processes that use or improve IT to help leaders of enterprises to achieve their goals (ACM, AIS, & IEEE-CS, 2005). Therefore, the IS discipline requires analytical thinking, business acumen, and IT skill sets to create the required product or service successfully. With such diverse requirements, research in IS requires methods that provide a framework to support the research without interfering with the actual IS practice. Additionally, the changing environment of IT ensures the data gathered are not the same during analysis. Therefore, a research method that adapts and supports the peculiarities of the IS field would be more suitable for research purposes.

The three key principles of grounded theory method are "emergence, comparative analysis, and theoretical sampling" (Matavire & Brown, 2008, p. 139). The principle of emergence requires that a researcher not predecide a hypothesis, but that it instead emerges from data. This concept works well with the IS field, as IT systems and processes generate data that produce a variety of information relating to diverse phenomena. Comparative data analysis and iterative data gathering allows theory generation. Theoretical sampling further enriches and saturates the emergent theory by supplementing it with data collection and analysis. The comparative analysis and iterative data collection support the changing environment of the IS field. Mavetera and Kroeze (2009) highlighted that with each refreshed data set, researchers had a better understanding of the research problem. Most practitioners in this field are experts in either one area or several. The experiences of IS professionals greatly enrich and influence theoretical sensitivity. Inductive analysis, comparative data analysis, and theoretical coding make grounded theory a well-suited approach for IS research. Highly dynamic environments that undergo rapid and significant changes are most suitable for grounded theory (Zikmund, Babin, Carr, & Griffin, 2003). The changing environment and continuously evolving IS disciplines serve as a fertile ground for discovering new emerging theories.

Publication of the first IS research using grounded theory occurred in 1987 (Matavire & Brown, 2008). Matavire and Brown (2008) conducted an exploratory analysis that indicated 62% of the researchers of 272 articles published during the period of 1985 to 2007 used grounded theory method in their research design. Between 1995 and 2000, researchers published 26 articles with 46% using a grounded theory approach. This trend further spiked, with 95 researchers performing grounded theory research between 2001 and 2007. Matavire and Brown (2008) credited the increase in the adoption of grounded theory in IS research to the unsuccessful delivery of scientific methods.

The initiation and progress of this research followed the path of grounded theory. I performed theoretical memoing and sampling, though unintentionally. However, when defining the research design, it became evident that the approach should be grounded theory. The initial data sample and analysis and the subsequent data analysis and collection led to theory construction. The combined influence of inductive analysis and data comparison enabled theory evolution. Theoretical memoing shaped the theory construction; the emerging theory provided constant direction to the memoing and data analysis. Intermediate theoretical coding ensured I placed the emerging theory within the selected phenomenon and supported it with literature while adding to existing research.

The Role of the Researcher in the Study

Burden and Roodt (2007) noted that grounded theory method researchers work in natural situations, which enables data collection and interpretation in their natural setting and leads to theories emerging from inductive analysis. Additionally, in grounded theory, my role as the researcher is pivotal to the study, as a researcher is responsible for both data collection and interpretation (Walden University, 2013). Situated on site, I witnessed the enthusiastic adoption of the process as well as the impact of the process in improving the employee’s perception of their role and contribution to the federal agency.

The data used for this study were the data gathered by the ARP. Having developed the process, I was well aware of the type, source, and the data generated by the process. At the federal agency, each team had to complete a DCF, which documents the resource, skills, and dependent materials retired and released after decommissioning the application. Initially, the data generated for each application retired only signified the success of the process. Subsequently, I consolidated the data thus gathered, which revealed information that led to this study. My constant involvement with the process enabled me to study the data and its benefit to my client firsthand. I received notification each time a project manager completed an ARIF. I also received notification at the completion of each stage of the process. My familiarity with the process and my access to the ARIF, DCF, and consolidated data in real time formed the building blocks of this study. I was a key witness to the success of the process, and to the subsequent maturing of the process. Additionally, I was the principal participant for the data collection required to conduct this study.

I addressed any researcher bias using the various tools and methods that the grounded theory methodology provides. Using these tools ensured I handled the bias in a scientific manner and dealt with it within the scope of the research design. As the facility where the process took place was a federal site, I broadly classified the organization and withheld the name of the organization to maintain its confidentiality.

Grounded Theory Methodology and This Research

The goal of this research was to propose a framework or theory to realign business and IT when applications developed to enforce the alignment, were decommissioned. The study involved researching a process implemented to retire applications and analyzing data generated by the process to study the impact on alignment. The data captured during the process of application decommission provided technical information. The data were computer generated and consisted of values for memory released, hard disk space freed, server space freed, and resources reclaimed. An analysis of the application retirement data revealed the absence of any interaction or communication with business. The plan of study involved data collection and analysis that led to identifying missing components. The missing components led to identifying the phenomenon. Detailed research and further analysis of data revealed the need for the process to interact with business.

The iterative comparison, combined with inductive analysis, led to a revised process that enabled an enterprise either to sustain its existing alignment or to revise the alignment to ensure business aligned with IT. Applying the chosen conceptual framework, I identified the IT disciplines that aid in sustaining the alignment through their constant interaction with business. The revised process included a feedback mechanism and appropriate updates to repositories to ensure business is aware of the applications retired and that decisions rest on facts and valid assumptions. This research generated a revised process that added to the existing body of knowledge and expanded the impact of the social change introduced by the ARP.

Aligning Conceptual Framework With Grounded Theory Approach

Henderson and Venkataraman (1993) defined strategic alignment as the strategic fit and functional integration between business strategy, IT strategy, business infrastructure, and IT infrastructure. The SAM developed around these four domains is the conceptual framework for this research. Identification of the framework evolved during theoretical memoing and initial data analysis.

Although my initial research began on the topic of business and IT alignment, the missing piece of data was integral to this study. An increased focus on the missing business data and the impact of analysis on strategic decisions led to a focus on the alignment gap. The researchers of most empirical studies indicated that the SAM provided a framework that reduced the alignment gap. The framework included the four domains and their roles in reducing the alignment gap by strategically aligning business and IT. A combination of the domains targeted specific areas of business and IT to identify areas that were out of alignment or needed aligning. The SAM proposed alignment perspectives to evaluate such scenarios. Applying these perspectives enabled me to identify the IT domains. I surmised that including the identified IT domains within the revised process would align business with IT. Subsequent data collection, analysis, and theoretical memoing aided in identifying the alignment perspectives to close the gaps in the current process. The alignment perspectives identified were strategic execution, service-level, and IT infrastructure strategy.

With the core category identified as business and IT alignment, the SAM alignment perspectives aided in identifying the subcategories. Theoretical memoing and theoretical sensitivity enabled a validation of the relationship between business and IT alignment and the contributions of EA, CMDB, and SLA toward the alignment. The subcategories and their relationships served as theoretical codes that, when later combined with data analysis, aided in achieving theoretical integration. The identification of the conceptual framework, core category, subcategory, and their mutual relationships evolved during the study through constant comparison of data, theoretical memos, and theoretical sampling. As I constructed the theory during the study, which evolved from an existing framework, I ensured the emerging theory fit in with existing theory and supported a phenomenon already in practice.

Population and Sample Size

The implementation of the ARP occurred in spring 2011. Since then, the U.S.federal agency has continuously retired applications each year using the process. The population for the study comprised the cumulative data variables, the values of which I gathered in the process through the DCFs and the ARIF for all the applications thus far retired.

The data for this research referred to the fields or variables in the ARIF and DCF for which I gathered values using the ARP. The values gathered from the ARP for the data fields has no impact on this research. The data variables pool comprised the initial sample for the research. Theory development from data was fundamental to grounded theory; therefore, the research design did not require any prior planning for data or data collection strategy. I was at the site and had access to the data generated from the ARP. I received notifications of events such as the initiation of an application retirement, the completion of a DCF, and the subsequent inventory update of the application. Inductive analysis of the data led to theory development.

Creswell recommended that sample sizes for grounded theory research range from 6 to 30 (as cited in Walden University, 2013). The sample size of the initial data set for this research was 21 data fields. As this research involved investigating the alignment between business and IT, the data fields described that relationship. Therefore, the data fields served as data for this research. The actual values that the process gathered for the data fields was not relevant to this research. The ARIFs and the DCFs served as the source of the data fields. The data fields formed the initial sample for this research.

While I initiated theory construction from the initial sample, I led theoretical integration by data identified as gaps in the sample. Theoretical sampling involved inserting the data categorized as gaps so that the cumulative sample represented the identified core category. The theoretical sample comprised of properties of the subcategories. The theoretical sample was an outcome of purposeful data collection. Creswell (2007) indicated that purposeful sampling helps researchers to “inform an understanding of the research problem and central phenomenon in the study” (p. 125). The purposeful sample led to the identification of the phenomenon affected by the current process, which ensured the purposeful data was effective in answering the research problems, and the theoretical codes ensured the emerging theory fit in with the existing framework and research.

Data Collection and Analysis

Transparent data analysis reduces the contention by demonstrating the analysis process. The presentation and interpretation of data has been an issue of contention in qualitative studies (Heath & Cowley, 2004). The data analysis techniques of grounded theory provide a framework to represent the analysis logically, therefore increasing the transparency of data analysis.

The initial data sample for this research came from two main sources. The ARIF provided data about the application stored in the application inventory. Additionally, specific DCFs designed for each stakeholder provided data variables that captured relevant data as the process progressed to completion. The data from the ARIF and DCFs provided all the details about the application, computing resources used, and resources assigned to the application. The development platform of the decommissioned application indicated and measured the client's goal to regress from legacy applications. The initial sample provided a comprehensive list of variables gathered during process execution and indicated the success of the process. Subsequent data sets demonstrated that the data focus was on technical aspects. Therefore, conforming to open coding, the correct label for the data was *technical*. Subsequent data collection and comparative analysis revealed the absence of data related to business.

Theoretical memoing indicated the lack of business data, which led me to believe that business leaders did not know about the decommissioned applications. Further, theoretical sampling combined with data sets indicated that missing business-related data would eventually lead to misalignment between business and IT. Axial coding aided in identifying the core category. Reconstructing theory from my memos, the data sets and missing information led to identifying the core category as business and IT alignment. Theoretical sampling and theoretical sensitivity identified the strategic alignment model as the conceptual framework. Applying the alignment perspectives of the model revealed that the role of IT domains directly affected business and IT alignment.

The focus of selective coding was on validating and integrating relationships between the core category and the subcategories. This step involved researching the role of the identified IT domains in business and IT alignment. Subsequent comparative analysis did not reveal any further information, which indicated theoretical saturation. The detailed research and literature review of business–IT alignment, identified IT domains, and application decommission helped me to integrate theoretical codes with the core category. The literature review revealed that the research, when developed, would augment the existing knowledge base on the core category. This study was a result of the theoretical integration.

The Initial Sample

This research rests on the data generated by a process. For each decommissioned application, the ARP gathered data. That data served as the initial sample. In accordance with the process design of the ARP, the retirement initiation form, the ARIF collected data about the application, decommission timeline, development platform, and reason for decommissioning. Each execution additionally required the IT group to complete the related DCFs that provided data pertaining to the IT group. The data fields from the four forms (1 ARIF and 3 DCFs) formed the initial sample for this research. Analysis of the data fields led to this study. Hence, the data fields constituted the data for this research. The data fields describe the type of data collected. The initial sample appears in Table 4.

As the values for the data fields had no bearing on this study, they were not relevant to this study.

Table 4

Initial Sample From ARIF and DCFs

Application name
Application description
Acronym
Business owner
Retirement initiation date
Reason for sunset/closure
Reason for sunset
Development platform
Dependent applications
Data retention requirements
Data archive location
Code archive location
Personally identifiable information data
Disk space per computer released
Total servers released
Total hard disk space occupied
Total memory consumed
Total CPUs released
Total de-installations
Average duration for each de-installation
Total number of full-time effort (FTE) for each de-install
Platform of the retired database/instance/schema

Data analysis involved applying the data analysis techniques of the grounded theory method. Outcomes of each level of the data analysis techniques, supplemented by memos, served as the required input to the next level. This advanced the research in a progressive succession in accordance with the research method.

Open Coding

The types of analysis used for the initial sample varied. I analyzed the data set from the ARIF, followed by the data sets generated from the three DCFs. The initial analysis was from a perspective of completeness. Analysis consisted of reviewing all the data fields within each data set and across data sets. The data sets were complementary and the data fields together provided the needed information. Hence, the data analysis was satisfactory. The comprehensive data set provided detailed information about the retired application. The initial analysis demonstrated that each data field described the application by providing unique information of the application. Hence, the data sets seemed to serve the requirement and indicated success.

Successive analysis following the initial analysis yielded similar outcomes. Matavire and Brown (2008) emphasized that the key activities in this phase included “naming, comparing, and writing memos” (p. 140). Therefore, subsequent analysis involved categorizing and codifying the data. Categorization involved grouping data fields that described a specific aspect of the application. For instance, some of the data fields included information about the application while some included a description of the resources used by the application. This analysis resulted in three categories: metadata, technical data, and business. As the names suggest, metadata included fields that provided information about the application, technical data were the fields with technical information, and the fields with information about business were business data. In addition to classifying the data, I conducted rudimentary measurable analysis on the initial sample. The analysis included computing category totals and each category’s share as a percentage of the initial sample. The categorization and the analysis provided additional information on the gaps in the initial sample. The classification of each data item in the entire sample appears in Figure 3 and Table 5.

Initial Sample	Meta-data	Technical-data	Business-data
Application Name	✓		
Application Description	✓		
Acronym	✓		
Business Owner			✓
Retirement Initiation Date	✓		
Reason for Sunset/Closure	✓		
Development Platform		✓	
Dependent Applications		✓	
Data Retention requirements		✓	
Data Archive Location		✓	
Code Archive Location		✓	
PII data		✓	
Disk space per computer released		✓	
Total servers released		✓	
Total hard disk space occupied		✓	
Total memory consumed		✓	
Total CPUs released		✓	
Total de-installations		✓	
Average duration for each de-installation		✓	
Total number of FTEs for each de-install		✓	
Platform of the retired database/instance/schema		✓	

Figure 3. Initial coding: Data labels and classification.

Table 5

Analysis – Initial Sample

Label	*n*	%
Metadata	5	24
Technical data	15	71
Business data	1	<5

Analysis of the data yielded that 71% of the sample was technical data. Of the remaining 29%, business data was less than 5%. The raw data revealed only one data field classified as business data. Additionally, the data field did not add or provide critical information in support of the goal of the process.

The outcome of the initial coding was data labels based on the key words identified from the data analysis of the sample (Birks & Mills, 2011). Accordingly, the initial coding of the sample resulted in three labels: metadata, technical data, and business data. These labels, as evident, are in vivo codes. The analysis thus demonstrated and documented that the sample lacked any business-related data. As I retrieved the data fields from the ARP and DCFs, I made a confident inference that the ARP neither communicated with nor provided any information to business. Further, a review of the process design substantiated and verified my inference. This inference led to the discovery of the ARP's missing communication with business and raised several questions. These questions became the research questions for this study:

1. How does application decommissioning impact IT business components?
2. What is the impact on the existing business and IT alignment from decommissioning applications?

3. What is the impact on future strategic decisions if the business stays uninformed of decommissioned applications?
4. How do the research findings close the gaps in the ARP process?

The research questions and the data analysis guided by my theoretical sensitivity led to generating several memos. Additionally, I reviewed the process design and the data analysis in conjunction with the application metadata. The goal for the review was to identify or discover any uncaptured data or gaps in the process design that communicated with business. I evaluated the process design to investigate integration points with business. The investigations and evaluations reinforced the finding that the process design lacked communication or integration points with business, which resulted in a sample that lacked business-related data.

As the data gathered for every execution of the process were the same, the data set was homogeneous. The lack of variance in the data set provided no additional information, as it eliminated any opportunities for differing perspectives. Concurrently, I reviewed literature on ALM, the application retirement phase, and tools from a business and IT relationship perspective. The literature review and my analysis of the data set led me to generate information to identify the missing data. As the initial sample was the purposive sample generated from the process, a theoretical sample was the only source for additional data.

As the premise was large and vague, I made a strategic decision to develop a broad sample initially. The literature review, analysis of the initial data set, and research questions led to the creation of the theoretical sample. Bitsch (2005) noted that sampling in open coding focuses on introducing “systematic variation” (p. 79) during this phase. Hence, the goal was to create a theoretical sample, as a collection of fields related to business, which was missing in the initial sample. The only constraint while developing the sample was to limit my selection of fields to those that described in-house developed software applications. The sample created resulted from the critical evaluation of the initial sample, memos, and the theoretical sensitivity derived from my experience. The focus of open coding is to break data into parts to enable an investigation and to aid in uncovering concepts or categories (Bitsch, 2005; Matavire & Brown, 2008). Therefore, I codified the theoretical sample similar to the initial sample to enable comparative analysis between the two data sets. The analysis revealed that the theoretical sample totaled to 20 data fields, of which 13 were technical and 15 were business. With four data-fields coded both technical and business, the theoretical sample had an equal share of data fields in each category. The sample included three fields coded as metadata.

I followed up the individual analysis of the two samples with an analysis of the samples combined. Analysis of the combined samples revealed that the data fields from the theoretical sample either augmented the meaning or supplemented the data fields in the initial sample, which indicated that as the data sets together provided information that was complete, the data sets seemed to be complementary. The outcome confirmed that the theoretical sample furnished the missing business-related data in the initial sample. To ensure the validity of the outcome, I performed an activity that involved deleting the theoretical sample from the combined data set. The resulting initial sample seemed incomplete as it displayed huge gaps filled earlier by the theoretical sample. In the absence of the theoretical sample, the initial sample seemed to provide partial information. The initial sample had a bias towards IT, with no information for business. The limited and incomplete information confirmed that the theoretical sample filled the gap identified at the outset of open coding. The theoretical sample with associated analysis appear in Figure 4.

Theoretical Sample	Meta-data	Technical-data	Business-data
Business Goal			✓
IT Service Goal		✓	✓
Investment			✓
Maintenance Cost			✓
Compliance/Regulations			✓
Department			✓
Business Process			✓
Communicates With	✓	✓	
Connected to	✓	✓	
Release Date	✓		
Last upgraded		✓	
Last downtime		✓	✓
Used by		✓	
Response times		✓	
Correction time		✓	✓
Workaround time		✓	✓
Actual response time		✓	✓
last service disruption		✓	
Last invoice date			✓
DR plan		✓	✓
Manager			✓
% Legacy Application sunset		✓	✓

Figure 4. Initial coding: Theoretical Sample 1.

Theoretical Sensitivity and Sampling

The basis of grounded theory is constant comparative analysis, as it aids in uncovering concepts and patterns leading to theory development. Literature always informs good open coding (Gasson; Strauss & Corbin; as cited in Matavire & Brown, 2008). Thus, literature supports, informs, and validates open coding.

Matavire and Brown (2008) emphasized that constant comparative analysis aided in discovering perspectives or cases that led to confirming the existence of categories and resulted in theory development. Therefore, I compared the initial sample and the theoretical sample. I merged the two data sets to assess the comprehensive data. The assessment of the initial sample led to identifying the missing business-related data. Concurrent theoretical sensitivity led by the memos resulted in researching ALM and the role of application retirement within ALM. Extensive literature on ALM indicated that applications are either outcomes or implementations of strategic plans. Several vendors shared their tools that performed a few specific activities related to application decommission. However, the literature on application retirement as a stage within ALM was insufficient.

Subsequent theoretical samples seemed mostly to link the data fields in the initial and the first theoretical samples. Therefore, data fields in the subsequent samples were more technical but mostly centered on business. Birks and Mills (2011) emphasized that inductive theory emerges from constant comparative analysis. Comparing the current theoretical sample with the earlier sample and the initial sample revealed that the refined theoretical sample resulted in aligning the two data sets by serving as a bridge between IT and business. The theoretical sample also connected data fields within the samples, which augmented the meaning of the data field. Any modification to the theoretical sample resulted in either impacting IT or business, which confirmed that IT and business and their mutual alignment were the most important themes in this analysis. The theoretical sample appears in Figure 5.

Theoretical Sample	Meta-data	Technical-data	Business-data
Configuration Item		✓	
Asset Type		✓	
Asset Version		✓	
Installation location		✓	
SLA ID	✓		
Inrack		✓	
CI priority		✓	✓
Components		✓	✓
IT Service		✓	✓
Service Segment (Biz, data, services, utility)		✓	✓
Application functionality		✓	✓
SLA adherence		✓	✓
TCO		✓	✓
TCS		✓	✓
Hours available			✓
Operation start date			✓
Operation end date			✓
SLA lifecycle state			✓
Escalation Procedure			✓

Figure 5. Initial coding: Theoretical Sample 2.

Associated theoretical sensitivity and memoing included researching business and IT alignment, the impact of IT alignment on ALM, and the role of strategic planning on IT alignment. Memoing included the following observations:

1. What was the effect on current and future strategic plans because of application retirement?
2. Listing of business services that were retired due to the decommissioned application.
3. What was the impact on configuration items due to the retiring applications?
4. What was the impact on agreements with the customer due to the retiring applications?

The research and memos helped in developing the theoretical sample that served to close the gaps identified in open coding. The outcome of open coding, a theoretical sensitivity-driven literature review, research questions, and memos established business and IT alignment as the core category.

Axial Coding

The initial coding technique identified the core category for this research as business and IT alignment. As the name indicates, axial coding is analysis and coding centered on the "axis of the category" or the core category (Matavire & Brown, 2008, p. 140). Theoretical sensitivity led to additional research on the core category. I read and reviewed several studies from known researchers and authors in the field to assimilate the theory and models supporting and related to the core category.

The broad topics within the literature were the need and benefits from IT alignment, surveys conducted by popular bodies such as Society of Information Management that highlighted the business and IT alignment as the top-most concern of business and IT executives, maturity models to measure and sustain IT alignment, and the impact of IT alignment on investments and IT governance. Additionally, I studied various concepts, models, and perspectives associated with business and IT alignment. The initial beginnings, evolution of frameworks, and current maturity of business and IT alignment enriched my knowledge on the core category. I also read several peer-reviewed journal articles on theory and practice involved in business and IT alignment, measuring linkages between business and IT, and different perspectives on business and IT alignment.

All the readings indicated that businesses benefit from IT only if a strategic alignment exists between them. Additionally, I gleaned that if organizational leaders chose to benefit from the strategic alliance between business and IT, then establishing, measuring, and sustaining business and IT alignment was the responsibility of organizations. Therefore, a framework or a model that aids in building the alignment, identifying and closing alignment gaps, and measuring alignment was necessary. The review of literature exposed several models and frameworks. Strategic alignment model developed by Venkataraman and Henderson had components on both business and IT for a current setup, as well as aimed to meet the future needs of an organization. My theoretical sensitivity led to a detailed review of literature on SAM. The two fundamental concepts of SAM, strategic fit and functional integration and alignment perspectives, led me to adopt the model as the conceptual framework for this research.

Strauss and Corbin suggested using a model to relate a category with its subcategories (as cited in Matavire & Brown, 2008). The model represented the phenomenon or category, while the causal conditions identified as subcategories have an influence on the category. In conformance with Strauss and Corbin's recommendation, the SAM served as the conceptual framework for this research. The alignment perspectives described in the SAM served as drivers to identify the subcategories within the context of application retirement. The SAM includes 12 alignment perspectives. Some of these have the anchor domain in business, while some have it in IT. The alignment perspectives with the anchor domain in business and the impacted domain in IT provided solutions to the research questions identified in initial coding. Therefore, I selected the alignment perspectives strategic execution, service level, and IT infrastructure strategy. The three perspectives indicated that the IT domains EA, CMDB, and SLAs were possible subcategories.

I extensively researched each of the three subcategories. The subcategories are well-developed independent IT domains with specific roles in the field of IT. My theoretical sensitivity guided the research to narrow it to select topics applicable to this study. Although each of the subcategories has a purpose, the combined information gathered from interactions with other components of the IT system provided complete information to business. Therefore, in each of the domain areas, I focused on literature regarding the benefit of each subcategory to business and the respective contributions to business and IT alignment. The literature review revealed that although the IT domains were essentially IT components, they served and aided business. Enterprise architecture, CMDB, and SLA have mechanisms such as repositories or contracts that capture and store technical data. The same technical data recast as business metrics or customer-centric metrics communicate with business. The subcategory while rooted in IT serves as the interface between IT and business. I observed that subcategories served as conduits between IT and business and as enablers of business and IT communication by transforming technical data into business information. The three IT domains thus foster business and IT alignment.

The conceptual framework aided in identifying the subcategories. The theoretical sensitivity driven literature review and memoing aided further in validating and establishing relationship between the subcategories and the core category. The analysis of the theoretical sample demonstrated that the data fields contributed to at least one of the IT domains. Evaluating the theoretical sample for the presence of the IT domains was the next step in the analysis. Each data field in the theoretical sample underwent investigation to ascertain the relationship to at least one IT domain. Categorizing the data fields as a specific IT domain enabled me to interpret the data field within a specific context to increase the value and importance of each data field. The analysis indicated that data fields coded technical provided business-related information. Similarly, data fields coded business provided sufficient technical information to IT. Such data fields served as bridges between business and IT, thereby enabling data transfer, communication, and alignment between business and IT. The data in the sample related to at least one IT domain. This led me to conclude that all the data fields were necessary, as they contributed to the larger phenomenon: the business and IT alignment. The theoretical sample categorized based on the IT domains appears in Figure 6..

Consolidated Theoretical Sample	Enterprise Architecture	Configuration Management Databases	Service-Level Agreements
Business Goal	✓		✓
IT Service Goal	✓	✓	✓
Investment	✓		
Maintenance Cost	✓	✓	✓
Compliance/Regulations	✓		✓
Department	✓		✓
Business Process	✓	✓	
Communicates With	✓	✓	
Connected to	✓	✓	
Release Date		✓	✓
Last upgraded		✓	
Last downtime			✓
Used by		✓	
Response times		✓	✓
Correction time		✓	✓
Workaround time		✓	✓
Actual response time		✓	✓
last service disruption		✓	
Last invoice date			✓
DR plan		✓	✓
Manager			✓
% Legacy Application Sunset		✓	✓
Configuration Item		✓	
Asset Type		✓	
Asset Version		✓	
Installation location		✓	
SLA ID			✓
Inrack		✓	
CI priority		✓	
Components	✓	✓	
IT Service	✓	✓	
Service Segment (Biz, data, services, utility)	✓		
Application functionality	✓		
SLA adherence	✓		✓
TCO	✓		
TCS	✓		
Hours available			✓
Operation start date			✓
Operation end date			✓
SLA lifecycle state			✓
Escalation Procedure			✓

Figure 6. Axial coding: theoretical sample and subcategories.

Extending the theoretical sample to include additional data from other IT components such as IT security added another dimension to the sample but did not provide answers to the research questions or uncover additional concepts. The outcome indicated theoretical saturation. Boeijee (2010) shared that on reaching saturation, researchers may stop collecting data. Hence, I ceased data collection upon reaching theoretical saturation.

The outcome of open coding resulted in theoretical samples that provided the missing data in the initial sample. Strauss and Corbin defined axial coding as building the data back by making connections between the core and its subcategories (as cited in Walker & Myrick, 2006). Accordingly, the literature review presented adequate information on the role of each subcategory in business and IT alignment. Categorizing the data fields into the identified IT domains aided in demonstrating that the data set served the purpose of developing and sustaining the relationship between the IT domains and business and IT alignment. Hence, axial coding aided in realizing the outcome of building the data set by establishing connections between the subcategory (IT domains) and the core category (business and IT alignment).

Selective Coding

After assessing the initial sample and the theoretical samples, the initial coding technique resulted in identifying the core category for this research as business and IT alignment. Application of the SAM aided in identifying subcategories and the literature review of the core and subcategories guided axial coding. I investigated the theoretical samples for the presence of subcategories. The samples also aided in establishing the relationship between the core and the subcategories. Walker and Myrick (2006) highlighted that selective coding involved integrating the core and subcategories with other entities in the research. Therefore, I evaluated the combined sample, which related IT and business alignment with the IT domains in the context of applications.

Concept Map

Researchers use concept maps to explain and demonstrate the interrelationship between interconnected concepts and aid in development of knowledge. The following diagram is a conceptual representation of the IT domains, EA, CMDB and SLA their interconnections, and their dependencies. I validated and established the interrelationships using the data fields as part of the theoretical sample. The process involved initially classifying the data fields into one of the three IT domains. Within the IT domain, I further grouped the data fields by the function they described. For instance, data fields that contributed to IT services goals fit under that heading. Information technology service goal, business process, and application details are part of the EA domain. Similarly, the data fields from the theoretical sample that formed part of a CMDB fit under the heading CMDB. A CMDB stores all configuration items. Therefore, key fields that link the IT domains EA and SLA to CMDB were also under the heading CMDB. The key fields uniquely identified applications, business process, database, configuration item, and associated SLA and related fields within their respective functions or domains. The key fields were application ID (APP ID), business process ID (BP ID), database ID (DB ID), configuration item, and SLA ID. The red dotted lines in Figure 7 represent this aspect. Further, the red dotted lines and the blue solid lines together represent the interrelationship between the IT domains. The diagrammatic representation neither conforms to any standard nor is comprehensive. I used the conceptual map to demonstrate my interpretation of the interrelationships between IT domains and to explain the impact of application retirement on each of the identified IT domain.

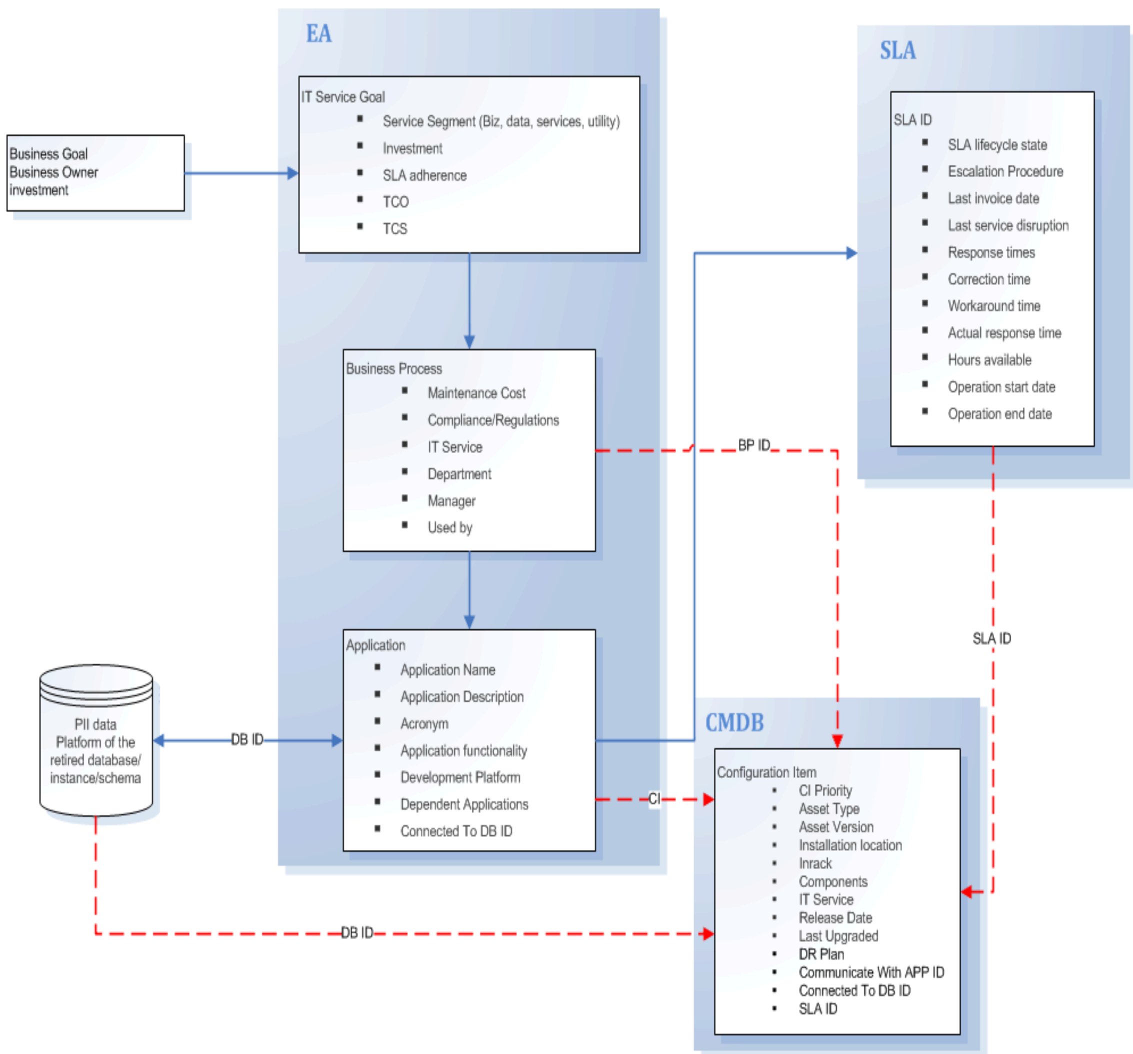

Figure 7. Concept map depicting the interrelationship between IT domains using data from the theoretical sample.

Interpreting Data Fields

I grouped and categorized the data fields listed in the theoretical sample according to their IT domains. This section contains an explanation of the thought processes that resulted in the above grouping and categorization of the data fields, their interrelationships, and the subsequent concept map. The data fields thus far described an application but this section, evaluates the interconenctions between the data fields.

Applications are identifiable by name, acronym, description, functionality, platform used to develop the application, other applications that they interface with (connect to), dependent applications, and the database the application uses (DB ID). Using the DB ID can lead to identifying the appropriate database. Additional details of the database remained as metadata within the database. Relevant to this research were presence of PII data (PII) and the platform of the database, the schema, or the instance. Hence, these were the only two data fields included in the theoretical sample to describe any database.

The reason for developing most applications is to implement one or more business processes. Therefore, data fields related to business processes map to both business and IT. The theoretical sample included fields for monitoring maintenance cost, compliance regulations, and IT service that a process implemented and the department it served. The data fields also included the end-user base (used by) and the manager of the process. The theoretical sample contained data fields that described the IT service such as the total cost of operation, total savings, any SLAs, and the business segment that the IT service served. Among IT service, business processes, and applications, only applications are tangible, and the application objectives contribute to the objectives of business processes and IT service at a higher level. Therefore, an association exists between SLAs and applications, as applications deliver the final service as defined by the IT service. Hence, the data fields in the theoretical sample that related to SLAs were the current SLA life cycle state, estimated time to respond, provide a workaround, and correct a problem and the actual response time. Business-related data fields included hours the service will be available, operation start and end dates, dates of last service disruption, and date of the last customer invoice. The data field, escalation procedure caters to conflict resolution issues.

Items stored in a CMDB are configuration items. A CMDB is a repository of all components of an information management system (Pharro, 2011). Therefore, items that are a part of the information system should remain in storage in a CMDB. When applying this concept to the theoretical sample, all the data fields should appear in the CMDB, as they describe various components of an information system. Although some data fields fit under the heading CMDB, some are indirectly referenced using a key field. For instance, APP ID refers to a specific application, and by using the key field APP ID, it is possible to access related details about the application. The data fields grouped under CMDB describe configuration items. The description includes priority (configuration item priority), type of IT asset, asset name and version, installation location, rack where placed, IT service rendered, interfaces with applications (APP ID), database used (DB ID), associated SLA (SLA ID), dates released and upgraded, and associated disaster recovery plans.

Purposeful sampling, theoretical samples, and constant comparison with the initial sample resulted in the above data fields. I used my theoretical sensitivity to guide and refine the data fields. The research problems, the premise of ARP, and the scope of this research influenced as well as limited the selection of the data fields. Therefore, the above sample is not comprehensive and complete. However, as the research questions guided the sample creation, the sample was conducive to and supportive of the research.

Data Reliability and Validity

The techniques of the grounded theory approach ensure research begins with some degree of credibility, reliability, and validity. The inductive analysis and the interpretation of logic demonstrate reliability. Integration and validation of relationships between the main and subcategories establish validity. I collected and analyzed the data systematically, which lent initial credibility to this research.

The components of a research design often present threats to the validity and reliability of the research. This research also had some in-built threats. However, a research design should significantly alleviate the impact of threats.

Threat from homogeneous data sets. Creswell (2007) indicated that homogeneous data sets ensure research has a greater focus, has little or no variance to manage, and is predictable due to simple, anticipated patterns. However, a homogeneous data set can lead researchers to be more carefree, which restricts or limits the analysis. Having little or no variance in the data set yields the same analysis, which ensures accuracy of the analysis. Although variances are distracting to researchers, they serve to aid researchers in establishing their findings through a selection-by-elimination approach.

Homogeneous data sets do not provide such an opportunity to researchers. Therefore, addressing this threat was critical to the validity of the research.

Researcher's bias. I played a critical and pivotal role in designing this process and I was the key witness to the success of the process. This familiarity and ownership can pose a threat to the validity of analysis. The familiarity can limit and affect a researcher's ability to view gaps in a holistic manner. Therefore, the familiarity, experience, and ownership of the process I enjoyed, could influence the analysis. Addressing this bias was pivotal for credibility of the research.

Theoretical sampling. Theoretical samples are guiding components in grounded theory method that shape and direct a researcher's thinking. Therefore, researchers should conscientiously decide the content of theoretical samples. Researchers initially have vast opportunities to pick their theoretical samples. The theoretical samples also introduce variance to the data sample. Theoretical samples can be the only source of variance in homogeneous data samples. Therefore, researchers should responsibly create theoretical samples. A random selection of data for theoretical samples presents a hidden threat to the analysis, which researchers may identify very late in the research process. Therefore, researchers should closely monitor this threat to ensure it is manageable all along the study.

Theoretical sensitivity. Theoretical sensitivity enriches a grounded theory. A researcher's theoretical sensitivity drives theoretical memos, samples, and codings. My experience and knowledge augmented the study, but unbridled and unrestrained theoretical sensitivity can confuse researchers as well as drive a study away from the problem under analysis. This component in grounded theory has no external control or validation, and so, the onus is on researchers to provide the appropriate level of sensitivity, when applicable. Extreme theoretical sensitivity is a threat to the analysis.

Ethical Considerations

The data sample for this research was a predetermined and limited pool resulting from two types of forms: ARIF and DCFs. The data fields in these forms constituted the sample. Theoretical sampling during the research process augmented the sample. The theoretical sample was external to the ARP and mostly derived from my theoretical memos. The uncontrolled nature of theoretical sampling provides both scope and opportunities for influence and bias. A researcher's limitations or excesses can influence a theoretical sample while steered by the researcher's bias. Such theoretical samples restrict the theory from evolving naturally and guide the analysis to a predetermined destination. To protect the analysis and the researcher, it is important that the theoretical sample conform to the chosen conceptual framework. Additionally, samples thus generated will aid in theoretical coding and integration.

Summary

Chapter 3 included an introduction to the research design used in this study. A justification for selecting grounded theory method as the research design followed the introduction to qualitative research. This chapter also included the effective role and growing trend of using grounded theory method for IS research. The initial focus of the chapter was explaining the design and terminology associated with the grounded theory method, which set the stage for me to present the study in terms of the research design and associated terminology.

Qualitative research required that I be in the natural environment of the study. In conformance to this requirement, Chapter 3 also included a description of my role as the researcher in the study. With a position at the site of the research, I was in a beneficial position to observe firsthand the execution and impact of the process and to collect and analyze data. My experience supplemented my observations, which led to codes that enabled the proposal for a revised process.

The grounded theory method effectively aided theory construction by designing this study, interpreting the analysis, and integrating my inferences with existing literature. To summarize, theoretical memos that provide a firm ground for the research supplemented the data analysis techniques of grounded theory, which included constant comparative analysis using open coding. Using axial coding to identify the core category when supplemented with theoretical samples and theoretical memos led to the identification of the subcategories. Theoretical saturation indicated the conclusion of the iterative comparative analysis. I used selective coding to analyze the core category at a conceptual level, with triangulation establishing the validity of relationships between the core and the subcategories. Additionally, when I integrated theoretical coding with emerging theory, the concepts led to theoretical integration. My theoretical sensitivity enriched the process leading to a quality research developed on both data and practitioner experience.

The design of the research method itself lent credibility and reliability to the study. As the study grounded in data developed, the research design ensured credibility built into the study. The constant analysis extended intrinsic reliability to the study. Further data generation and reduced human interference in data collection accompanied by governance constraints built into the process design of the ARP demonstrated reliability and ethical considerations in this study, which enhanced the credibility factor. A discussion of the findings from this data analysis and the results thereof appears in Chapter 4. The solution and answers to the research questions appear in detail in the next chapter.

Chapter 4: Results

The alignment gaps burgeoning between business and IT after application retirement led to this study. The purpose of this study, thus, was to generate a theory that ensured alignment between IT and business after application retirement. The research questions in this study included examining if application retirement affected IT and business alignment and the subsequent impact on future strategic decisions due to an uninformed business. One of the goals of this research was to close the gaps identified in the current ARP process.

In the previous chapters, I systematically built the case for this research. In Chapter 1, I introduced application retirement from both business and IT perspectives. From the business perspective, I explained the relevance and benefits of applications for businesses to gain competitively and strategically. From an IT perspective, I explained the positioning of application decommissioning within the ALM and the current practice of decommissioning applications. In the same chapter, I introduced the research problem of the impact of application retirement on business and IT alignment after analyzing the data from a process that facilitated application retirement. I also provided an overview of the SAM as the theoretical framework for this research and qualitative analysis as the nature of the study, grounded theory method as the chosen research design, and the research questions. The chapter also included a discussion on the significance of the study to the field of IS management as well as on social change and the associated limitations.

Chapter 2 included a review of the literature in the areas of IT and business alignment and the IT domains EA, CMDB, and SLA. The chapter included a section on the SAM and the alignment perspectives. I applied the alignment perspectives of SAM, which resulted in identifying EA, CMDB, and the SLA as the IT domains interfacing with business. The literature review also included an evaluation of the relationships between IT and business alignment and each of the three IT domains. As the research was in the area of application retirement, the evaluation included several application retirement tools developed by leading vendors that are in current use by practitioners. Other topics discussed included application retirement practices and procedures implemented within various organizations. Chapter 2 included a review of the limited literature in the area of application retirement and a discussion on the lack of any reference to IT and business alignment after application retirement.

I laid out the research design for this study in Chapter 3. The initial analysis of the data indicated grounded theory method would be the most appropriate research design. Data gathered from the ARP served as the initial data sample. Initial data analysis led to the research questions and the problem statement for the study. I applied the data analysis techniques of the research design to conduct data analysis. Theoretical sampling and sensitivity coupled with comparative analysis led to identifying core and subcategories. A discussion of the detailed analysis of data using grounded theory method's open coding, axial coding, and selective coding techniques appeared in Chapter 3. The chapter also included associated data validity and reliability issues. In the following section, I review the data analysis.

Review of Data Analysis

I conducted data analysis using the techniques prescribed in the grounded theory method. Initial coding involved codifying the initial sample as technical data, business data, and metadata. This initial analysis revealed an imbalance in the initial sample resulting from a skew toward technical data. Theoretical samples introduced into the sample added value and complemented the initial sample. Several experimentations with the combined sample, as discussed in Chapter 3, confirmed that the underlying theme was IT and business alignment. Applying the SAM alignment perspectives revealed the subcategories to be EA, CMDB, and SLA. Axial coding involved categorizing the combined sample into the three subcategories. Further investigations revealed a definite relationship between the core category and the subcategories. Selective coding involved integrating the combined sample of the initial and theoretical sample with the SAM and the theoretical memos. I translated this interpretation into a concept map that explained the interconnections and dependencies among the fields in the combined sample. The overall concept map demonstrated that the combined sample established an alignment between IT and business, and the subcategories played a pivotal role in implementing the alignment.

The data analysis, therefore, revealed the core category and the subcategories and established the relationship between the subcategories and the core category. The research questions, however, were about application retirement. Therefore, I further investigated the linkage between the core categories (EA, CMDB, and SLA) and IT applications. The goal of this step was to identify aspects of application that relate to each of the subcategories to study the effect on IT and business alignment in those areas after application retirement.

Application Retirement

Application retirement involves series of activities within IT and business. There is no inherent connection between these activities, which include backing up data, deleting a database, and deleting an application. The experience of the personnel executing these activities usually drives the determination of the sequence of activities. This dependency on factors external to IT activities is often the cause for improper decommissioning of applications. I observed that the lack of a predetermined sequence within IT resulted in either faulty or incomplete application retirements. Such retirements resulted in traces of applications available or applications in operation while marked as retired. These inconsistencies resulted in inaccurate IT reports that subsequently confusing business leaders. Such decommissions highlighted and demonstrated the impact of application retirement on business and IT.

Initial coding indicated that a limitation of the ARP was that it applied only to the functions of IT and lacked activities associated with application retirement within business. Proper alignment between IT and business demands timely business response to technological developments (Messioneo & Ryder, 2008). The ARP process design did not include any notifications to business, and therefore business remained uninformed. Thus, a lack of timely updates to business resulted in an alignment based on unreliable and inaccurate data. To assess the impact of application retirement on IT and business alignment, it was critical to investigate if applications had a role in enabling or supporting IT and business alignment.

Applications and IT and Business Alignment

Axial coding revealed that the three IT domains supported IT and business alignment. Therefore, I investigated the relationship between each of the subcategories EA, CMDB, and SLA with applications. This process involved identifying the aspect of applications from the concept map that related to each subcategory. I then integrated the literature review resulting from my theoretical memoing with the data analysis conducted as part of the research design. This integration involved identifying application-specific data fields from the combined sample and associating them with a specific subcategory. The identified sets of data fields demonstrated the aspect of applications that related to each of the subcategories. The resultant sets of data fields thus represented and served as evidence of the relationship between applications and the subcategory.

Axial coding in Chapter 3 revealed that the subcategories EA, CMDB, and SLA played a critical role in implementing the core category IT and business alignment. Therefore, I inferred that the above identified application-specific data fields in each subcategory should either implement or support IT and business alignment. To verify the inference, I analyzed the data fields categorized as EA, SLA, and CMDB from an application perspective by codifying the data fields identified in each IT domain area as technical data and business data based on the role and support an application would provide to IT, business, or both. I concluded that if the analysis revealed that the data fields supported both IT and business when associated with an application, then the data fields were critical to the implementation of IT and business alignment. The following section includes a detailed discussion on this investigation. The outcome of the investigation revealed the extent to which the data fields were critical to the implementation of IT and business alignment. Additionally, this outcome was critical to the research, as it led to the answers to the research questions driving this study.

Applications and EA

In Figure 14, the concept map, I categorized the combined sample into three major categories under EA: IT service goal, business process, and applications. Applications are part of one or more business processes, and business processes serve a specific IT service goal that is part of larger business goals. Hence, applications are the IT implementations of business goals.

Enterprise architecture repositories, store data related to these logical linkages, which may be in the form of models and blueprints referred to collectively as EA deliverables. Buchanan and Soley (2002) emphasized that the logical linkages between enterprise business, information, and technical architectures described within EA repositories linked business strategy to IT implementation. The EA deliverables thus, represent the planning process of the business strategy and serve as inputs to the IT vision and value. The combined information serves to guide and shape design decisions for projects in alignment with business goals, analyze, and document current and future-state architecture (Xionwei, 2008). It is therefore important that the data is updated and refreshed.

From the combined sample, the data fields categorized as EA during axial coding underwent investigation for the presence or support of IT and business alignment. I further categorized the data fields as technical data or business data from an application perspective. The categorized data fields appear in Figure 8 and Table 6.

Enterprise Architecture	Technical-data	Business-data
Business Goal	✓	✓
IT Service Goal	✓	✓
Investment	✓	✓
Maintenance Cost	✓	✓
Compliance/Regulations	✓	✓
Department	✓	✓
Business Process	✓	✓
Communicates With	✓	✓
Connected to	✓	✓
Components	✓	✓
IT Service	✓	✓
Service Segment (Biz, data,		✓
Asset Type	✓	✓
% Legacy Application Sunset	✓	✓
Application functionality	✓	
SLA adherence	✓	✓
TCO	✓	✓
TCS	✓	✓

Figure 8. Data fields categorized as Enterprise Architecture.

Table 6

Analysis – Applications and EA

Label	*n*	%
Technical data	17	94.44
Business data	17	94.44
Both	16	88.89

Analysis of the categorization resulted in categorizing most of the data fields as both technical and business data. The EA categorized data fields within the context of applications served as either an input to or an outcome of the other category. Data fields categorized as technical data provided input to business data, and data fields categorized as business data seemed to be dependent on technical input. The data fields served either as a bridge between IT and business or complemented IT and business. For instance, though categorized as business data, applications that are IT components implemented the business goals. Similarly, IT service goals, though categorized as technical data, were part of the larger business goal. Thus, the EA-categorized data fields were not stand-alone components of either IT or business areas but served different but specific role within IT and business. This observation indicated that both IT and business required the data fields, which implied that the data fields enabled and implemented IT alignment with business.

Applications and SLA

Applications deliver business services, as they are customer-facing IT components. Service-level agreements represent business expectations from technology and measure the services delivered by IT (Albright, 2013). Albright (2013) further elaborated that businesses therefore require measurements that are more granular, such as SLAs for business processes and associated applications. Application-specific SLAs are tools used to measure business-critical applications. Hence, business leaders set up metrics to measure and monitor the services for continuous availability and time and effort for remedying a broken service, reducing downtime, and establishing accountability and responsibility. Service-level agreements maintained a state corresponding to the status of the associated services. Thus, termination of business services should lead to termination of associated SLAs.

Greiner and Gibbons Paul (2013) emphasized that SLAs are dynamic documents that need periodic updates when changes occur to the underlying applications or IT infrastructure. Therefore, the underlying application life cycle directly affects the SLA life cycle. As a result, retirement or suspension of applications delivering a business service leads to terminating the associated SLA. Inconsistencies between the application and SLA states can result in unsupported and fictitious data reported to business. The SLA category in the concept map represented the data fields related to IT services from the combined sample. The data fields also entailed a description of the aspects of applications related to service delivery.

Categorizing the data fields from the combined sample as technical data and business data revealed that 85% of the fields were either business data or technical data. The data fields described application performance while providing business-specific information. Service-level agreements that measure application performance ensure continued support to business goals such as “increased revenue, higher productivity and efficient resource allocations” (Sevcik, 2008, p. 1). Thus, as technical information was recast as business metrics (Matlus, 2004), which is a key factor driving SLAs, the SLA-catgeroized data fields demonstrated support to both business and IT. This implied that s that the data fields effectively implemented IT and business alignment. Figure 9 and Table 7 present the SLA-categrozied data fields codified as technical and business-data.

SLA	Technical-data	Business-data
Business Goal	✓	✓
IT Service Goal	✓	✓
Maintenance Cost	✓	✓
Compliance/Regulations	✓	✓
Department		✓
Release Date	✓	
Last downtime	✓	✓
Response times	✓	✓
Correction time	✓	✓
Workaround time	✓	✓
Actual response time	✓	✓
Last invoice date		✓
DR plan	✓	✓
Manager		✓
IT Service	✓	✓
SLA adherence	✓	✓
Hours available	✓	✓
Operation start date	✓	✓
Operation end date	✓	✓
SLA lifecycle state	✓	✓
Escalation Procedure	✓	✓

Figure 9. Data fields categorized as service-level agreement.

Table 7

Analysis – Applications and SLAs

Label	*n*	%
Technical data	17	85.00
Business data	19	95.00
Both	17	85.00

Applications and CMDB

The components in an IT environment include applications and business processes, in addition to hardware and networking infrastructure. A CMDB is a repository of the technical, ownership, and relationship information of all components in an IT environment (Pharro, 2011), including "the relations between services and the underlying components" (Baldree et al., 2009, p. 5). To render a business service or IT service, applications interact with or are dependent on other applications and a variety of databases. A CMDB stores these interlinkages and relationships between applications and services, applications and other applications, applications and databases, and applications and the business unit or process, in addition to the hardware they reside on and the networking infrastructure required for their successful execution.

In situations of application or service downtime or performance issues, these linkages or relationships play a critical role in identifying the root cause to troubleshoot problems. Thus, CMDBs serve as a centralized repository that merges the business and IT silos and the silos within business and IT to provide a business-centric view of services through the relationships between IT components (Pharro, 2011). In the absence of these linkages, business leaders would only be able to guess the business impact of such problems and issues (Carvalho, Silva, & Fernandes, 2013). Carvalho et al. (2013) emphasized that tracking all the changes between the configuration items and their relationships was the most important responsibility of a CMDB. Therefore, applying updates or changes to the configuration items in a timely manner becomes critical so that a CMDB can continue to serve as a trusted source of IT infrastructure to business. The dependency of business on CMDBs demonstrated that CMDB is an enabler of alignment between IT and business. In the concept map, all data fields categorized as CMDB fit under the same name. Similar to EA- and SLA-categorized data fields, these data fields also underwent analysis as technical and business data to verify if the CMDB-categorized theoretical data set supported IT and business alignment. The categorization of the data fields apprears in Figure 10 and Table 8.

Configuration Management DB	Technical-data	Business-data
IT Service Goal	✓	✓
Business Process	✓	✓
Communicates With	✓	✓
Connected to	✓	✓
Release Date	✓	
Last upgraded	✓	
Used by	✓	✓
Response Times	✓	✓
Correcton Time	✓	✓
Workaround Time	✓	✓
Actual Response Time	✓	✓
last service disruption	✓	
DR plan	✓	✓
Configuration Item	✓	
Asset Type	✓	✓
Asset Version	✓	
Installation location	✓	
Inrack	✓	
CI priority	✓	✓
Components	✓	✓
IT Service	✓	✓

Figure 10. Data fields categorized as CMDB

Table 8

Analysis – Applications and CMDB

Label	*n*	%
Technical data	21	100.00
Business data	14	66.67
Both	14	66.67

Categorizing the data fields as technical data and business data resulted in 100% of the data coded technical data and 66% of the total data represented business data. The analysis indicated that the data fields coded as technical data were business-related information. Although all the data fields received a code of technical data, only 34% were purely IT, and 66% supported both IT and business. The data indicated that the CMDB-specific data fields provided a business-centric view of IT attributes, which led to the conclusion that the CMDB-categorized data fields supported and enabled IT and business alignment.

The IT domains thus serve as bridges between IT and business, enabling communication and information exchange. Figure 11 represents the three repositories interfacing between IT and business. The repositories enable storing application-specific technical data, as well as providing a business-perspective-based interpretation to business.

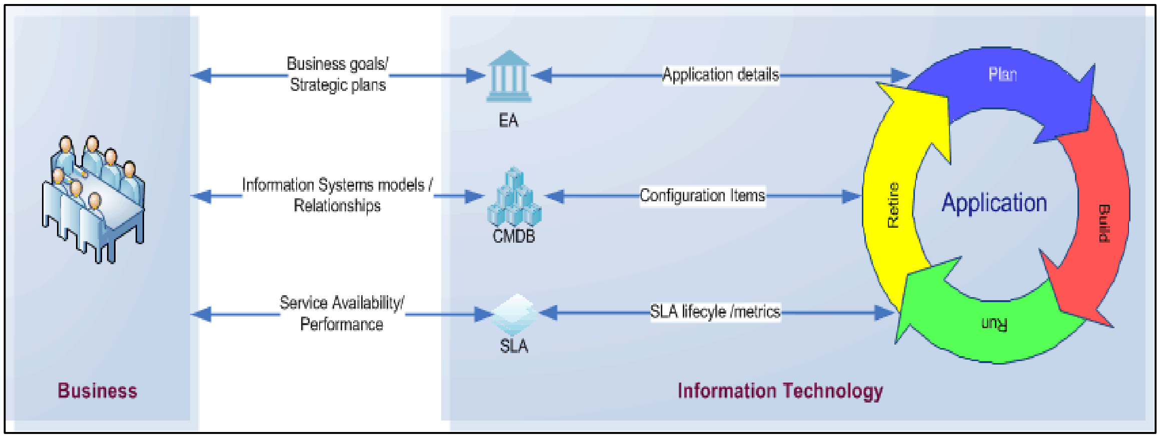

Figure 11. Application life cycle management subcategories: enterprise architecture, configuration management database, and service-level agreements.

The investigation thus revealed that application-specific data fields in each subcategory were supportive of IT and business alignment. At an implementation level, while the data fields would be part of the repositories of the respective subcategories, cumulatively they represent a single application. This dual representation of the data fields indicated that continuous synchronization of the data fields is a necessity. The risk presented by the dual representation was any incoherence among the data fields would communicate differently to business and IT or provide inconsistent information about the application. Therefore, changing any one data field specific to a subcategory would require updates to the remaining data fields in the other repositories to ensure the changes to the data fields were consistent and the alignment undisturbed.

The data fields cumulatively represented aspects of the same application, which indicated that the data fields were interrelated and interdependent. They were not stand-alone components. Hence, a change introduced in a data field could span across one or more repositories. Additionally, the change could distort the cumulative meaning of the decommissioned application to business. Therefore, the conclusion was that to avoid such a situation, it was important to execute the decommission-related tasks in a specific sequence to track changes to the data fields and update related fields accordingly. Such an approach would minimize inaccuracy and inconsistency among the data fields. Structured execution of the activities would involve ordering the activities in a predetermined sequence that conformed to the organization's IT infrastructure and business model. Tying the activities together in an orderly manner ensured the successful execution of the decommission activities before retiring the application.

Updating the technology repositories (EA, CMDB, and SLA) in a timely manner, as well as ensuring the orderly execution of decommission-related activities, ensured business remained informed. Therefore, it was critical that appropriate communication to business followed the technology updates and application retirement. Informing business in a timely manner would be the final objective of updating the repositories as well as ensuring a structured decommission. The infrastructure setup may vary among businesses. Hence, not all businesses might have technology repositories. In such exceptions, communication or notification to business serves the role of the repositories.

Summarized Analysis

Analysis for this research involved data as well as the IT functional areas. Navigating the data analysis involved following grounded theory method data analysis techniques, and the IT functional area involved evaluating the data samples to identify relationships between the IT domain areas and the applications. Figure 12 represents the overall analysis leading to the research findings.

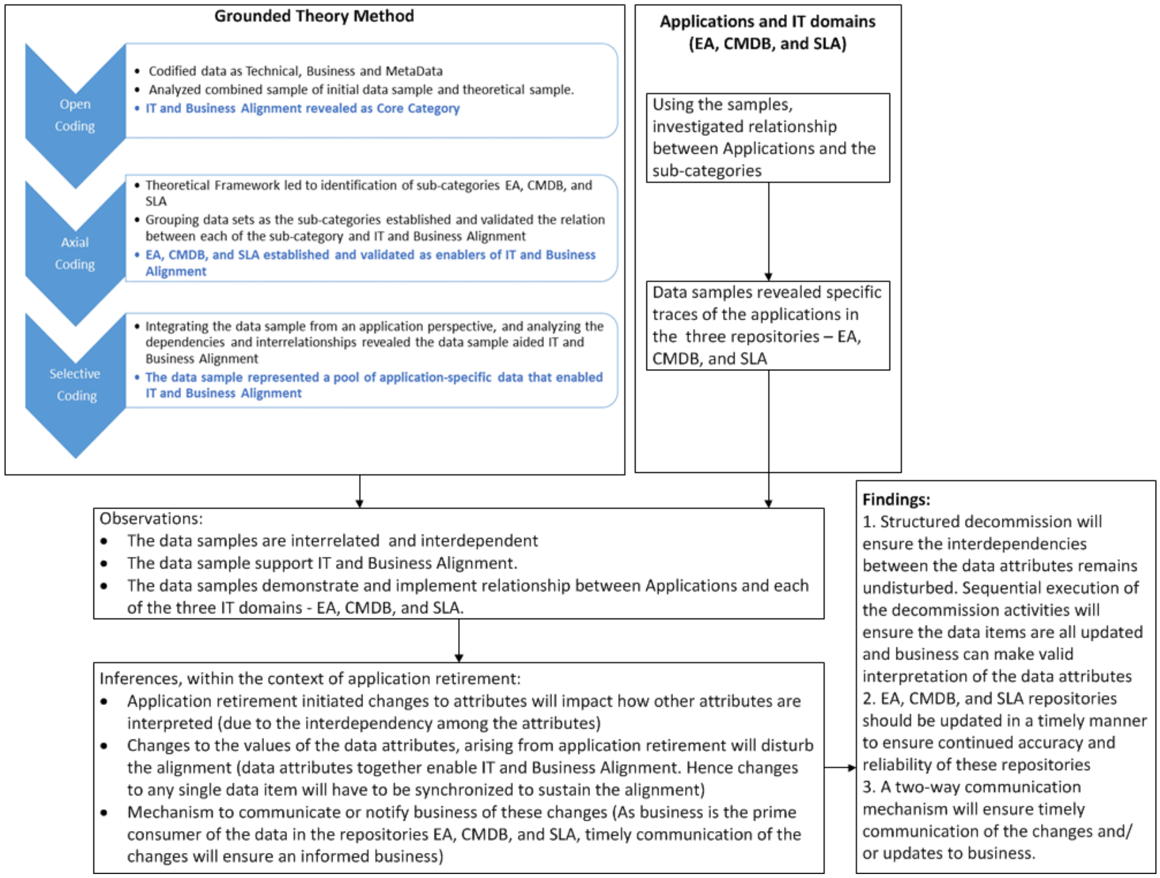

Figure 12. Overall analysis, observations and research findings.

Implementation of Grounded Theory Method

The box labeled *grounded theory method* in Figure 19 includes a summary of the data analysis described in detail in the Data Analysis section of Chapter 3. Analysis of the initial data sample generated from an existing process resulted in defining the problem statement and framing the research questions. I codified the combined data of theoretical samples and the initial sample as technical, business, and metadata. A detailed explanation of open coding performed for this research appeared in Chapter 3. Inductive theory resulted from constant comparative analysis (Birks & Mills, 2011). Comparing the theoretical sample with the initial sample resulted in a refined sample that bridged IT and business. Data analysis indicated modifications to the sample affected IT or business, which revealed IT and business alignment as the core category.

Applying the alignment perspectives of the SAM revealed EA, CMDB, and SLA as the subcategories. Matavire and Brown (2008) defined axial coding as analysis and coding around the axis of the core category. The literature review in Chapter 2 included information on the role of each of the IT domains in supporting and enabling IT and business alignment. Strauss and Corbin emphasized that while open coding involves breaking the data apart to study the underlying theme, axial coding involves building the data back by relating the core and subcategories (as cited in Walker & Myrick, 2006). Chapter 3 (pages 97 to 102) included a detailed description of the axial coding for this study. When grouped and categorized into each of the IT domains, the data set demonstrated that the data categorized as EA, CMDB, and SLA aided and supported IT and business alignment.

Integrating the data sample from an application perspective allowed me to highlight the interdependency and interrelationships between the data elements. Selective coding involves "integrating and refining the theory" (Strauss & Corbin, 1998, p. 143) by relating the core and subcategories with other entities in the research (Walker & Myrick, 2006). The concept map, thus, included the combined sample categorized into each IT domain from an application perspective. Analyzing these dependencies and interrelationships revealed that the data sample aided IT and business alignment. Chapter

3 (pages 102 to 106) included a discussion on the interdependencies and interrelationships among the data elements.

Applications and the IT Domains (EA, CMDB, and SLA)

The grounded theory method data analysis techniques served to establish and validate the relationship between IT and business alignment with each of the three IT domains. The data analysis techniques progressively demonstrated that the IT domains EA, CMDB, and SLA enabled and supported IT and business alignment. As the research problem concerned applications, and the outcome from grounded theory method related the IT domains with IT and business alignment, I next investigated the relationship between the IT domains and applications to assess if applications had a role in IT and business alignment.

I evaluated the relationship between applications and each of the IT domains. The literature review in Chapter 2 included an overview, purpose, and role of each IT domain in aligning IT with business. Chapter 3 included a concept map used to present the data elements from an application perspective. The next step involved investigating the same sample for evidence of relationship between IT domains and applications. I therefore categorized the already-grouped IT domain-specific data into technical, business, and metadata.

Applications and EA. Enterprise architecture is a set of models that represents the current and future state of an organization that aid in making business and IT decisions in a systematic and holistic manner (Plazaola et al., 2007). Pages 44 to 49 of Chapter 2 include an overview of EA, the purpose and benefits to businesses using EA, and EA's role in aligning IT with business. In Chapter 4, pages 117 to 119 I demonstrated that the EA-categorized application-specific data set provided evidence that it aided IT and business alignment.

Applications and SLA. Service-level agreements are contracts with clients that include technical details in terms of business goals for the benefit of business units while positioning IT as a strategic partner (Matlus, 2004). Pages 55 to 59 of Chapter 2 included a review of the literature on SLAs, the benefits of SLA to business, and the role of SLAs in aligning IT and business. Chapter 4, pages 119 to 121 include an explanation regarding how the SLA-categorized application-specific data set provided evidence of enabling IT and business alignment.

Applications and CMDB. A CMDB is a repository of information systems that provides a logical model of IT configuration items, their attributes, and their relationships in the IT environment (Behnia, 2006; Pharro, 2011). Pages 50 to 54 of Chapter 2 included a discussion on how a CMDB is a source of truth to business, its benefits to business, and its role in aligning IT with business. Chapter 4 included investigations from pages 121 to 124 that revealed the CMDB-categorized application-specific sample enabled the alignment of IT with business.

When grouped as EA, CMDB, and SLA, the data set, presented from an application perspective, demonstrated that the data elements provided information to both IT and business. This indicated that the sample, at a strategic-level and when presented from an application perspective, supported IT and business alignment. At a tactical level, this conclusion indicated that the repositories of EA, CMDB, and SLA stored data attributes that described applications as well as supported IT and business alignment.

Observations

Combing the outcomes from the grounded theory method and applications and IT domains, my cumulative observation was as follows:

1. The data sample was interrelated and interdependent.
2. The data sample supported IT and business alignment.
3. The data sample demonstrated and implemented a relationship between applications and each of the three IT domains: EA, CMDB, and SLA.

Inferences within the Context of Application Retirement

I assessed the above observations within the context of application retirement. After application retirement, the values of the data fields either changed or became redundant within the current business context. Assessment of the theoretical sample revealed that application retirement affected all the data fields in the theoretical sample. Retiring applications led to terminating the related business or IT services, which led to SLA-categorized data fields becoming redundant. Similarly, CMDB-related data fields would no longer be relevant, as one or more components may not exist. Newer business goals and strategic plans would render the data fields categorized as EA both obsolete and inapplicable. Thus, I observed that the resultant changes to the data fields from application retirement spread across the three repositories that served as the source of current and future business decisions. Thus, the inferences arrived at were as follows:

1. Due to the interdependency and interrelationships among the data fields, modifying a data field would render other related data fields either meaningless or inaccurate.
2. Such an inaccuracy among the data fields, if prolonged or related fields received delayed updates, led to inconsistencies among the data fields. This inconsistency then resulted in inaccurate, inconsistent, and imbalanced repositories.
3. Such inaccurate and inconsistent repositories coupled with uninformed business due to lack of timely communication would result in gaps in IT and business alignment.

The above inferences, supported by the investigations described in earlier sections, led to the conclusion that application retirement affects business and IT alignment. As demonstrated, application retirement is a stage that modifies all the data fields within the theoretical sample. As these data fields enabled business and IT alignment, I concluded that application-decommission-initiated changes affect business and IT alignment. If not handled in a timely manner, these changes could be lost with time, which would lead to gaps in IT alignment with business. I therefore inferred that the lack of solutions for these shortcomings coupled with every application decommission would exponentially increase the gap between business and IT. Such a scenario could eventually lead business leaders to base their strategic decisions on inconsistent or non-existent data, thereby resulting in subsequent loss of alignment between business and IT.

Research Findings

A variety of tools exist to aid with application decommission. However, as noted in Chapter 2, the tools failed to address the alignment issue. Additionally, the scope of the tools included the back-office functions of IT infrastructure. Therefore, incorporating my inferences would ensure the data repositories supporting and aiding business decisions are accurate as well as endure both IT and business are aware of the decommissioned applications.

When applying the research findings to the end-of-life stage of an application, I propose the following:

1. Structured decommission will ensure the interdependencies between data attributes remain undisturbed. Sequential and orderly execution of the decommission activities will ensure timely updates to the data items and business leaders can make valid interpretation of the data attributes.
2. Timely updates to EA, CMDB, and SLA repositories will ensure continued accuracy and reliability of the repositories.
3. A two-way communication mechanism between IT and business will ensure timely communication of the changes or updates, thereby ensuring an informed business.

The investigations and the subsequent outcomes led me to the above conclusions. Organizations may implement the findings in a variety of ways, including into tools and frameworks so that IT continues to align with business after retiring applications. As part of this study, I have provided a process-level implementation of the findings. The revised process closed gaps identified earlier in this research and answered one of the research questions. The revised process also closed the gap identified in previous research.

Responses to Research Questions

Research Question 1 was as follows: How does application decommissioning effect IT business components? Axial coding in Chapter 3 validated and established that the IT domains supported and enabled IT and business alignment. To assess if application retirement had any impact, I investigated if the IT domains described applications. Hence, I analyzed the theoretical sample to discover which elements of the IT domains described applications. The investigation revealed that each of the three repositories of the IT domains stored related details of applications. Although EA repositories stored information related to idea generation to initiation of an application, the CMDB stored all information on the infrastructure that hosted and supported the application, and SLA contained contractual and operational details of the service rendered by the application. Application retirement results in changes in values of the related fields in all three repositories. Because the three IT domains support IT and business alignment, these changes, if not aligned, will affect IT alignment with business. I explained in detail the investigation process with an inference of how application decommissioning affects IT and business alignment. Discussion from pages 116 to 125 explain the investigation in detail that asnwers this research question.

Research Question 2 was as follows: What is the impact on the existing business and IT alignment from decommissioning applications? The investigations revealed that the three IT domains described some aspect of applications. Hence, the combined information from all three repositories described an application. The investigations revealed that retiring applications modified the values of the data elements in the three repositories and that interdependency exists among the data elements. These outcomes led to the inference that after application retirement, it is critical that they update the application-related information in the EA, CMDB, and SLA repositories. Failures or delays to updates can mislead business, resulting in mismanaged IT investments, mismanaged resource allocations, and unrealistic timelines. This dependency with consequences influencing business decisions established that a definite connection exists between application decommissioning and IT business components. I detailed the investigations from pages 131 to 132 that led to answering this question.

Research Question 3 was as follows: What is the impact on future strategic decisions if the business stays uninformed of decommissioned applications? My investigations established that the three IT domains EA, CMDB, and SLA bridged IT and business to enable communication and information exchange. The inferences derived demonstrated the data elements are interdependent and application retirement affects these repositories. Therefore, after application retirement, unrefreshed repositories can result in uninformed business. The consequence of such an occurrence would cause business leaders to base future strategic decisions on phantom data or past data that are no longer valid. Such decisions would result in mismanaged efforts arising from an inability to leverage IT to its full potential to support business decisions. Tallon and Kraemer (1999) indicated that strategy shortfall happens when business is not aware of developments in IT or fails to leverage IT capabilities in making business or strategic decisions. Thus, future decisions would no longer be strategic, as an uninformed business cannot develop strategies to address issues in a proactive manner.

Research Question 4 was as follows: How do the research findings close the gaps in the ARP process? The gaps in the ARP process served as a basis for this study. The research questions resulted from the gaps identified in the ARP process. I revised the ARP process to close the identified gaps and demonstrated an implementation of the findings. Additionally, the revised process closed the gap identified in the literature by augmenting the literature on process-based IT and business alignment. In the following pages, I explain and demonstrate how the research findings close the gaps in the ARP process.

Solution: Revised ARP Process

The problem statement for this study emerged from the analysis performed on the ARP. The scope of this research included proposing an enhanced process that closed the gaps identified in the ARP. Additionally, through the revised process, I implemented the findings shared in the earlier sections of this chapter. Although organizations may apply the solution in many different ways based on the organization size and infrastructure landscape, I chose to provide a process-based solution. The gap that I identified from previous research was the limited literature available in the area of process-oriented IT and business alignment. The enhanced process and the associated literature was my contribution to reduce that gap by contributing to the literature on the process-oriented implementation of IT alignment with business.

Benefits of Process-Level Alignment

Business initiatives, when implemented, translated into lower level operational processes that Tallon (2008) referred to as operationalizing alignment. Mooney, Gurbaxani, and Kraemer emphasized that the impacts on intermediate processes, which form a business's value chain processes enabled in assessing the business value of IT investments (as cited in Tallon & Kraemer,1999). Therefore, process-oriented alignment ensured that IT alignment with business was not limited to strategic levels but was all encompassing within an organization. Additionally, Tallon and Kraemer (1999) highlighted that process-level alignment revealed any misalignment at the lowest levels of an organization. They further contended that this visibility enabled identifying bottlenecks within a series of key activities or processes, which made it easier to extend, observe, and monitor IT-supported activities.

Thus, the main benefits of a process-oriented implementation of IT and business alignment are as follows:

1. Ensured IT and business alignment permeated down to operational levels, transforming strategic alignment to tactical alignment.
2. Realized business value of IT through increased and measured productivity.
3. Increased transparency enabled identifying early alignment gaps, bottlenecks, and scope for increased or improved engagement with IT.

Revised ARP: The Solution Process

Chapter 1 included a detailed description of the original ARP. Thus, the focus in this section is the revisions. Through the revisions, I explain how I incorporated the solution in the process. The ARP was a process embedded within IT and lacked any communication with business. As a result, after application retirement, no one gathered or updated business-related data. The investigations as part of this research revealed that a lack of business data led to gaps within IT and business alignment.

I applied the findings of this study to the ARP to arrive at an enhanced process. The resultant process design closed all the gaps identified at the onset of this research and served as an implementation of the solution I proposed. The following section includes an explanation of the enhancements to the process:

1. Sequential execution of the activities: The activities within the process have numbers to demonstrate the order in which the activities should occur. Some activities have to follow a sequence, and some may take place concurrently. The sequence ensures structured decommissioning and enforces adherence to process design. While automating this process design, the sequence ensures logical ordering and execution of the activities. The structured execution of the decommissioned activities will make sure the interdependencies between data attributes remains undisturbed, thereby ensuring the coherence and accuracy of the values. This design construct implemented and conformed to the research finding on structured decommissioning.
2. Inclusion of EA, CMDB, and SLA repositories: The revised process included the three IT domains EA, CMDB, and SLA. The revised process design demonstrates the integration points with business and activities that refresh related repositories. The inclusion of the three business-facing IT domains in

the process design implements IT integration with business. The original ARP lacked this aspect, which led to gaps in IT and business alignment. The enhanced process design that involves implementing the integration with business closed this gap. Additionally, the revised process design included activities to refresh the three repositories. This step within the process design ensured business always used updated data, thereby closing the gap identified in Chapter 1. The inclusion of the three IT domains and the subsequent steps to refresh repositories ensured business remained informed and IT alignment with business remained intact.

3. Stage gates: The process design included two stage gates that served as additional checkpoints to ensure structured decommissioning, communication with business, and the collection of metrics and related documentation. Additionally, by incorporating this design construct, I implemented the research finding, that recommends including a communication mechanism to notify business. Hence, if organizations lack the infrastructure for EA, CMDB, and SLA, the stage gates implement a communication mechanism that ensures notifications to business. Building this construct ensured IT aligned with business, thus closing the gap identified early in the research. As I chose to propose the solution as a process, I used stage gates to build in checkpoints that ensured notifying business. Based on the demands of the solution, organizations can tailor this implementation of a communication mechanism to suit their needs. The revised process appears in Figure 13.

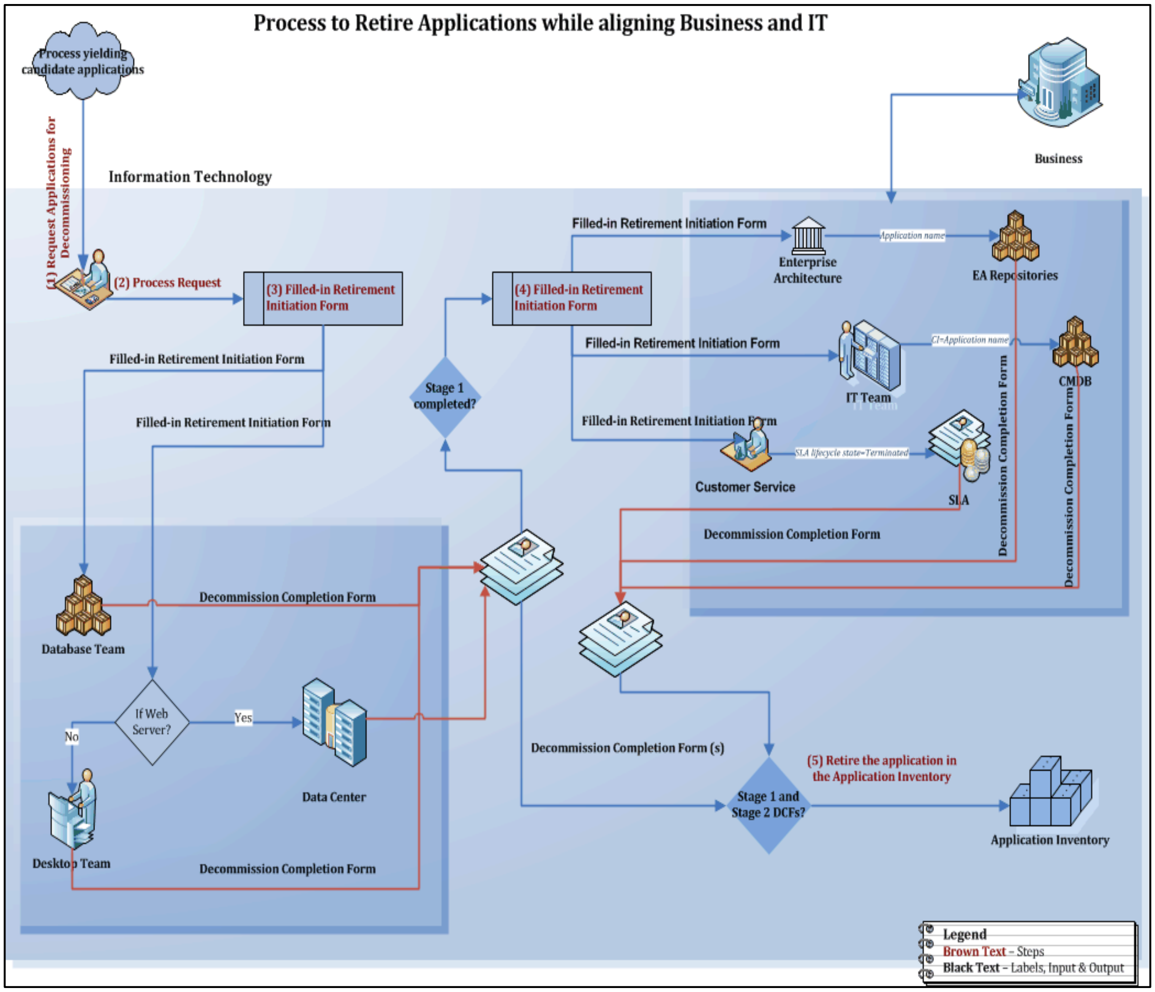

Figure 13. Revised solution process for the application retirement process

Validity and Reliability

Grounded theory method includes techniques, analysis, and triangulation of sources to establish the validity and reliability of the research design. The theory emerging from such rigorous analysis, consistent data scrubbing from iterative comparative analysis, and conforming to existing research after triangulation with multiple sources of research has to be valid and reliable. However, Patton (2001) urged qualitative researchers to consider validity and reliability while designing their research and analyzing results. In the following sections, I share how I handled the threats identified in Chapter 3.

Threat from homogeneous data sets. As the data were a collection of fields from the ARIF and the DCFs, the data set was static and homogeneous. The homogeneity did not provide opportunities to me to analyze from various perspectives. Absence of variance yields the same analysis repeatedly. The repeated identical analysis led me to view and analyze the data set in a limited manner. The consistent outcome of the analysis led me to believe that a consistent outcome or a lack of variance might have been limiting me from viewing the data set differently. I realized the possibility of the threat in the data set very early in the research and employed theoretical sensitivity, theoretical sampling, and memoing to create different perspectives. The analysis of the data set took place within the context of those perspectives. Some examples of contexts considered were financial investments, licenses, and IT governance. Though I eliminated these contexts, analyzing the data sets within the context provided pointers to the lack of business data. Although the analysis within these perspectives did not directly provide additional information, the effort was worthwhile. The varied context ensured the homogeneity of the data set did not skew the analysis, and the pointers provided by the perspectives indicated gaps from the business domain.

Researcher bias. I was responsible for designing and leading the implementation of the ARP process. I was also the key witness of the success of the process. The familiarity and the success of the ARP provided me confidence. While analyzing the data set, I recognized the familiarity of the process design, and the operation of the process limited my analysis. Comparative analysis and theoretical sampling enabled me to overcome the bias. The combined activities of data collection, theoretical sampling, and comparative analysis provided different perspectives of the data set. The various perspectives encouraged me to think and analyze differently, which eliminated any bias.

Theoretical sampling. In grounded theory, theoretical samples play a pivotal role in shaping the emerging theory as well as directing the researcher's thinking. Additionally, the theoretical samples carry the onus of introducing variance into the homogeneous data sets. Therefore, I had to be responsible in selecting the samples. A random selection of theoretical samples can introduce unrelated variance or may not add value to the data set. Initially, I selected and discarded samples. Eventual analysis led to identifying the core category. Consequently, I ensured the samples selected related to business and IT alignment. Such samples added the required variance as well as aided theoretical sensitivity through comparative analysis. The samples were supportive of the study and resulted in identifying the subcategories EA, CMDB, and SLA. Additionally, I investigated and validated the role of EA, CMDB, and SLA in business and IT alignment. Therefore, by conforming to the core category and subcategory, I ensured my selection of theoretical samples was not digressive to the study.

Theoretical sensitivity. Grounded theory is a research method that provides many opportunities to researchers to apply their experience and practice. Theoretical sensitivity therefore drives and enriches grounded theory. However, the downside to this concept is the research design does not provide any external mechanism to control, limit, and direct theoretical sensitivity. The onus and responsibility is on a researcher to ensure the application of experience and practices occurs in a balanced manner. The initial sample provided many opportunities for estimation and analysis. Subsequent comparative and iterative analysis driven by my theoretical sensitivity ensured precise and streamlined data sets. Identification of the SAM as the conceptual framework served to anchor and channelize my theoretical sensitivity. I directed subsequent literature research, theoretical memoing, and theoretical sensitivity around the SAM. Identification of EA, CMDB, and SLA as the subcategories further channelized and focused my theoretical sensitivity to ensure my efforts and research supported the study.

Summary

Chapter 4 included a discussion of the results from the data analysis, detailed investigations, and research findings. The data analysis set the stage for the detailed investigations in Chapter 4. I adopted a systematic approach to arrive at the research findings and analyzed the relationship between applications and IT and business alignment to assess the impact of application retirement on IT and business alignment.

The combined outcome from applying the data analysis to the data in the theoretical sample, led by my theoretical sensitivity, demonstrated the relationship between applications and IT and business alignment. Using the theoretical sample, I established the relationship between applications and IT and business alignment. The outcome of this investigation enabled me to analyze the impact of application retirement on IT and business alignment. This final analysis resulted in the findings that answered the research questions.

Through the research findings, I was able to answer the research questions. The solution I provided was a revised ARP process that closed all identified gaps. The revised process demonstrated the implementation of my findings. I adopted a process-oriented approach to demonstrate the implementation of my findings, thereby closing a gap in the literature.

Grounded theory data analysis techniques based on data and iterative comparative analysis incorporated validity and reliability in the research design. I addressed validity and reliability issues identified in Chapter 3 using grounded theory constructs. Iterative comparisons, a theoretical sample, and the research questions controlled and directed researcher bias to find solutions to the research questions. Theoretical data ensured a balance in the homogeneity of data sets with the appropriate amount of variation. As theoretical data resulted from my theoretical sensitivity, I relied on the SAM framework to channel my theoretical sensitivity to drive the research.

Chapter 5 includes recommendations on different ways to implement the solution. The chapter also includes a detailed explanation of potential areas for improvement and future research. Additionally, Chapter 5 includes a discussion on the positive social change initiated and supported by this research.

Chapter 5: Discussion, Conclusions, and Recommendations

Constant analysis of the data sets gathered from the ARP, resulted in the questions that initiated this study. Analysis of the data sets revealed gaps in the process that resulted in identifying the problem that I solved through this study. The main goal of this study was to answer the research questions. As the theoretical framework, the SAM served as the conceptual platform for the research. The study adhered to the research design's data validity, reliability, and ethical considerations, in addition to applying data analysis techniques. As a result, the research design served to ensure the research adhered to and took place in a structured manner.

In the initial analysis, I defined the problem and generated a pool of research questions. Missing business-related data led me to focus on IT alignment with business after application retirement. A review of the literature on ALM, IT and business alignment, and a variety of application retirement tools revealed that application retirement was an area that lacked sufficient attention by both practitioners and researchers. Additionally, I recognized a gap in the literature and research in the area of process-oriented implementation of IT and business alignment. The data from the ARP served as the initial sample, and the initial analysis resulted in the problem statement. This outcome revealed the grounded theory method would be a strong contender among all the research designs of qualitative research inquiry. After a close inspection of case study and phenomenology research design, I selected the grounded theory method as the research design. Additionally, my detailed research about the methodology revealed that the grounded theory research design was conducive to and supportive of IS studies.

The data analysis techniques of the grounded theory method served to guide this study in a structured manner while incorporating trustworthiness and ethical considerations. The initial coding technique revealed the core category to be IT and business alignment. I assessed various alignment models before selecting Henderson and Venkataraman's SAM, based on strategic fit and functional integration. The alignment perspectives provided the various configurations that ensured alignment between business and IT. Applying the conceptual framework and the strategy execution, service level, and IT infrastructure strategy alignment perspectives revealed EA, CMDB, and SLA as the subcategories. My theoretical sensitivity guided the research and resulted in theoretical samples. Axial coding involved investigating the relationship between the subcategories and the core category using theoretical and initial samples. The resultant outcome of this analysis was the establishment and validation of the roles of EA, CMDB, and SLA in implementing IT and business alignment.

Selective coding involved integrating theoretical sensitivity with theoretical codes. The outcome of axial coding led me to investigate the relationship within the context of applications. The theoretical samples provided the evidence that the subcategories EA, CMDB, and SLA described an aspect of applications that served as a conduit between IT and business. This outcome established applications as enablers of IT and business alignment. I therefore investigated the theoretical sample to study the impact of retiring applications on IT and business alignment. The outcome of this investigation resulted in my findings, from which I answered the problem statement and research questions, and the solution process demonstrated the implementation of the findings, which closed the gaps in the original process.

I proposed the revised ARP process as the solution, as it closed the gaps identified at the onset of this study in the original ARP process.The solution process demonstrated the implementation of my findings and closed a gap in previous literarture. In the following section, I share the importance of this study, its findings, and the relationship between the findings.

Importance of the Study

The research findings reaffirmed the importance of this study. The key significance of this study was identifying the integration points with business that highlighted and aided the maintenance of business alignment with IT after retiring applications. According to the research findings, application retirement affects the alignment between IT and business. The study may benefit both business and IT. Identification of the IT domains, their role in bridging IT and business, and the impact from application retirement were the turning points of this research.

Interpretation of the Research Findings

Business and IT always come together while launching new plans, goals, and ideas. Together, business and IT share and launch new business plans and IT services with heightened enthusiasm and fanfare. Continuous replenishment of resources and funds is required to maintain and support applications that deliver these services or to meet the business goals. However, after the retirement of the same applications, reduced communication and coordination occur between business and IT. In this study, I highlighted the lack of communication between business and IT and its subsequent impact on planning, coordinating, and executing shared plans between business and IT. The IT domains identified were enablers as well as inhibitors of IT and business alignment. The study demonstrated that the IT domains bridged business and IT and served as the integration points for business and IT. Further, the investigations validated and demonstrated the IT domains as enablers of business and IT alignment. The same investigations also revealed that any change to the data within these repositories resulted in disturbing the very alignment that they supported, thus, serving as inhibitors of business and IT alignment. Through my experimentations, I demonstrated that application retirement introduced changes to the repositories of the IT domains EA, CMDB, and SLA. Therefore, after application retirement, examining these repositories and refreshing them would ensure EA, CMDB, and SLA continued as enablers of business and IT alignment.

Another finding of this research was the need to update the technology repositories in a timely manner. This finding is important, as timely updates to the repositories determines the continuation of the IT domains as enablers of business and IT alignment. I highlighted this dependency. Any latency in making updates to the technology repositories can convert the IT domains from enablers of business and IT alignment to inhibitors of business and IT alignment. Therefore, I emphasized that these updates should follow any application retirement. I also highlighted that an application retirement is not complete until the updates to these repositories occurred. This finding seems an obvious function, but ignoring its implementation could reverse the role of the IT domains in maintaining IT alignment with business.

Implementing these findings will require communication and coordination among personnel in both business and IT with varied skills. Application administrators, server administrators, database administrators, and project managers on the IT side will have to coordinate with enterprise architects, configuration managers, SLA managers, and portfolio managers on the business side. Although retiring applications would involve these roles in business and IT, the actual number of personnel would depend on the organizational structure of the business. Therefore, I recommended a two-way communication mechanism that would ensure personnel communicated and coordinated in a timely manner. I have observed that at my client site, the lack of such a mechanism was instrumental in delayed communication and led to eventual missed communications with business. Such missed or delayed communications affected ongoing or future business decisions. I also recognized that the IT landscape and infrastructure setup varied as it depended on the size, function, and needs of the business. Therefore, some businesses may not support any of the three technology repositories: EA, CMDB, and SLA. In such situations, the only source of updates on application retirement to business would be explicit communication from IT. Hence, I highlighted the necessity of a two-way communication mechanism between business and IT.

Research Findings and Theoretical Framework

The theoretical framework for this research was the SAM developed by Henderson and Venkataraman (Henderson & Venkataraman, 1999). The two main concepts of the SAM are strategic fit and functional integration. Strategic fit is the business strategy that determines the infrastructure for business, and functional integration is the ability of business to leverage IT infrastructure to gain competitive advantage (Coleman & Papp, 2006).

The alignment perspectives of the model, namely strategy execution, service level and IT infrastructure strategy, led to identifying the IT domains EA, CMDB, and SLA. These domains, while being part of IT, enable business alignment. The role of the IT domains in IT alignment with business, supported by the theoretical sample, led to the research findings. The theoretical framework thus was effective in delivering the research outcome. Therefore, because I indirectly derived the research findings from the theoretical framework, they were supportive of the SAM. This inference implies that applying the research findings at any organization, should augment the alignment maturity of that business. Luftman (2000) developed the strategic alignment maturity model to measure the maturity of IT alignment with business. The model’s six maturity categories are:

1. The communication matrix: measures effectiveness of information exchange between IT and business.
2. Competency/value measurements maturity: business and IT metrics to measure IT and business to determine IT’s contribution to business.
3. Governance maturity: determining roles and responsibilities and prioritizing the procurement of IT resources.

4. Partnership maturity: measures business's awareness of IT organization and the mutual trust and dependency between them.
5. Technology scope matrix: ability of IT organization to provide new and emerging technology and infrastructure, and facilitate business processes.
6. Skills maturity: measures an organization's readiness to retain and hire talent in response to business changes.

Supporting any of the above categories would enable a business to sustain or mature its current alignment maturity, if not elevate it to the next level.

The research finding *structured execution of decommission-related activities* supported the orderly execution of decommission activities. This finding ensures a reliable decommissioning of the application through the structured and sequential execution of all activities related to application retirement. Most of the activities such as data migration, data archiving, and application removal are disparate. Structuring these activities and ensuring sequential execution ensures the guaranteed completion of all activities in a reliable manner. Hence, this finding supported Luftman's (2000) technology scope matrix, partnership maturity, and governance maturity.

The next finding, *applying timely updates to the technology repositories after application retirement*, ensures the effective use of IT to gain a business advantage. Additionally, the repository updates provide business and IT metrics for business to make informed decisions. The timely availability of these metrics measures and demonstrates the dependency of business on IT as well as the business value of IT. Incorporating this finding into application retirement tools, procedures, or processes ensures IT's understanding and support to business. This research finding was supportive of the categories competency/value measurements maturity, partnership maturity, and communications maturity.

The third research finding, *two-way communication between business and IT*, ensures the effective exchange of communication between business and IT. The implementation of this research finding demonstrates and measures the understanding between IT and business. Implementation of this finding as a component within products supporting application retirement or can integrate application retirement tools with external messaging applications. This finding becomes critical when businesses are not large and their infrastructure does not include all the technology repositories identified in this research. Thus, this finding was supportive of communications maturity and partnership maturity.

Adhering to the concepts of the SAM and aiding in augmenting existing alignment maturity levels demonstrates that the research findings aligned with using the SAM as the theoretical framework for the study. The objective of this study was to implement the research findings to close identified gaps in the process that facilitated application retirement. Based on the literature review, the theoretical framework, and gaps in previous research, this study is a response to improve and progress current practices and theory. This study therefore included a revised ARP process that facilitates application retirement, and I implemented the research findings to align business with IT. The revised ARP process is only one of the many ways to implement my findings. The following section includes recommendations for different ways to implement the findings.

Recommendations

The focus of the findings was to maintain business and IT alignment after application retirement. The solution included in this study is a process-based implementation, but there are other ways to implement the findings. This section includes recommendations of other methods. Business leaders set up IT and IS to respond to and meet a variety of demands from the industry, consumers, market regulations, and competition. Because every business has this need, I have set forth ways in which business leaders can adapt the solution I proposed in this study to respond to their unique situations.

1. I proposed a process-based implementation, which may be adapted to meet the needs of enterprise organizations. I recommended that leaders of enterprises tailor the proposed process to meet the demands of their organizational structure, IT infrastructure, and industry. A custom solution that ensures the implementation of the research findings will ensure IT alignment with business.
2. Alternatively, vendors may implement the proposed solution as a software tool. Vendors can develop software tools based on the solution proposed in this research. Major vendors such as IBM, Capgemini, HP, and Solix Technologies have developed tools that decommission applications (Applimation, 2009; Capgemini & HP, 2010; IBM, 2009; Solix, 2008). By

incorporating my findings, vendors can enhance their tools to solution sets. Such implementations may enable business leaders to realign with IT subsequent to application retirement.

3. Based on a review of the literature, I recommended including application retirement in strategic plans. As applications are outcomes of strategic plans, retiring an application formally closes that strategic plan. Therefore, strategic plans should include high-level plans regarding the retirement of associated IT applications.
4. Leaders of IT organizations always create plans for deploying applications to production. I recommended that leaders of IT organizations plan and document activities and steps for retiring applications while planning for deployment to production. As the time span between an application's deployment and its retirement is usually more than 10 years, documenting application retirement requirements at the time of deployment assists in future planning. The solution I proposed aids in this planning activity.
5. I kept a generic implementation of IT in mind and considered the current prevalent technology when proposing the solution. I strongly recommended tailoring the proposed solution to include technological advancements in the IT and IS landscape.

Limitations of the Study

During this study, and particularly while designing the revised ARP process, I observed a variety of limitations in the study. The limitations of the study were as follows:

1. Limited availability of literature and research on application retirement affected the research. I relied on industry white papers and technical articles. While these articles provided the most recent information on application retirement, lack of peer-reviewed journal articles was an impediment to the research process.
2. There is a lack of literature on process-based implementation of IT and business alignment. The available sources are two decades old. While the seminal work and the concepts are valid, current technological and marketplace developments call for more recent and applicable literature. The limited availability on process-based business and IT alignment was a limitation to this study.
3. This research originated from a process deployed at a very large federal facility with more than 40,000 employees. Data samples from a variety of organizations such as privately owned, small and mid-sized organizations, and large conglomerates would have ensured variations to the data set and provided additional scenarios.
4. I deployed the ARP that provided the data for this research at a time when leaders of the federal organization were becoming process aware. The ARP

process that set the premise for this research was yet to mature. The lack of knowledge and experience that mature process organizations would have been able to contribute to the research process therefore limited this study.

Prospects for Future Research

Technologically, application retirement affects several other areas. As I am an IT practitioner, I focused my recommendations in this sector. Application retirement can involve a variety of areas within IT, business, finance, compliance, and regulation, depending on the size of the business.

1. The ALM area of application retirement is a fertile area for future research, and the sectors affected by this stage of ALM provide additional opportunities for future research. Application retirement includes addressing unique industry-related demands. Tapping into these potential areas might allow IT practitioners, business experts, and industry professionals to benefit from them.
2. Most organziations treat application retirement more as an operational activity than as a stage within ALM. Considering the set of activities related to application retirement, increased research in this area might lead IT practitioners and analysts to consider standardizing application retirement as a stage or phase within the ALM.
3. Through this study, I minimized the existing gap in process-based alignment. With IT increasingly offered as a service, dependence on processes has

grown. Therefore, additional research in process-based IT and business alignment would benefit both the IT and the business sectors.

4. Information technology security, an important area of concern for both IT and business, is a potential area for future research. Application retirement leads to gaps within IT security, as most applications have some security built in that secures either IS or prevents unauthorized access. Future researchers can enhance and standardize existing IT security procedures and protocols associated with application retirement.
5. Most businesses use the application portfolio management (APM) tool to balance and manage their application portfolios. Most APM tools provide dashboards that aid in monitoring existing applications. Olavsrud (2012) and Murphy (2005) emphasized that APM improved impact analysis by providing increased visibility into the interrelationships among applications and their dependencies. Olavsrud further emphasized that as APM tools ensured alignment between business users and the technical community, the tool served as an enabler of business and IT alignment. Considering this growing popularity of APM tools with CIOs, and considering the association of APM tools with an application’s life cycle, future researchers would benefit from reviewing the relationship between application retirement and APM.
6. Recent developments in IT have resulted in tools that integrate various disciplines to provide IT managers an integrated view of their IT landscape. Integrated IT Portfolio Analysis (IIPA) is one such tool. Stang, Duggan, and

Short (2012) shared in their Gartner report that IIPA tools combined ALM, EA, and IT service management to provide IT managers an overall and balanced view of the enterprise's IT infrastructure, while also providing benefits of process automation at tactical levels to the IIPA user community. IIPA tools therefore implement IT and business alignment at tactical levels while enabling the same alignment at strategic levels. Hence, future researchers can investigate opportunities to include such mature and intelligent tools, thereby enhancing the process proposed by the researcher.

7. Technological advancements such as disruptive technologies (specifically, mobile technologies and cloud computing) have expanded the impact zone of application retirement. Although earlier technologies focused on client-server or web-based platforms, mobile devices and various cloud configurations have increased the demands involved in retiring applications. As these areas are more contemporary and have greater opportunities for future growth, future researchers should treat these areas with utmost urgency.
8. Application retirement costs money. Conversely, retiring applications eventually leads to savings. Therefore, application retirement affects finance adversely, as well as aids in the derivation of financial benefits. The assessment of application retirement from the perspective of IT investments is an important area for future research.

The above potential areas of research for future researchers demonstrate that this study is conducive to and provides ample opportunities for future research and development activities. Given the fast pace of growth in technology and the limited research available in the areas of application retirement and process-based IT and business alignment, future researchers can find many opportunities for research in this area. Additionally, any research related to application retirement and process-based IT and business alignment will aid with the scarcity in research and literature in these areas. Any addition to this area's body of knowledge would be welcome by scholars and practitioners.

Implications on Social Change

The final consequence of any innovation or research is change. Research outcomes propose improvements, refinements, and new approaches, all of which change existing theories, principles, practices, and methodologies. Implementing the research findings extends this impact to related and connected processes, functions, and people. The goal of research is to initiate and develop new methods and theories. Implementing research outcomes demonstrates the exact scope of the impact of the research findings. Therefore, when proposing implementations of their findings, researchers should bear in mind the total impact of the change. While changes to a discipline or area of research are planned, anticipated, and measured, it does not hold true for the areas, functions, and people directly or indirectly affected by the change. Researchers should therefore strive to ensure their research implementations extend the change so that it affects all involved positively.

Positive social change is the outcome of a process wherein impacted individuals and communities apply ideas and strategies in a thoughtful manner with an intent to improve thier worth and dignity (Walden University, 2014,). Walden University, as an institution promotes this spirit of positive social change to its scholar practitioners through its vision, mission, and goals.

The implementation and subsequent adoption of the ARP extended positive social change to all users of the process. I was a witness to a mind-set change among users, as well as to an increasing respect among the users of the ARP for the talents, experience, and contributions of their fellow users. This newfound respect for themselves and for their colleagues enabled the users to adopt the ARP with increased alacrity. Therefore, the positive social change triggered by the ARP not only aided in improving the working culture in the federal agency but also promoted the ARP in a beneficial manner. This symbiotic benefit inspired and encouraged me. I was pleased to note that the process I designed and implemented was effective in initiating and promoting an environment that was beneficial to my client.

The business problem, process design, process automation, and process governance incorporated into the ARP solution were all instrumental in triggering this positive social change. The business problem was effective in bringing all the teams together, as the teams were working toward a common shared goal through the process. Each team had a share in the project's overall success. The process design ensured that the teams worked in a phased manner comprising a series of sequential steps. Each team was individually responsible for the execution of its tasks and activities related to application decommission, but each team also realized that, for overall success, the teams had to complete their tasks in a timely fashion. The process automation cut across silos, seamlessly connecting all the teams. Breaking down the silos enabled all the teams to communicate, coordinate, and collaborate with each other, resulting in each team viewing the other teams as extensions of itself rather than as separate entities. The governance mechanisms implemented accountability, transparency, and responsibility. The process's governance and transparency ensured fairness and set a plan in place in case of disagreement or escalation. This approach increased the confidence of both the process users and their colleagues.

The positive changes accelerated quickly. The ARP was instrumental in helping the process users to understand how their contributions affected the business. The business services rendered by the application during its lifetime led the federal employees to realize their involvement and contributions at an enterprise level. This realization increased their self-worth and professional pride. They recognized the same involvement and contribution from their colleagues in their own teams and in the other teams. This shared sentiment helped to break down the silos and increase collaboration and coordination among the process users, which improved work culture and resulted in definite predictable success through increased employee contribution and performance. This observation confirmed that people engaged in a change process "work collectively towards a common objective, realizing benefits and delivering results" (Prosci, 2014, p.1).

The scope of the revised ARP process includes the business side of the organization in addition to the IT side. The positive social change triggered by the ARP makes me confident in expecting a similar, if not better, impact from the revised process.

The process design extends this positive change to the business side of the organization. The ARP was instrumental in triggering and sustaining the positive social change, but this change included only the IT teams identified in the process design. Therefore, the revised process would extend the positive social change to the business side of the organization. Moreover, the objective of the revised process was to align IT with business. Achieving this goal would ensure improved and timely communication between IT and business.

Processes operationalize IT alignment with business. Tallon (2008) emphasized that IT alignment was effective in extending the value created within a process. Therefore, the success of the revised process would not only ensure IT alignment with business but also extend positive social change to the identified areas of the business side of the organization. Additionally, implementing the study findings would ensure improved planning, execution, and communication, thereby resulting in tighter alignment between IT and business. Such an alignment would ensure improved communication, collaboration, and coordination among teams and employees. Tallon indicated, that depending on the needs of an organization, a tighter IT and business alignment may or may not prefered. Tallon acknowledged that the degree of the coupling was a key factor in determining performance. Sabharwal and Chan supported the same thought process, as they revealed a positive correlation existed between IT alignment and firm performance (as cited in Tallon, 2008). Therefore, a tighter alignment ensured by the implementation of the findings through the revised process would extend the positive social change to a larger employee base, as well as improve overall employee performance. The revised process would solve the problem of aligning business with IT after application retirement, improve overall employee performance across business and IT due to tighter alignment, and continue to sustain and extend positive social change. The combined impact would ensure the revised ARP would be equally successful in retiring applications while continuing to align IT with business as in ensuring positive social change across the organization.

Conclusion

This study's findings resulted in identifying three core requirements for ensuring IT continues to align with business after application retirement. These requirements are a structured decommission across the IT and business teams, timely updates to technology repositories, and a two-way communication mechanism between IT and business. The research also included a process-based implementation as a solution that answers the research questions as well as closes gaps identified in previous research.

I conducted investigations that revealed that application retirement has an impact on the alignment of IT with business. The revised process proposed provided a demonstration of an implementation of the research findings, as well as a process-based solution to implement IT alignment with business. Per the SAM, business and IT alignment is an outcome of strategic fit and functional integration. The study findings ensure the closure of gaps in functional integration arising from application retirement, enabling business and IT to continue to be a strategic fit. The research findings thus adhered to the conceptual framework. Implementation of the research findings would ensure IT alignment with business after application retirement. The impact of application retirement on IT and business alignment necessitates the recognition of application retirement as a stage in the application life cycle.

In addition to resolving the problem, this study contributed to literature and research in the areas of application retirement and process-based approaches to IT and business alignment. Tallon (2009) noted a known and documented deficit of literature and research in the area of process-based IT alignment with business. This study and the resulting solution process are my contributions to reducing that deficit. This research also contributes to and augments literature and research in the area of application retirement. The ARP has triggered social change by improving collaboration and communication, resulting in a positive turn in employee thinking and performance. Although the scope of the process limited that change to the IT teams, the implementation of the findings of this research may extend the positive impact to the business side of the organization. The research findings expanded the scope and the impact of the process, thereby extending positive social change to a larger area of the organization. The increased coordination and collaboration between business and IT arising from a tighter business and IT alignment will result in overall improved performance of organizations.

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