# Enterprise Architecture Professional Journal

Interviews With Top Business and Technology Thinkers, Case Studies, and Articles on Enterprise Transformation

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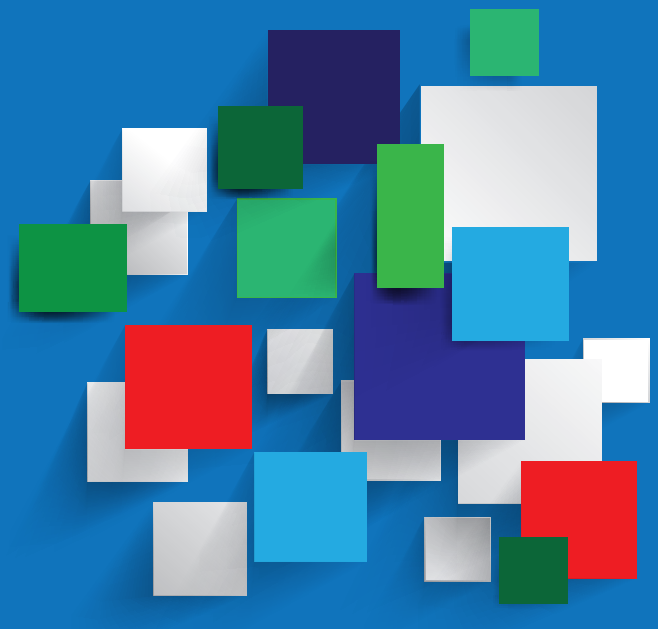


Volume 1 March 2013

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# ENTERPRISE ARCHITECTURE PROFESSIONAL JOURNAL

# VOLUME 1

# MARCH 2013

For Business and Technology Insights: Case Studies and Articles on Enterprise Transformation

## IN THIS ISSUE: APPLIED, PRACTICAL CASE STUDIES USING TOGAF® 9*



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FROM THE EDITOR

Welcome to the initial issue of The Enterprise Architecture Professional Journal. This journal provides a whole new channel for practitioners and experts in enterprise architecture (EA) to showcase their original thinking through case studies and articles. In addition, I will include articles about current trends and best practices in business and technology, often featuring reviews and syntheses of major Gartner® conferences, as well as interviews with leading companies and thinkers in these areas. I will also feature book and other EA-resource reviews in upcoming issues.

This issue is based on work originally submitted as projects on actionable EA done at the University of Denver, University College. All the students used TOGAF as their EA framework, but the Journal promotes the use of all pragmatic EA and related frameworks for enterprise transformation and will have articles covering the gamut of such frameworks. I would like to thank the professionals submitting these articles for sharing their knowledge

The Journal will be published online on approximately a monthly basis, with several issues coming out, though, in quick succession in 2013, including a special issue on using enterprise architecture to enhance approaches to disaster recovery. Should you want to subscribe to a hard copy version, please contact us for more details.

If you would like to register to be informed about when new issues are published, please send an email to the editor in order to be added to our mailing list, which will be used exclusively to notify you about the Journal and related enterprise architecture blogs and news.

I welcome your ideas and feedback to help more knowledgeable people around the world to get published by the Journal, the Board of which consists of leading trainers, educators, and practitioners of EA. If you would like to be considered to be a member of the editorial board, please contact me, Dr. Steve Else. Besides being the Founder and Executive Editor of the Journal, I am also CEO of EA Principals, the Founder and Chair of the Association of Enterprise Architects -- Washington, DC Chapter, and Assistant Director for Knowledge on the Technical Operations Board of the International Council of Systems Engineering.

Please spread the word about this exciting new publication so others can benefit from it and contribute to it. You will find it to be a "friendly" publication, which—while ensuring the accuracy, originality, and integrity of the prospective pieces—will respect all submitters of work for publication and will, to the extent possible, help contributors have their work published by suggesting timely and detailed feedback.

Steve Else, Ph.D.

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# ABI O'NEAL: IMPROVING A CLOUD COMPUTING INITIATIVE AT A NON-PROFIT ORGANIZATION

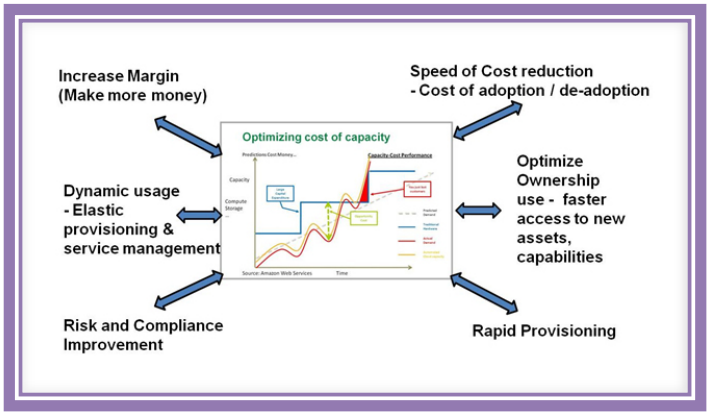
## EXECUTIVE SUMMARY

The prospect of adopting a cloud-computing environment is, for many organizations, enticing. The investigation herein explores the prospect of pursing a cloud computing initiative at a non-profit organization within the context of business, information systems, and technology architectures. The solutions proposed include employing TOGAF, introducing novel organizational structures, standardizing organizational data and relevant business processes, and standardizing the technological landscape at the organization. The investigation finds that these solutions would improve the likelihood of project success, result in reduced IT and training costs, and improve productivity within the organization. The standardization of both business processes and technology environments would likely simplify and improve the user experience. An iterative process of discovery, development, and deployment would serve to help the organization mature from an architectural perspective. In addition to the benefits derived from the successful adoption of a cloud-computing solution, architectural maturation would benefit the organization in terms of reduced IT costs and other measurable indicators. In tandem, the benefits associated with architectural maturation and the adoption of a cloud-computing environment would positively impact the organization's strategic capabilities.

## PROJECT BACKGROUND

### ORGANIZATIONAL BACKGROUND

The organization is a non-profit organization that serves individuals with developmental disabilities in the state of Colorado. The organization is comprised of no less than eight distinct business units. Support operations, which include Information Technology, are inextricably linked to each business unit. Primary business units include an ostensibly non-profit case management entity and six direct service provision entities. While consumer data is necessary for the operation of each entity, and involved in regulatory and auditing processes, the technological environment in the status quo does not enable on-demand, standardized, and integrated interactions with those data.




THE OPEN GROUP 2012

## CLOUD COMPUTING

Cloud computing has been described as a "paradigm shift in computer services" (Smith 2011). The technology includes the use of virtualization, which "makes a single computer look like many computers", and clustering, which "makes many computers… look like a single resource" (Oracle 2010; Godinez et al. 2010). Cloud computing is a "model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly [provisioned] and released with minimal management effort or service provider interaction" (Mahesh, Landry, Sridhar, and Walsh 2011, 10). The use of cloud computing has continued to expand rapidly (Mahesh, Landry, Sridhar, and Walsh 2011). The purported benefits of cloud computing include "on-demand self-service, resource pooling, [and] rapid elasticity" (Smith 2011, 71). It has been suggested that the virtualization associated with a cloud-computing environment can help to improve overall performance and "speed up transactions" (Mahesh, Landry, Sridhar, and Walsh 2011, 15). In addition to being faster, the promise of cloud computing is to "deliver all [of] the functionality of existing information technology services… enable new functionalities… [and] dramatically [reduce] the upfront costs of computing" (Marston et al. 2011). While the potential for cost savings may be enticing, other factors must also be considered.

Security and Regulatory Considerations. Cloud technologies, despite the rapid growth in their adoption, are relatively young. At this early stage, "not all the implications of cloud computing are well understood or even defined" (Smith 2011, 73). The vagaries associated with the cloud have introduced concerns for both security and regulatory compliance (Smith 2011). HIPAA and Sarbanes Oxley, among other regulations, mandate the "archival… [and] easy recoverability of corporate data and documents" (Mahesh, Landry, Sridhar, and Walsh 2011, 15). Other potential requirements, such as PCI compliance, mandate that certain data be explicitly handled. In the context of cloud computing and virtualized environments, the PCI Security Council has suggested that PCI compliance may, in fact, be impossible (Smith 2011).

The use of Virtual Private Network (VPN), on high-capacity WANs, may help to curb Quality of Service (QoS) issues associated with Internet-based cloud computing (Mahesh, Landry, Sridhar, and Walsh 2011). The relative quality of the end-user experience, however, must be considered in a broader organizational context. While the adoption of a cloud takes, on average, between three and five years, security and compliance issues can necessitate a significantly longer development period in regulated industries (Smith 2011). Regardless of the time investment associated with the adoption of virtualized cloud environments, many organizations and individuals are drawn to the potential for long-term decreases in IT expenditures.

Potential for Cost Savings. Cloud computing has been associated with potentially dramatic cost savings (Oracle 2010; Smith 2011). When considering the potential for cost-savings associated with a transition to a virtualized environment, it is critical to note that parallel advances in technology may offer viable alternative potentials for cost reduction. Researchers have suggested that a "marked improvement in server efficiency… will significantly reduce the cost of data center operation, making the efficiency offered by virtualized server based data centers far less valuable" (Mahesh, Landry, Sridhar, and Walsh 2011, 15). Regulatory compliance concerns, security issues, and alternative avenues for IT cost reductions may, for some organizations, render cloud computing a non-ideal solution.

Cloud Computing at the Organization

In an effort to promote a significantly more standardized and integrated environment, a private cloud computing initiative has been proposed. The Department of Information Technology has conceived of an initiative that has been described as a move towards a cloud-computing environment. The existing proposal, offered as a single page announcement on the organization's Intranet, outlines certain goals. The primary goals expressed include reducing costs and transitioning all existing computing functions to a cloud-computing environment. As the following investigation details, however, a successful cloud computing initiative will require considerably more standardization and integration of both data and business processes, managerial inclusiveness, and organizational maturation than exists in the status quo.

## ARCHITECTURAL ISSUES

In the adoption of a cloud-computing environment at the organization, several architectural issues must be considered.

Organizational. In the status quo, the organization lacks certain organizational structures, and subsequent IT and information governance capabilities, that are positively correlated with IT project success.

Data, Information & Knowledge. In its as-is state, the organization lacks standardization and integration of data, which are of particular concern in a cloud-computing environment.

Information Technology. A marked complexity, and lack of both infrastructure and application standardization, may inhibit the organization's architectural maturation and adoption of a cloud computing solution.

Business Processes, Policies, and Procedures. In the status quo, IT-business alignment and related business processes, policies, and procedures are not explicitly enumerated.

## IMPLEMENTING CLOUD COMPUTING

### ORGANIZATIONAL

The implementation of change requires governance. Without governance, decisions are often "ad-hoc, poorly managed and coordinated, and cost businesses real money" (Godinez et al. 2010, 54). For enterprise-wide IT projects, both IT and Information governance are requisite (Godinez et al. 2010; Avison, Gregor, and Wilson 2006; Brown 2006; Ross and Weill 2006). In order to deliver value to an organization, IT must have

"…governance structures and processes to ensure that IT projects are aligned with strategic business objectives… have the potential to transform the business… [and create value] by managing projects to be on time, on budget, and deliver expected results… growing revenues, improving customer satisfaction, increasing market share, reducing costs, and enabling new products and/or services" (Brown 2006, 141).

The structures of IT governance often include a "CIO on Board, executive management committees, IT strategy committee, IT leadership committees, and IT steering committee(s)" (Brown 2006, 141).

Chief Information Office (CIO). Cloud computing has been described as a paradigm shift which requires "a change management program for the IT team… [and] introduces new roles related to architecture" (Smith 2011).

Specialized skill and longevity of experience are each positively correlated with the success of IT projects (Brown 2006; Avison, Gregor, and Wilson 2006; Mahesh, Landry, Sridhar, and Walsh 2011). An experienced CIO can serve to enable effective information governance, improve accountability, and lead to improvements in the management of operational and other knowledge (Chen and Wu 2011). The involvement of an individual, or group of individuals, whose skillsets are specifically oriented to information management can allow an organization to more effectively leverage the skills of existing internal IT professionals. More importantly, in the context of effective IT governance, a CIO can facilitate improved discussions and decision making among senior organizational leaders (Chen and Wu 2011).

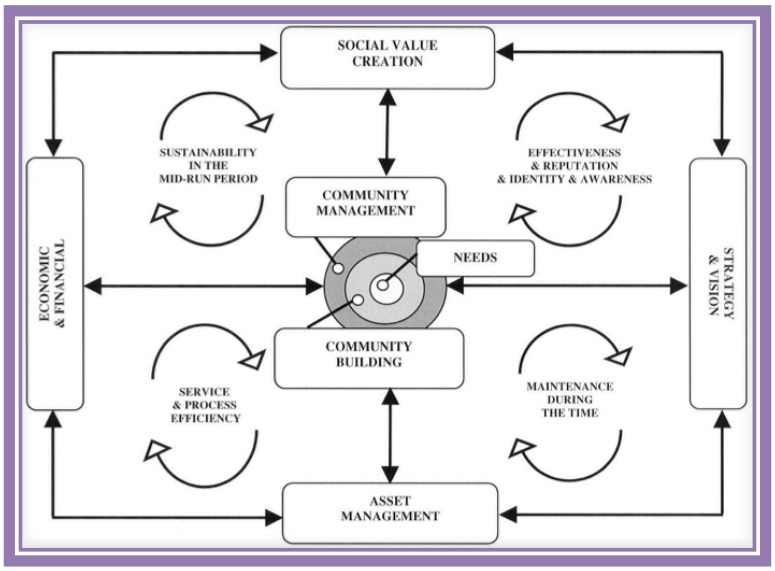
Managerial involvement. The mere adoption of IT solutions, especially novel endeavors such as cloud computing, is influenced by managerial support (Mahesh, Landry, Sridhar, and Walsh 2011). The involvement of managerial and other staff in broad IT governance and project-specific management has been shown to "significantly [enhance] the probability of [success]" (Brown 2006, 152; Avison, Gregor, and Wilson 2006; Mahesh, Landry, Sridhar, and Walsh 2011). A lack of executive support, the "leading cause" of IT project failure, can cause "projects… [to] drift into a technological or political abyss" (Brown 2006, 146). Relational or linking mechanisms between stakeholder groups, including managers of vastly different organizational units, are thus necessary (Brown 2006).

At the organization, the Department of Information Technology consists of one director, one assistant director, one full-time and one part-time technician, a reports specialist, and a Webmaster. While the organization ostensibly has an IT steering committee, the vast majority of IT decisions are generally made within the IT department. At present, the organization does not have active and collaborative technology strategy or leadership entities. These factors, in conjunction with the lack of a CIO, suggest that the fundamental organizational structures of IT governance are lacking.

## DATA, INFORMATION & KNOWLEDGE

Effectively and purposefully managing data, and subsequent knowledge, within a non-profit organization is critical to short-term success, long-term sustainability, and the creation of social value (Lettieri, Borga, and Savoldelli 2004). In a cloud-computing environment, information must be managed with privacy and security in mind (Oracle 2010; Godinez et al. 2010). When considering a transition to a cloud computing environment, and engaging in a necessary consolidation and integration of data, it is imperative that an organization properly understands both the types of data in use and the processes related to their use (Oracle 2010).

In the non-profit sector, some have suggested that knowledge "flows through four different cycles," transitioning from the individual level to the community level (Lettieri, Borga, and Savoldelli 2004, 18). The second cycle "introduces the activities of transfer and sharing and explains how to shift from the individual to the group level" (Lettieri, Borga, and Savoldelli 2004, 18). The third makes knowledge available on an organizational scale (Lettieri, Borga, and Savoldelli 2004, 18). The availability of organizational knowledge has been identified as a "key asset that fosters the achievement of a competitive advantage" (Lettieri, Borga, and Savoldelli 2004, 19). One of the organization's primary business units is essentially non-competitive. Due to the nature of case management for individuals with developmental disabilities in the state of Colorado, funding for case management activities is, in many cases, guaranteed. The other business units, however, operate in a competitive series of markets. From residential services to recreation, many of the organization's business units thus have a vested interest in gaining competitive advantage.




LETTIERI, BORGA, AND SAVOLDELLI 2004

Researchers have identified six clearly identifiable knowledge groups: accounting and administrative, managerial and organizational, teaching and training, fund raising and public relations management, operational, and miscellaneous (Lettieri, Borga, and Savoldelli 2004). At the organization, these knowledge spheres necessarily overlap to a great extent. Data related to the individuals that the organization serves forms the foundation for each knowledge realm. Those data are utilized, to varying degrees, by each respective business unit. In the status quo, consumer data is stored in disparate locations and often exists in duplicate.

As an example, basic consumer data (such as Social Security number, address, and service subscriptions) is often managed in parallel by two or more business entities. Duplicate records, in addition to fostering unnecessary redundancy, increase the opportunity for inconsistencies in data. When individual knowledge, especially knowledge about an individual in service, exists in isolation it is not capable of contributing to organizational knowledge. The contemporary data management processes at the organization may, in the context of knowledge flow, be inhibiting competitive advantage and efficiency in business operations. The integration of information has been associated

with significant improvements in operational reliability, planning and scheduling, regulatory compliance, customer satisfaction, and general administration† (Harkins and Chin 1999).

Technical infrastructure supports knowledge creation, from its codification and storage, to its retrieval and presentation, and lastly to its application (Lettieri, Borga, and Savoldelli 2004; Handzic 2011). Research has revealed that the role of technology has been most evident in accounting and administrative, teaching and training, and operational knowledge (Lettieri, Borga, and Savoldelli 2004). The benefits of employing technology to manage knowledge are vast and diverse. From reducing workflow and redundancies, to mitigating loss, to improving efficiency and effectiveness, IT solutions have the potential to dramatically improve knowledge management within organizations (Lettieri, Borga, and Savoldelli 2004).

## INFORMATION TECHNOLOGY

In transitioning to a cloud-computing environment, "the IT infrastructure [ought to] become more standardized [and] less complex" (Oracle 2010). A lack of standardized infrastructure has been associated with nearly 10 percent of IT project failures (Brown 2006). Complexity in IT projects, driven by factors such as the need to integrate diverse and disparate existing systems, has likewise contributed to a lack of success in IT projects (Avison, Gregor, and Wilson 2006). In order to combat issues associated with complex and non-standardized environments, organizations must first make the shift from a siloed existence to the Standardized Technology level of architectural maturity. In order to effectively establish a cloud-computing environment, however, some have suggested that an organization must mature to the Business Modularity maturity level (Oracle 2010). Necessary steps in the process involve consolidating physical devices and applications (Smith 2011).

As part of the organization's initiative, the organization has recently acquired and deployed two separate models of thin clients. Thin clients are generally less expensive than traditional workstations, have a minimal amount of software installed locally, and facilitate access to virtualized environments (Harkins and Chin 1999). With the deployment of novel computing environments, standardization across business units and locations has actually been reduced (See Appendix D). In contrast to a unified cloud computing environment, the use of multiple versions of Windows and Linux operating systems has increased training requirements, increased complexity, and necessitated the use of multiple inconsistent user interfaces (See Appendix E). At a single location, employees may be required to interact with a thin client in order to record their billable hours and a Windows XP workstation in order to access consumer data and check their corporate e-mail (See Appendix C and Appendix E). The differences associated with thin client and Windows environments have resulted in the inconsistent use of critical human resources software. One of the thin client models in use is not capable of supporting the full-featured version of the application. The use of both HTML and Java versions of the software has resulted in increased training time and costs and an inconsistent user experience (See Appendix C).

† While Harkins and Chin were predominately concerned with the chemical process industry, it should not be assumed that improvements associated with the integration of data are industry-specific.

Access to critical productivity software, such as case management software and Microsoft Office, is sometimes facilitated via a Remote Desktop Connection to a virtual environment. The organization maintains a virtual desktop pool, utilizing Windows Server 2008 R2. A Remote Desktop Connection broker facilitates session management across three separate hosts. The hosts are, theoretically, identical. Each of them allows users to access business software and data (See Appendix C). While this fact may create a relative unity in user experience, the process is not employed consistently throughout the organization. Remote Desktop methods are used for off-site employees and sporadically at primary business locations.

In addition to increasing training burdens, the current computing environment at the organization has introduced complexities for the staff responsible for supporting the environment. The diversity of software and hardware deployed, and the resulting processes requisite to enable employees interfacing with different scenarios to complete tasks, introduces novel support concerns. As employees are often unaware of (or otherwise unable to convey) the specifics of their environment, it may be difficult for support staff to know precisely what environment a user is interacting with. Uncertainty, and the process of discovery, has the potential to increase the duration of support calls and, subsequently, increase support costs.

The diversity of the organization's technological landscape may heighten costs in additional areas. The use of multiple third-party systems to maintain critical operational data, in contrast to a consolidated environment, mandates the maintenance of multiple support contracts. One of the primary systems in use by the organization has required an average annual investment of nearly $60,000 in support fees. According to the most recent organizational budget, those costs are expected to double this year. Personnel costs may also be impacted. Over the past five years, the organization has invested nearly $40,000 annually in a staff member whose primary role is to provide reports using the system.

## BUSINESS PROCESS, POLICIES, AND PROCEDURES

Ineffective business policies and processes, including a lack of integration of IT strategy, are correlated with decreased potentials for project success (Brown 2006). Effective organizational management, in conjunction with technology, supports "knowledge generation… collaboration and knowledge sharing" (Handzic 2011). Some have suggested that organizational leadership and related elements are, in fact, more critical to effective knowledge management than technology (Handzic 2011). In information and knowledge-oriented IT projects, such as a cloud computing initiative at the organization, the processes and procedures involved in organizational, data, and technology management are thus an important consideration.

The development of effective IT governance processes within an organization can help to curb the potential for failure stemming from inefficiencies, and subsequent inefficacies, of relevant processes. Examples of processes that could improve the likelihood of success include strategic "information systems planning, balanced (IT) scorecards, information economics, service level agreements… objectives for information and related technologies… [and] IT portfolio management" (Brown 2006, 141). In order to transition to a cloud-computing environment, business processes and policies – pertaining to everything from regulatory compliance to contracts and disaster recovery – ought to be clearly and explicitly defined (Smith 2011).

Transitioning from one environment to another necessitates an understanding of the status quo. Business process modeling can help organizations make "decisions about where, how and why changes to the processes should be enacted to warrant improved operational efficiency, cost reductions, increased compliance or better IT-based systems" (Recker, Safrudin, and Rosemann 2011). Researchers have suggested that these models, in order to be effective, ought to be "readily and intuitively understandable by the various stakeholder groups" (Recker, Safrudin, and Rosemann 2011, 558). At the organization, the backgrounds of stakeholders are diverse and range from technical to educational to financial.

Their respective stakes, and unit-specific business processes related to core business data, vary considerably. In the status quo, documentation related to business processes is exceptionally limited in both scope and accessibility. There is a general lack of transparency in business processes, especially those related to essential operational data. The relative obscurity of business-unit-specific processes may contribute to the obstruction of organizational knowledge creation. As noted previously, this reality may have negative implications for both operational efficiency and competitiveness.

## RECOMMENDED SOLUTIONS AND HIGH-LEVEL ROADMAP

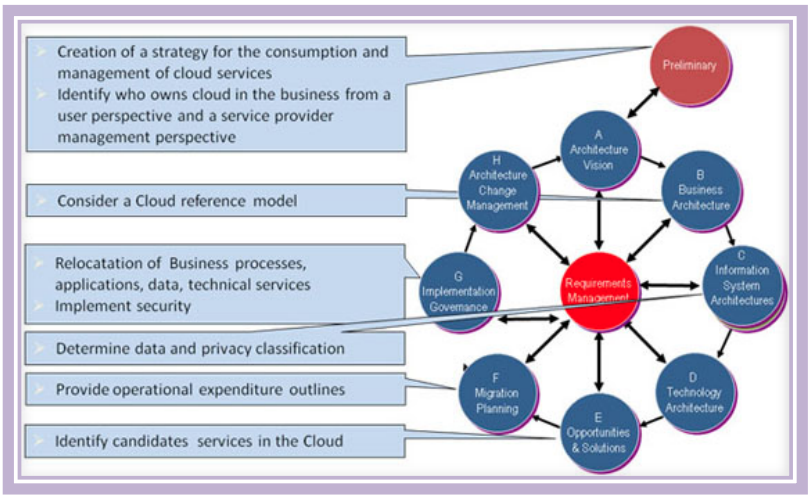
### ROADMAP TOWARDS THE ADOPTION OF A CLOUD COMPUTING ENVIRONMENT

As evidenced throughout, a successful cloud computing initiative at the organization has the potential to result in measurable declines in IT costs, improved service provision, improved productivity, and reduced training costs (See Appendix E). In order to improve the likelihood of success for the cloud computing initiative, structural and process changes are required at an organizational level. In the status quo, decisions pertaining to technology and data management at the organization are conducted in relative isolation. Technology decisions are predominately driven and executed by a single individual. The scope of those decisions includes technology infrastructure, applications, and data management. The potential areas of impact of those decisions are exceptionally far-reaching. As evidenced throughout, issues such as regulatory compliance, technology investment costs, training costs, productivity, and others are each directly influenced by such decisions.

Given the breadth of impact associated with large-scale technological changes, a structured approach employing a demonstrably effective framework (or combination thereof) may be highly advantageous. As outlined herein, utilizing a framework such as TOGAF could facilitate a comparatively informed and effective transition a cloud computing environment. Implementing a cloud computing initiative in purposeful and well-defined phases may help the organization to mature from an architectural perspective, improve business processes, and realize success in the project.

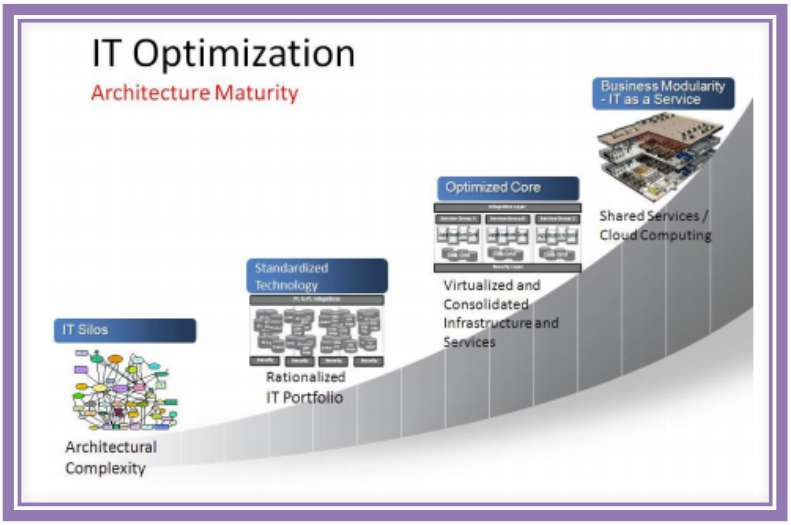
| | |
|---|---|
| Phase 1: Foundation Building<br><br>1 to 3 Months<br><br>TOGAF Preliminary Phase | Develop IT and Information Governance Mechanisms |
| Phase 2: Requirements Assessment and Planning<br><br>3 to 6 Months<br><br>TOGAF Phase A - F | Engage in requirements assessment with stakeholders<br><br>Evaluate current business, IS application, IS data, and technology capabilities<br><br>Define target cloud capabilities<br><br>Select cloud reference model<br><br>Conduct gap analysis<br><br>Develop migration plan |
| Phase 3: Standardization and Integration<br><br>3 to 6 Months<br><br>TOGAF Phase G | Acquire HIPAA compliant enterprise-wide consumer management solution<br><br>Migrate from disparate legacy applications and databases<br><br>Adopt location-based standardization in computing environments<br><br>Make a single version of primary business applications available in virtualized environment. |
| Phase 4: Monitor Initial Cloud Deployment<br><br>Ongoing<br><br>TOGAF Phase H | Monitor cloud performance to ensure that desired capabilities have been realized.<br><br>Engage in continual stakeholder discussions to assess individual business-unit satisfaction<br><br>Expand and/or modify cloud resources as required by demand and actual use |

Architectural Maturation. In addition to improving the likelihood of success for a single project, engaging in a process that facilitated the development of Enterprise Architecture generally, and Business, Application, Data, and Technology architectures specifically, could positively impact the organization in the long-term. As organizations mature architecturally, their IT-related costs decline (Ross and Weill 2006). Expressed as a percentage of revenue, IT costs tend to be sixty-four percent lower for more mature organizations (Townson 2011). Even with reduced total IT spending, organizations spend more on innovative projects (Townson 2011). "Emergency" projects decline by nearly forty percent (Townson 2011). The responsiveness of IT, risk management capabilities, "managerial satisfaction, and strategic business outcomes" likewise all improve as maturation increases (Ross and Weill 2006, 93).



ORACLE 2010

In terms of the organization's current level of maturation, the Business Silos architectural model may be most appropriate. Despite the partial adoption of what some might describe as a "spaghetti cloud," disconnected business processes and non-integrated technological solutions are prevalent (Thorn 2010; Ross and Weill 2006). The benefits of standardization, discussed throughout, are thwarted in such an environment (Ross and Weill 2006). The solutions proposed herein are intended to promote a gradual and thorough maturation of the organization's architecture while satisfying the need for a specific technology solution. The primary solutions focus is on "standardizing and consolidating technology platforms… providing shared infrastructure… [and reducing] the number of software products performing similar functions" (Ross and Weill 206, 75). While these efforts might suggest that a Standardized Technology level of maturation would be the ultimate outcome of the solutions proposed, the standardization of core business processes and eventual elimination of data redundancies may enable the organization to transition to the Optimized Core level of maturation (Ross and Weill 2006).



THORN 2010

The Application of TOGAF. Serge Thorn, CIO of Architecting the Enterprise, has suggested that the use of Enterprise Architecture, and the TOGAF ADM specifically, can help organizations to develop effective cloud solutions (Thorn 2010). Regardless of cloud-specific activities in the TOGAF ADM, Thorn warns that “badly designed solutions won’t be improved by relocating to the Cloud.” (Thorn 2010). The risks of rushing into the cloud are great. In the solutions proposed, the Requirements Assessment and Planning phase is intended to help curb the potential for poorly understood requirements and a resulting sub-optimum solution. While some have suggested that deploying a cloud could take as little as a few months, the process, overall, is expected to take more than a year at the organization (Smith 2011; Stogsdill 2012).

In Phase A, Thorn suggests that addressing concerns such as interoperability is key (Thorn 2010). In the context of this project, Phase A would encompass a broader range activities. Given its current level of maturation, the organization would need to invest considerable time in assessing and agreeing upon its strategic goals. In Phases B through D, Thorn notes that the selection of a Cloud Reference Model, addressing security concerns, and determining data requirements are key activities (Thorn 2010). At the organization, these phases would include a robust effort to develop both baseline and target architectures and gap analysis. Phase B would include a significant focus on understanding existing business processes and interactions and how they could be reengineered to promote the standardization and integration required in a well-defined cloud computing environment (See Appendix A). Phase C would likely be the most time consuming, as stakeholders would need to both understand the complexities of the current data and application architectures and determine data migration requirements (See Appendices C and D). Preliminary data and information governance plans, established in the Foundation Building phase proposed, would need to be reviewed and revised as necessary.

Phase D would include an assessment of the current and goal technological landscapes, with a focus on consolidation and standardization (See Appendix D). Phases E and F would predominately be concerned with a plan for migrating from the status quo to the desired future state (The Open Group 2011). Typically, Phase E would include decisions about whether to outsource or acquire novel technologies (The Open Group 2011). At the organization, technologies capable of supporting a private cloud-computing environment have already been purchased. Phase H would include monitoring the deployment of the cloud. As the project would potentially be developed dynamically, according to demand and need, Phase H would be ongoing. The prior TOGAF ADM phases would, likewise, be iterated through as necessary.

## SOLUTIONS

Organizational Structures. As outlined herein, the organization currently lacks many of the key organizational structures to support effective IT governance. Inline with TOGAF, and in accordance with contemporary best practices, governance mechanisms must be defined, developed, deployed, and monitored. In the context of the organization, distinct IT and information governance methodologies and entities, in particular, would help to ensure that key operational data, and the technologies supporting them, were effectively managed. In order to develop and maintain effective information governance, the procurement of an experienced CIO would be highly recommended. As industry experts have noted, mapping "IT Strategy to Business Strategy isn't about reacting or

dictating - it's partnering" (Stogsdill 2012). The creation of collaborative groups, such as IT strategy committees, could help to improve managerial involvement in, and understanding of, a cloud computing initiative.

Alternatives. The acquisition of novel talent, and the development of governance structures, requires both fiscal and temporal investments. The least disruptive alternative to embarking on such a strategy would be to leave the current organizational structure intact. As evidenced herein, however, the existing organizational structure is not capable of supporting effective governance. Failures in governance have financial and other negative implications. In the interest of long-term success, for the organization and for a cloud computing initiative specifically, the risks associated with maintaining the status quo could be detrimental.

Data Standardization and Integration. In the status quo, the organization has multiple applications and databases in use to manage consumer information. The acquisition of a comprehensive solution, such as Therap, would enable both support and primary business units to standardize, integrate, and consolidate data (Therap Services 2012). A web-based solution would enable seamless integration into a cloud-computing environment. The integration of a HIPAA-compliant solution into a cloud-computing environment is key, as the organization must maintain verifiable HIPAA compliance. While virtualized environments, in and of themselves, raise compliance concerns, the inclusion of a HIPAA-compliant solution would help to mitigate potential security and privacy issues.

Alternatives. The organization has developed a comprehensive Intranet solution. Custom development has enabled the solution to provide users with simplified access to diverse data sources, including maintenance, IT support, and HIPAA incident tracking tools. In the same manner, a wrapper could be developed which would create a novel interface for interacting with legacy system data. Improving and simplifying the user experience, however, would not resolve underlying issues of both a lack of data standardization and integration. The continued use of multiple systems would prevent a “single version of the truth” from being created and used (Godinez et al. 2010, 203). Furthermore, the solution would encourage the continued use of separate solutions, thus undermining efforts to standardize and integrate business processes.

Technology Standardization. The implementation of a “partial” cloud in the organization thus far has resulted in what could be described as siloed Standardized Technology environment. In order to transition to a true Standardized Technology architecture and, eventually, to a Business Modularity architecture, enterprise-wide standardization is necessary. While it may not be feasible, or even advisable, to utilize one computer model and one operating system, the organization has an opportunity to significantly reduce the diversity of its computing landscape. If the organization were to adopt location-based standardization, the pitfalls of a multitude of computing environments at each could be avoided.

In order to most effectively leverage existing resources, it would be recommended that a single user environment, consisting of one Windows operating system, be established for all primary locations. For remote locations, it would be recommended that a single thin client model be deployed. Relative unification of environments would enable the development of standardized access and other processes. Most importantly, in the context of cloud computing, a single method for accessing

organizational resources could be employed. The user experience, and productivity processes, in a virtualized environment would nonetheless be simplified and standard.

Alternatives. Significant investments have been made by the organization in the existing diverse computing landscape. An alternative to location-based standardization, which would result in two distinct environments, would be to adopt a single enterprise-wide environment. In the long-term, such an approach would likely have significant positive impacts. Unfortunately, it is highly unlikely that the fiscal contributions necessary for the adoption of a single solution would – in the short or long term – become available. As a non-profit organization, the organization has an obligation to the individuals that it serves, and to the community, to use its resources in the most efficient way possible.

Business Processes, Policies, and Procedures. A successful cloud computing initiative, ideally, will result in a virtualized infrastructure capable of supporting key business operations (Godinez et al. 2010). In order for the operations of each respective business unit at the organization to be most efficiently served, they must first be standardized and integrated. The adoption of a novel consumer management solution, as discussed previously, would dramatically reduce inconsistencies and duplications of data. The use of Therap, the solution proposed herein, would enable the standardization and integration of a wide range business processes. Examples of processes and procedures that could be unified across business units include: eligibility determination, intake, referrals, waiting list management, note recording, incident reporting, health monitoring, billing, and staff management (Therap Services 2012; See Appendices B and C).

Alternative. One of the primary tools employed at the organization to manage consumer data has required significant investments over many years. While the application is, in the status quo, used by a limited sub-section of business units, custom development could enable it to be a valuable resource for others. In contrast to Therap, which is natively capable of supporting many other consumer-oriented functions, the existing application is predominately a tool for case management. Custom development, in addition to requiring significant investments of both time and monetary resources, would likely not result in a comprehensive solution that was capable of unifying business processes.

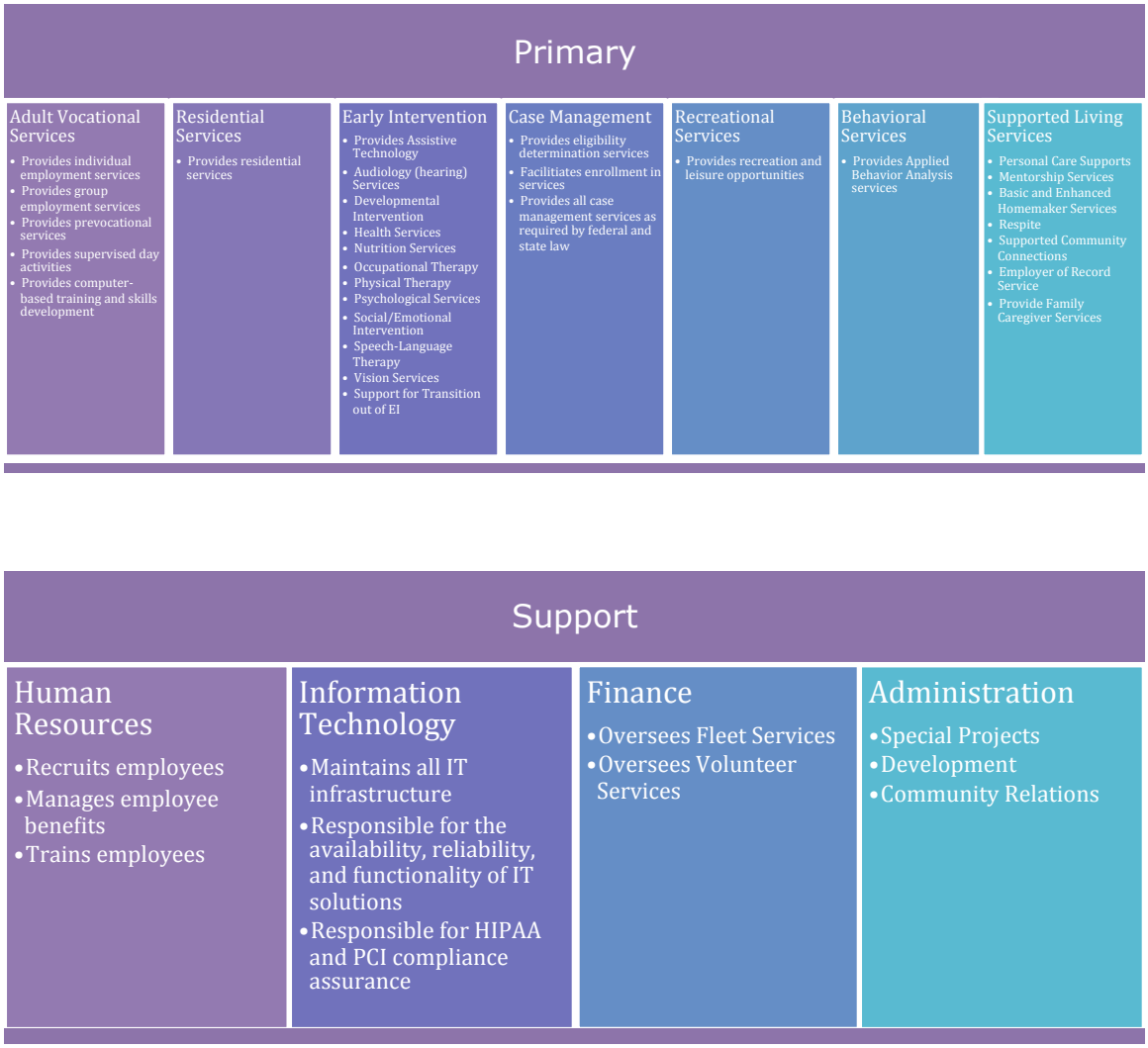
## CONCLUSIONS

As evidenced throughout, the process of integrating and standardizing technology and data can result in significant fiscal, temporal, and other benefits. In order to avoid the pitfalls of ineffective organizational structures and ad-hoc transition management, however, organizations have a duty to plan change effectively, deploy novel processes and technologies efficiently, and monitor the outcomes thereof thoughtfully. The use of a framework, such as TOGAF, can provide a proven and highly adaptable foundation from which an organization can mature. An evaluation of the organization herein has suggested that a framework can, in fact, be introduced during a significant project.

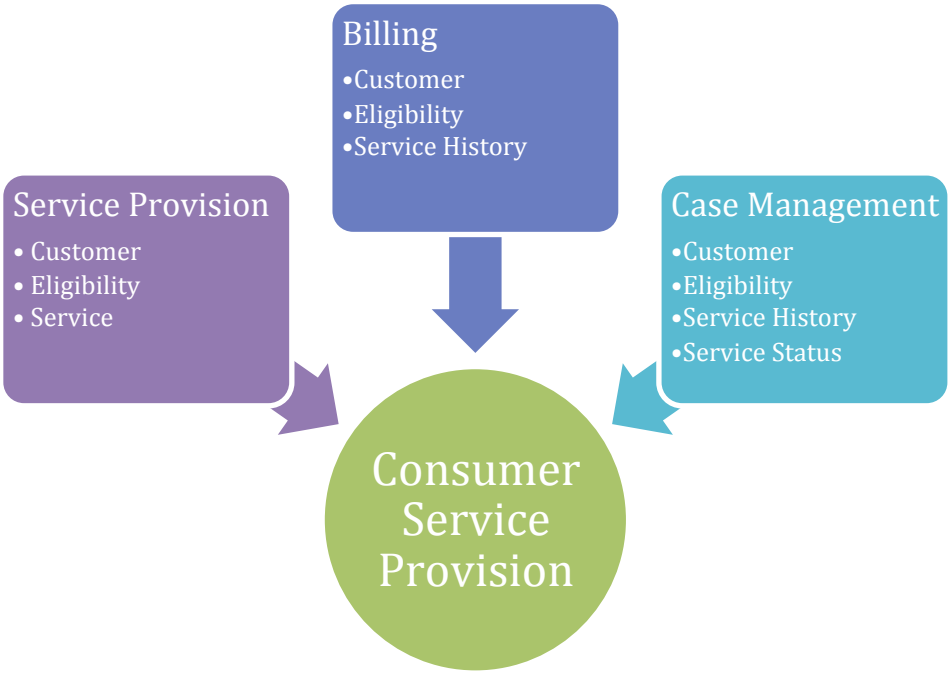
In the status quo, the organization could be described as having a partial cloud, fragmented governance structures, and ineffective processes relevant to technology and change. The existence of an established cloud-computing effort and entrenched organizational practices has not, however,

rendered the possibility of effective change management moot. The adoption of a cloud-computing environment at the organization, in conjunction with both best practices and TOGAF, has the potential to significantly benefit organizational, data, information technology, and business architectures at the organization. The process, although ostensibly having a single goal, could facilitate organizational maturation and improve long-term sustainability. These advents, in turn, have the potential to improve the organization's ability to serve its underlying mission, individuals in service, and the community.

## *Appendix A: Functional Decomposition Diagram*

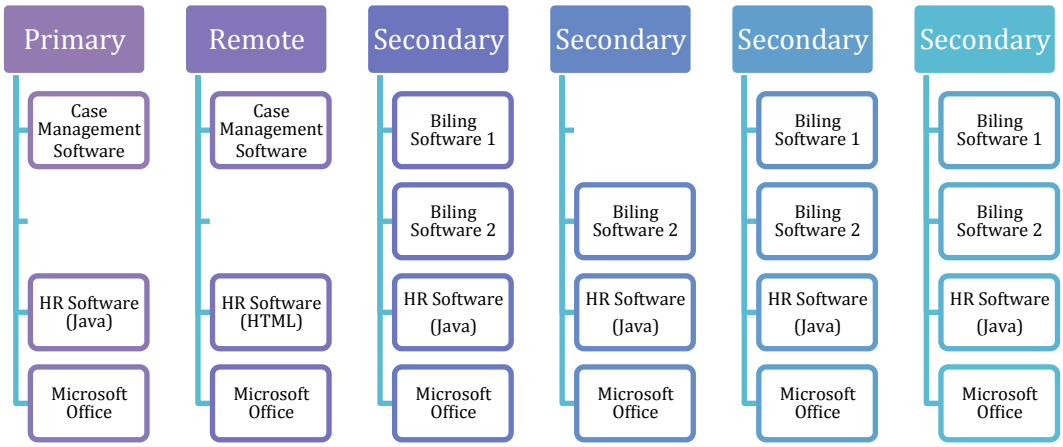


***Appendix B: Data Dissemination Diagram***

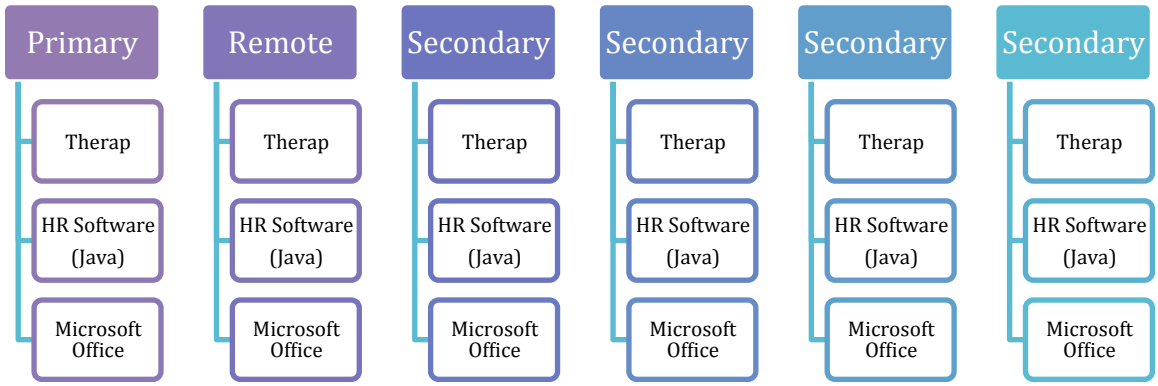


## *Appendix C: Application and User Location Diagram*

Status Quo

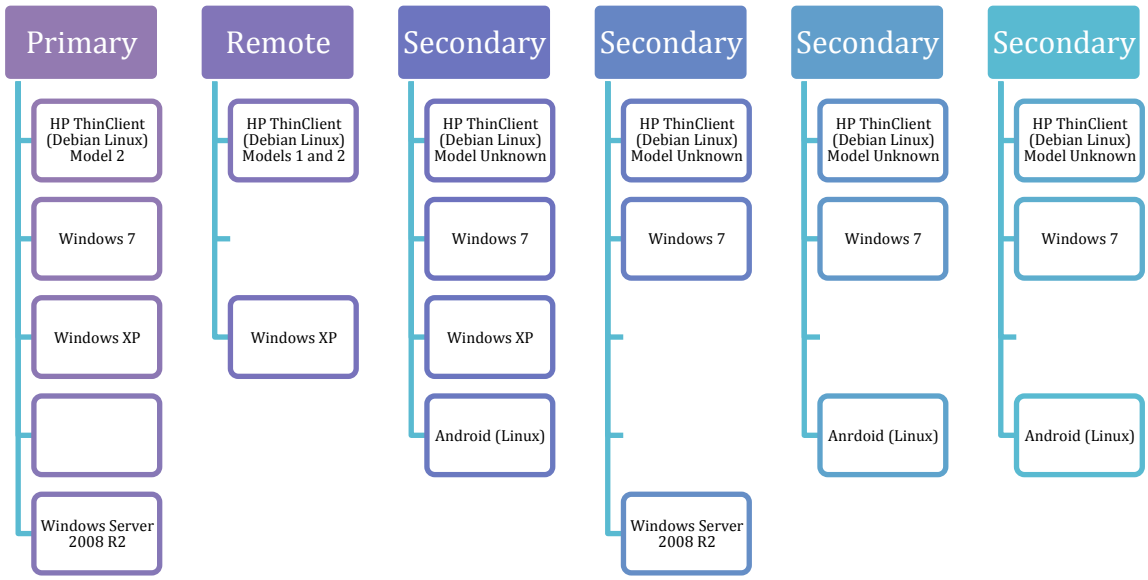



Future State

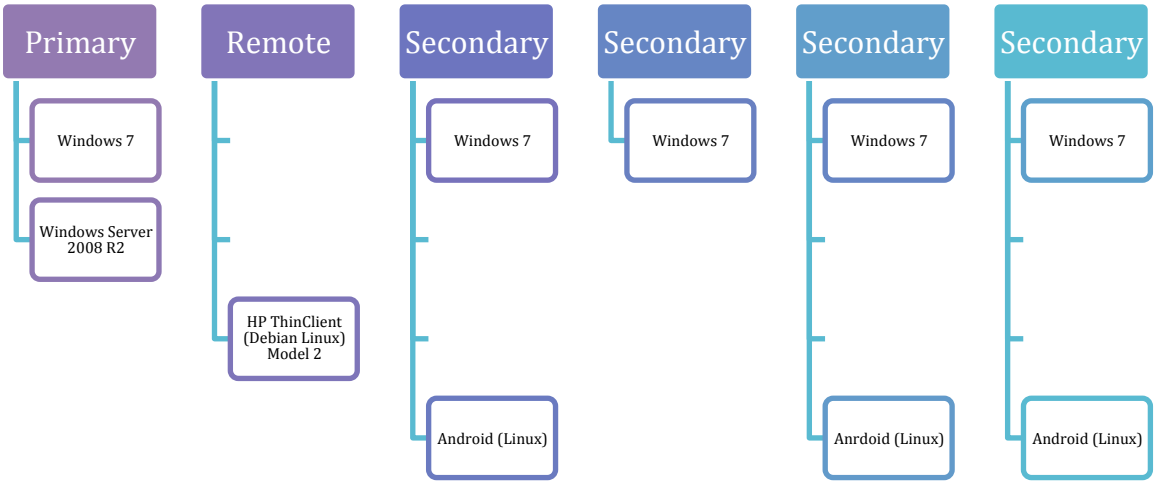


### *Appendix D: Environments and Location Diagram*

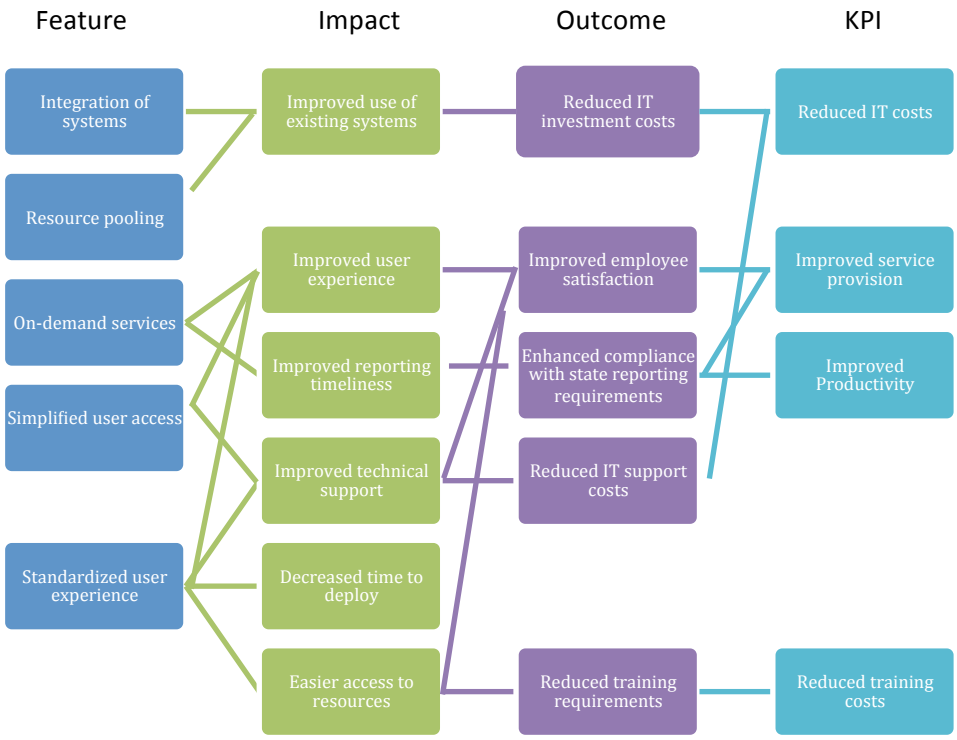
Status Quo




Future State



### *Appendix E: Solution Benefits Diagram*



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## AUTHOR BIO

Abi O'Neal graduated Summa Cum Laude, with a class rank of 1, from the University of Colorado Denver with a degree in Political Science in 2011. Abi is currently a student at the University of Denver seeking a Masters degree in Web Design and Development. Her decade-long career in Information Technology has included experience in telecommunications, non-profit organizations, and the government sector. Abi is committed to contributing to a truly accessible World Wide Web and improving the user experience.

# SARAH NASSER: ENTERPRISE ARCHITECTURE: MOVING ORGANIZATION X TOWARDS THEIR STRATEGIC OBJECTIVES

## EXECUTIVE SUMMARY

In an article titled "Business Architectures in the Public Sector: Experiences from Practice," several authors discuss the common phenomenon currently being faced by many government organizations. They write,

"A critical assessment of the internal processes in many government agencies reveals a substantial level of redundancy and rigidity, as well as a lack of modularity. Moreover, processes are usually organized in (often product-oriented) stovepipe systems. As a result, governments are unable to meet customer needs, coordinate their processes in a coherent manner or offer the transparency modern customers demand. There is a need to redesign and modularize government processes. Due to the failing connection between the new customer-oriented business processes, which require specific information to be available at the right moment, and the existing rigid product-oriented processes and information architectures, agencies find it next to impossible to implement services for citizens" (Bouwman et al., 2011, 412).

The organization discussed in this paper is facing this exact challenge in their current operations. This paper presents several directly related issues recently identified during a business process analysis project in a local government organization. The effort entailed documenting the as-is state of the organization and identifying major pain points within the agency. The problems that were detected are preventing the organization from being an efficient, strategic, customer-facing agency, which are the main focus of their long-term goals and vision. Among other things, this study brought to light issues such as the cultural divide between departments, the housing of data in departmental siloes, the lack of internal controls and governance, the lack of metrics, and the use of far too many systems.

While each problem discussed can be solved individually, it is recommended that the agency take on an enterprise architecture initiative to address all of these issues and to prevent further foreseeable roadblocks. All solutions provided in this paper are built around the TOGAF framework, which is a highly used and accepted methodology for implementing enterprise architecture in any organization. TOGAF is centered around an Architectural Development Method (ADM) that is broken out into phases, moving an organization more seamlessly through the development and implementation of an enterprise architecture program.

Solutions for each individual issue are identified below, but at a high level, the main recommendation for the organization is to band together as a cohesive unit to take advantage of departmental synergies in order to simplify processes and share information. This will empower the organization, hold all members accountable, and provide an efficient, customer-centric experience for all involved.

## GENERAL BACKGROUND

This organization is a local government organization whose main business is handling public records in several different domains. The office is divided into five main divisions plus a management team, a finance team, and a human resources team. A depiction of the organization is presented in the Appendix (Value Chain Diagram). It is led by an elected official who is either re-elected or rotated out every 4 years. This organization serves only the residents of a particular county in Colorado.

This agency is extremely public and customer facing, hence their vision and mission statements are centered around being regarded as very customer-centric and as a trusted team, in addition to providing customer friendly processes that are efficient and transparent. Like many government agencies, the residents of this county must rely on this organization to perform several different services, and thus the agency is focused on striving to make each interaction as painless and easy as possible in order to drive customer satisfaction up while becoming a more efficient and successful organization.

The organization has experienced many periods of turmoil, due to many factors including newly elected leadership, external political and economic circumstances, employee turnover, and others. This has led to the establishment and implementation of processes and systems that were convenient at the time. Each division has dealt with the ups and downs in a siloed manner, adjusting within their own internal departments to deal with the situations they were facing. As a result, there are a multitude of systems being used and there is a lack of communication within the Office as a whole. Many of the divisions are duplicating one another's efforts because they continue to operate in the same way that things have always been done. Each division is also mandated by a set of government statutes that they must abide by, causing some unfixable inefficiencies and architectural issues; however, there are other matters that could be vastly improved using the principles of Enterprise Architecture and the framework that TOGAF provides. The office is currently undergoing a major business process analysis and re-engineering effort in order to alter their operations and systems, allowing them to become more efficient, more customer-centric, and more strategic in the long term. This undertaking has led them to explore the possibility of an Enterprise Architecture venture to aid them in being regarded as one of the top agencies in the state, and even in the nation.

The book Enterprise Architecture as Strategy showcases the Washington, D.C. government as an example of a successful enterprise architecture implementation; this discussion parallels many of the issues being faced by this organization today. The Chief Technology Officer of Washington D.C. states, "'As a District, the finest thing I can do for you, the residents, is to give you benign service delivery. I can make it easy for you to deal with me. I can make it not horrible'" (Ross, Weill, and Robertson, 2006, 17). This statement encompasses the agency's high-level goal, and they will be much closer to reaching it after addressing the issues presented below to move to a higher level of enterprise architecture maturity.

## INTRODUCTION OF MAJOR ARCHITECTURAL ISSUES

Issue #1: Cultural Divisions and Lack of Communication Between Departments

> Due to the fact that each division deals with a different set of records and processes and that they have accommodated for business environmental changes separately over the years, there is little communication between the departments and little cohesion amongst the organization as a whole.

Issue #2: Siloed Data

> Each division operates in a silo, using separate systems to store customer data even though the entire enterprise is dealing with the same customer base; essentially, each division is collecting and storing the same Master Data.

Issue #3: Lack of Controls and Governance

> The organization has a lack of internal controls, leading to customers being overlooked, certain employees not doing their work, and important tasks that do not get done; this is inherently a big risk management issue for the organization.

Issue #4: Lack of Metrics

> At the current moment, the organization does not have any tracking in place to measure metrics such as employee productivity, throughput time, customer satisfaction, etc., thus hindering their ability to improve without knowing where the problem areas are.

Issue #5: Use of Extensive Applications and Systems

> Each division is using their own set of systems, most of which do not integrate with any systems within other departments. In addition, some of the divisions' processes involve several applications that all perform the same functions.

## ANALYSIS OF MAJOR ARCHITECTURAL ISSUES

### ISSUE #1: CULTURAL DIVISIONS AND LACK OF COMMUNICATION BETWEEN DEPARTMENTS

**BUSINESS CASE**

Enterprise architecture brings with it many benefits that include agility, heightened customer satisfaction, lower IT costs, higher IT responsiveness, and strategic business outcomes, among others (Ross, Weill, and Robertson, 2006, 93). However, this relies on an enterprise that works together as a single entity, capitalizing on the synergies between departments within the organization. Enterprise architecture is the bridge between the IT side of the organization and the business goals and strategic vision developed by management. The front line workers in the organization carry out these goals via their every day work and interactions with customers. It is not

enough to simply align the long-term strategic objectives with the IT operations; everyone in the organization must also be unified behind a single EA effort and strategic vision and they must be willing to work together to achieve them. This is extremely hard to do when there is currently a cultural attitude within the organization that each division operates completely independently from the others. Without any communication between departments, all possibilities of enterprise-wide synergy are lost. Each department will continue operating in their own way, and the enterprise will not be able to take advantage of these enterprise architecture benefits by working together and sharing processes and information to more easily achieve success and move towards reaching their outlined objectives.

**BASE ARCHITECTURE**

Each department currently operates using its own set of processes, most without even knowing what the other divisions do. There is little communication or interaction between divisions on a day-to-day basis. When enterprise-wide changes are made, they are implemented one department at a time via the department manager. There is no sense of wholeness within the organization; speaking with employees at various levels of the organization has confirmed this. Employees identify with their own division and there is a sense of protection and ownership within each department. Most employees do not view the organization as a cohesive unit, some of which can be attributed to the fact that there is no sense of long standing culture or connectedness amongst the different departments since the leadership changes every so often.

Many of the employees in this organization feel a sense of entitlement due to the fact that they have been at the agency for many years and they know the ins and outs of their work and their department. They do not feel that they need to put any effort towards interacting with outside divisions or towards becoming a cohesive unit. Most employees are not even aware that there are strategic objectives in place, much less what these actually entail; they go to work to do their day-to-day jobs, but they do not see the bigger picture of the organization as a whole or of the long-term strategic implications of this attitude and method of operation.

**TARGET ARCHITECTURE**

Ideally, this organization would be functioning as one cohesive organization with each division still performing their individual processes. All employees would be conscious of the fact that they share the same customer base and they would be aware of the advantages of working with other divisions to ensure overall organizational customer satisfaction. Employees would be aligned behind a common set of long-term goals and the organization's vision and mission would become part of regular conversations. The leadership and management team would be able to sell the idea of enterprise architecture as an enterprise-wide initiative, the way that it should be done.

The employees in each division should be somewhat aware of what other departments are doing and have a basic knowledge of their processes. From the point of the view of the customer, the divisions are all part of one organization; when a customer is in need of a service from this organization, they generally tend to view it as one enterprise and thus the enterprise needs to conduct themselves as so. The employees need to have an understanding of how the overall objectives affect each individual division and each individual person. Scott Johnson writes about the challenge of strategy implementation without the use of metrics:

"Even with effective goal-setting, organizations often fail to connect higher level goals and objectives such as Comprehensive Plans, annual budgets, etc. (goals on paper) with individual department programs and activities (actions on the ground). The departments are where the work actually gets done. So, if citywide objectives aren't translated into department objectives, they won't happen. This is particularly important when one goal is significantly influenced by another department's activities" (Johnson, 2010, 3).

Employees should be stretching themselves to provide better customer service and to be more efficient by leaning on other departments or other individuals to make this happen. There should be a sense of unity within the organization and an attitude that reflects that all divisions are on the same side, so to put it, and that they are all working towards one common set of end goals.

Enterprise architecture cannot be implemented within one division, but not the others. This is an organization-wide endeavor, hence the word "enterprise." Everyone must collaborate and work together to share and integrate knowledge and simplify and standardize processes in order to become a market leader and a trusted organization.

**GAP ANALYSIS**

What is missing in the current organization is an enterprise-wide culture. Each division has established their own culture over time, particularly since most employees have been there for many, many years. They are all very comfortable with one another and with the way things are done within their own departments, and the organization has become complacent. In his article "Why Change Culture?" Christopher Dawson discusses the effect that a misaligned culture can have on organizational strategy. He writes, "If your strategy isn't working, your culture (the way we do things) may be the reason. […] The best strategy is useless with misaligned culture" (Dawson, 2012).

Since the leadership team is elected, it is changing every few years and the organization lacks a deep-seated culture that is present enterprise-wide; if this were present, the leadership would only add to the culture, not throw it for a loop every time members are changed out. Each new elected official that comes in is assaulted by an extremely high learning curve, and they unfortunately spend much of their time attempting to learn the ropes and not enough time on the things that will impact the organization in the long-term; Dawson writes, "Culture is a reflection of top leaders' personal values and behaviors" (Dawson, 2012).

This obviously takes an extremely long time to build, but the effort must start with the leadership team. These people must walk the talk, and infuse the organizational culture with values and actions that are consistent with the strategy. Management must begin emphasizing the value of working together as a cohesive organization and the synergies that can be developed between teams in a way that resonates with individuals' daily work. Culture is built in the workplace, but it is also built by forming relationships in social situations; the leadership team will have to work to create opportunities for these relationships to begin and for employees to meet people in other departments and become familiar with all of the faces in the organization so as to utilize all available talent and knowledge.

## ISSUE #2: SILOED DATA

**BUSINESS CASE**

As mentioned in the business case for Issue #1, enterprise architecture allows organizations to capitalize on potential synergies by aligning the entire enterprise to a single set of business goals and using a single set of IT assets to support that vision. One of the most important assets in an organization is the information that is captured by various systems and also by each employee throughout their time at the organization. In the case of this organization, all divisions are providing services to a single set of customers. Each division collects the same set of Master Data about the customer using their own systems; this information is then stored separately within each division and it is not shared enterprise-wide. Many customers require services from more than one division, and they must provide the same information each time. This is frustrating for the customer, and requires more time on the part of the employees. In turn, there is more room for data entry error, causing delays in throughput time.

If the data were to be collected by the first division visited by the customer and shared enterprise-wide in a central database, each division would be dealing with a single set of data, providing much better customer service as well as increasing efficiency and lowering error rates.

In regards to the organization's enterprise architecture initiative, a coordination-operating model is the most appropriate. This model is for organizations where departments share customers but they each have unique operations that demand unique processes and capabilities. The benefits of integrating data between business units in this type of model include integrate customer service, cross-selling, and transparency across processes (Ross, Weill, and Robertson, 2006, 33). A coordination operating model core diagram for this organization is presented in the Appendix (Core Diagram). In addition, a diagram depicting the systems in use as well as who is using them is also shown in the Appendix (Role/System Matrix); this shows how the data is siloed by division, and while management has access to all systems, there is no central place to access Master Data.

**BASE ARCHITECTURE**

Each division operates using a different set of processes and systems that do not interact with each other. When a customer requests a service, Master Data is taken about them and manually entered into that department's respective database as the first step to providing the service. This information is stored only within that division, so when the customer requires a service from a different division, their information must be re-entered to be stored within that department's records. There is a large margin for error, and employees within individual departments spend a large amount of time entering data that is already stored elsewhere in the enterprise systems.

This exact situation is described in a business scenario advocating the use of a Master Data Management system:

"IT systems, labor and money are limited resources for an enterprise; smart of use of them is equivalent to maximum returns on investment. […] This depends on high-quality customer master data delivered by an MDM system. If master data is unmanaged and a customer changes an

address, this often requires keying in this information multiple times across various systems. Using an MDM service for this can simplify this situation significantly" (Godinez et al., 2010, 313).

In addition, there are auditing steps at multiple points in the process to catch errors that may not have been made had the information already been in the system. This causes delays in throughput time, decreases in efficiency, decreases in customer satisfaction levels, and it wastes resources and time.

**TARGET ARCHITECTURE**

The organization's main data domain is Master Data, which is described in the book The Art of Enterprise Information Architecture as data that:

"represents the essential business entities such as customers, products, suppliers, accounts, and locations to name a few. This core enterprise data is used in many different business processes and many dependent data entities such as opportunities, orders and bills. Thus, they are considered master objects serving the purpose of being the information foundation for many operational processes" (Godinez et al., 2010, 57).

As part of their EA venture, the enterprise should implement a centrally managed Master Data Management system that would house customer data collected from all divisions. Each time a customer made contact with a particular division, information would be updated as necessary, but not completely re-entered. All divisions would have access to this MDM system and would be able to see customer interactions throughout the organization, rather than simply within their own division.

Each division will continue to operate using their own systems, since they each deal with a different arena of requests and operate using a different set of processes. The Master Data Management system would simply be coupled with each divisional application in order to provide information as needed; any Master Data entered into these applications would be uploaded in real-time and available to other divisions. This would include address changes, phone number and email updates, and other similar information. Information that is specific to each division and that would not be useful to other departments should continue to be stored within the divisional systems.

**GAP ANALYSIS**

The gap in this case consists of the lack of a Master Data Management system. There are currently no systems in place to house customer data from all divisions in one central place, easily accessible to all those who need it. In order to reach the target architecture, the organization needs to evaluate options on the market that can provide this solution.

The organization will have to educate all employees using the current systems on the new MDM system and processes will have be redesigned as needed to accommodate this system. There may be a learning curve or a user acceptance period during which the organization will need to continue the education and training necessary to put this system into place.

## ISSUE #3: LACK OF CONTROLS AND GOVERNANCE

**BUSINESS CASE**

An enterprise architecture initiative requires governance mechanisms surrounding all projects that are undertaken during the EA initiative as well as projects and processes that are added into the portfolio at a later time. The TOGAF® Foundation Study Guide defines governance as "ensuring that business is conducted properly. It is less about overt control and strict adherence to rules, and more about effective usage of resources to ensure sustainability of an organization's strategic objectives" (Harrison, 2011, 115). There must be rules governing how the enterprise does business that align with the long-term strategy and the IT systems that support it. One of the organization's main goals, as mentioned in the Background section, is to be regarded as a highly customer-centric organization. In order to do this, the organization must ensure that no customers slip through the cracks and that each request is fulfilled in a complete and timely manner.

Each employee must be pulling their share of their weight and contributing significant value to the organization in order to maximize the use of organizational resources and assets. Each member of the organization must be working towards fulfilling the enterprise goals by providing superior customer service and following the established rules and procedures governing the enterprise architecture and the organization as a whole. Without these internal control mechanisms in place, there is no management over how much work employees are doing, how well they are doing, whether customers are falling through the cracks, etc. They ensure that management enterprise-wide has a handle on how accurately requests are being fulfilled and by whom, while maximizing the management team's time as well, allowing them to focus on organizational strategic objectives rather than always being down in the weeds of the process. The current structure can be seen in the Appendix (Business Use-Case Diagram).

**BASE ARCHITECTURE**

Most of the divisions are currently operating with no form of internal controls. One example of this issue is seen in the fact that a very large percentage of requests come in via email, and individual employees then move these requests into their individual email boxes to work on them. Once the emails are moved, there is no trail of when the email was received, when it was moved to an individual's workflow, and whether or not the request was fulfilled. There is a risk that some of these requests may be forgotten about or that the work associated with them may not be completed, and department line managers have no way of tracking this until a customer realizes their request has not been completed and voices their discord to the organization. Once at this point, management does even know which employee had originally taken on the request.

On top of this risk, some employees are dealing with requests at a much faster rate than others; during conversations with several members of the organization, it became clear that some of them may be completing up to five times as much work as others. Without having the information as to whom is completing what work, management cannot make important organizational decisions regarding resource loading and organizational structure.

**TARGET ARCHITECTURE**

The target architecture for this issue would be an organization with internal controls, as well as checks and balances. Managers should have a way of tracking each employee's workloads and error rates; there should also be a process in place for managers to alert employees of their mistakes and have them fix their own errors. Employees should be held accountable for the correctness and completeness of their work, as well as the workload they are expected to carry.

The controls in place should be adequate enough so that managers can place trust in their employees to do their work, but also to know that should there be errors, a system is in place to catch them. This will allow managers to be focused on moving the organization towards its long-term vision and on creating strategies to become more customer-centric, rather than on policing employees' daily work. The book Enterprise Architecture as Strategy discusses this when the authors write,

"To focus management attention on higher-order processes, such as serving customers, responding to new business opportunities, and developing new products, managers need to limit the time they spend on what should be routine activities. They need to automate routine tasks so those tasks are performed reliably and predictably without requiring any thought" (Ross, Weill, and Robertson, 2006, 3).

Employees should be aware of these controls and the consequences that come with this new structure; this will in turn motivate them to pay more attention to reducing the number of errors and to handling higher workloads since there are now monitoring mechanisms in place. This should be communicated in terms of an enterprise architecture initiative, relaying the idea that having a governance structure in place in all aspects of the organization will streamline the enterprise architecture process, allowing the agency to more easily reach their goals and securing a stable foundation for execution for future projects and ideas.

**GAP ANALYSIS**

The current as-is architecture does not have any internal controls or governance structure in place. All work is done based on good faith and on management auditing every activity. This is extremely time-consuming and inefficient. The to-be governance structure should have internal controls built in to ensure that employees are carrying their own weight and to allow management to free up their time to focus on bigger issues that the enterprise is facing, in particular the implementation of an entire enterprise architecture.

There is often a lot of push back when changes like this are implemented. Many employees in this organization have been there for an extremely long time and are used to the way things are; several have a know-it-all attitude and feel that the organization owes them something for their many years of work. There will be resistance to the implementation of overarching controls; the key is how these changes are communicated. Management must present these new controls as being a helpful tool, allowing the organization to move towards their goals and to make sure that some employees are not doing more than their share of work to make the workload equitable throughout the organization. These controls will also improve customer service by making sure that all customers are taken care of and that no one slips through the cracks.

## ISSUE #4: LACK OF METRICS

**BUSINESS CASE**

In a problem somewhat related to Issue #3, the organization currently has no metrics in place. Metrics become very important in the case of enterprise architecture as they allow management to understand how the organization is functioning and where the pain points are within the process. Once a solid enterprise architecture is in place, the organization can tailor solutions to these pain points and bottlenecks that fit within their architecture vision; however, with no solid data to back these assumptions up, it will be difficult to zero in on a focus.

Being that this organization is focused on customer service and providing efficient processes, metrics are essential to tracking success levels. Having a set of easily identifiable and quantifiable metrics allows management to make strategic decisions, set long-term goals and benchmarks, become more aware of resource loading issues, and address areas of the process that may be holding the organization back.

Scott Johnson discusses a project done at the City and County of Denver to implement a Balanced Scorecard in the Development Services department in his white paper called "'Redeveloping' Denver's Development Services Function with Purpose and Value—An Application of the Triple Bottom Line Balanced Scorecard." His work is applicable to the problems being faced by this organization, which is apparent when he writes,

"Organizations in the public sector, however, are not about "making" money, but rather are about using money more effectively to create value for citizens through delivery of services and improving quality of life. The scorecard can be thought of as the "map" that connects the dots between day to day work activities that leverage unique internal resources and capabilities to create unique value propositions for customers and/or constituents" (Johnson, 2010, 4).

This Balanced Scorecard approach is applicable to enterprise architecture because it gives the organization a way to monitor enterprise maturity and enterprise progress throughout the implementation and into the future as the organization works its way towards achieving its strategic goals with the use of their resources and IT foundation

**BASE ARCHITECTURE**

The organization does not currently have any metrics in place. They do not track any measures aside from financials, and thus have no idea how they are really performing other than from limited customer feedback. The organization cannot connect day-to-day work with overall strategic objectives, and employees do not currently have an understanding of how their work affects these goals. This agency has identified being a leader in their field as a top priority, but they do not have a way to achieve this goal without accurate measurements as to where they currently sit.

There may also be areas where the process works extremely well and there are extraneous technologies or perhaps even personnel that can be directed elsewhere in order to increase efficiencies. On top of this, should the agency identify a pain point and need to request funding or

additional personnel to address it, it may be difficult to back this request up without solid, quantifiable evidence that is available from using a set of metrics.

**TARGET ARCHITECTURE**

The organization should put a Balanced Scorecard in place to track metrics for all divisions. Each division should have a set of metrics that reflect their everyday work and can be used to measure their success. These metrics, also sometimes known as Key Performance Indicators (KPIs), can provide significant value to an organization.

"By implementing the definition, monitoring analysis, and tracking of KPIs, BPM (Business Performance Management) provides business users and decision makers with the insights required for implementing actions aimed to optimize business performance. This mechanism turns BPM into a powerful enabler of the close link that must exist between IT and business communities, which we consider one of the core EIA principles" (Godinez et al., 2010, 287).

The metrics gathered using the Balanced Scorecard can be used to make informed, strategic decisions, particularly concerning enterprise architecture-related projects that may present themselves in the future.

**GAP ANALYSIS**

The organization currently does not measure any metrics; their customer satisfaction is monitored solely through customer comments or feedback that is pushed to them. The organization has identified several strategic themes that they would like to focus on; these include being a customer-centric organization, providing efficient processes, and being regarded as one of the best local government agencies in the state of Colorado. The problem is that they have no way to measure their progress towards these goals.

The organization needs to brainstorm what is important to measure in their day-to-day processes. Even if these metrics may be somewhat difficult to pin a qualitative number on, it's essential that these are tracked and monitored in some way. All metrics must be tied to one of the strategic objectives; employees must understand how these measurements are driven by their everyday work and why they are important in achieving the long-term vision.

The process of implementing these metrics is tied to Issue #3 as well, because a Balanced Scorecard automatically adds a level of internal controls to the organizational structure. Tracking different metrics will give the management team an insight into how well the organization is performing and what or whom is driving that success.

## ISSUE #5: USE OF EXTENSIVE SYSTEMS

**BUSINESS CASE**

Enterprise architecture is partly based upon the idea that the organization should deal with one set of systems that encompass all processes and support the goals of the organization. Information should be shared and distributed throughout, as appropriate. It should be readily available, complete, accurate and timely. The applications and systems that supply this information should be

simple but useful, each IT asset adding value and unique capabilities to the enterprise. The systems in place should be loosely coupled and should allow the flow of information throughout the organization as needed. Holding onto multiple IT assets that are not all useful leads to higher IT costs, both in maintenance and in employee training, as well as to work inefficiencies, more separation of data and a higher risk of error. Having a more streamlined set of technologies to support daily processes and long-term strategic vision enables organizations to be much more agile, to easily add on applications as needed, to decrease IT costs, and to increase efficiencies as well as overall customer satisfaction (Ross, Weill, and Robertson, 2006).

**BASE ARCHITECTURE**

At the current time, each division is operating using their own set of systems to perform their processes. These systems do not connect with any other division's systems, hence the problem in Issue #2 of siloed data. Employees of one department are unfamiliar with the systems and applications in any other area of the enterprise, and are therefore confined to working within their assigned division; this is partially due to the problem discussed in Issue #1 of a divisional, separated culture.

There remains a still bigger problem to address, which is that multiple systems are being used within each division as well. Many of the divisions are functioning using several applications that essentially perform the same operations. Department employees are trained on all systems as requests may come in using any of them, and they are expected to perform the work accordingly. Customers that are making requests are often confused about which portal to send their request through and employees spend a large amount of time dealing with these questions. Some of the systems require much more manual work than others, while still others require additional back-up systems to function properly. Each division seems to have a preference on which systems are the easiest, most accurate and most efficient to use, but the organization has made no effort to consolidate their systems and direct customers to use one rather than giving them a choice of up to four different avenues.

Related to Issue #2 of siloed data, the information from requests that come in through the different systems is stored in the various systems, and is thus sometimes not even shared with the whole department, let alone the entire organization. The applications and various users of each system can be seen in the Appendix (Application and User Location Diagram). This creates frustration on the part of the customer when they have to follow up on a request and the employee cannot immediately find their information, but instead they must shuffle through the multiple systems.

**TARGET ARCHITECTURE**

Each division should evaluate all of their systems that are currently being used. Many of the divisions are utilizing multiple applications that perform the same functions; this is completely unnecessary. By evaluating the systems that are currently in place and their functionalities, as well as their pros and cons, each division shall make some decisions as to which applications are the most beneficial and get rid of the others.

Each division shall educate their clients on the chosen systems, particularly those who do not currently use them. They will put some mechanisms in place to ensure that all customers are using

the preferred systems rather than the legacy systems. The divisional applications shall all link to the Master Data Management system in order to share Master Data amongst the departments.

**GAP ANALYSIS**

In this case, it is not what is missing from the organization but rather what can be eliminated. Part of implementing an enterprise architecture initiative involves simplifying the set of underlying technologies in order to establish a strong foundation upon which other projects and applications can be built. This organization is currently using far too many systems that comprise a rather complicated IT structure; the goal is to minimize this number.

The organization must conduct an analysis of all systems currently in possession and determine which are the ones that are essential to their operations. They must analyze how these systems interact with other in order to take advantage of any synergies that may exist.

## RECOMMENDED SOLUTIONS FOR MAJOR ARCHITECTURAL ISSUES

### ISSUE #1: CULTURAL DIVISIONS AND LACK OF COMMUNICATION BETWEEN DEPARTMENTS

**RECOMMENDED SOLUTION**

In an organization such as this one that has been around for many years and has operated in a siloed manner since its beginning, it is extremely hard to evolve to a cohesive organization. This will be a slow transition for the agency, and most probably one that will receive a lot of resistance. Many of the employees have been working at the organization for decades and are used to the way things are; in addition, they have become complacent and many are unwilling to do more than the bare minimum that is required. Attempting to motivate all divisions will require a great deal of time and effort, but it is a necessary step in order for an EA initiative to thrive in this organization. All managers and employees must be aligned behind one common set of organizational goals and one long-term vision of success. In an article called “Federal Enterprise Architects: Selling EA Requires Stealth,” Wade-Hahn Chan suggests selling the culture changes and the enterprise architecture initiative from a business perspective in a relatable way (Chan, 2006).

The key to this solution is baby steps. The leadership and management teams must bring organizational culture into all aspects of the agency slowly. Conversations must be started about the organizational culture and how the culture is connected to the strategic objectives. Managers should begin exploring quick wins that demonstrate the benefits of a holistic organization in order to prove their points. The leadership team should identify synergies that may exist within the personnel realm, for example, are there certain employees who are cross-trained or know the processes of more than one division? This may be one option to look into that could also address any issues of resource loading if one division experiences a large increase in workload while others do not. Once the idea of an enterprise-wide, strategic organizational culture is introduced and presented to employees, it should be re-introduced and over-communicated throughout the enterprise architecture implementation. Without a strong culture supporting the long-term goals and values of the organization, an enterprise architecture project will surely fail.

**ALTERNATIVES**

Building a new culture within a group of seasoned employees can prove to be extremely difficult, and there is no guarantee of success. One alternative to this is to bring on a new group of employees and build the holistic organizational culture within this new group from the beginning. While it may be easier to cultivate this type of environment with people who have not spend years working in such a divided culture, there are other setbacks to consider.

First of all, hiring new employees is extremely costly. The costs include recruitment, hiring and training costs, among others. Being that this is a government organization with a limited budget, this may not be the best way to spend money. In addition, these employees will not be familiar with the history of the organization and the way that it operates.

Most of the employees in the organization have a sense of dedication to the agency and it is easier to motivate people who feel as though they are part of something bigger. By cultivating this culture from within, the organization will push employees to embrace this change since they will feel a sense of ownership for the organizational culture. The costs and learning curve of going this route far outweigh the efforts of creating a new culture within an already thriving workforce.

## ISSUE #2: SILOED DATA AND SYSTEMS

**RECOMMENDED SOLUTION**

The recommended solution for this issue is to put a Master Data Management system in place to address the fact that there is a duplication of effort where each division is collecting the same basic data about the same set of customers. A Master Data Management (MDM) system will centralize data so that it is easily accessible to anyone who needs it, as well as give employees a more complete and up-to-date picture of a particular customer. Personalizing interactions with customers brings the organization one step closer to their vision of being regarded as one of the most customer-centric organizations in their field. In addition, centralizing data will also address pieces of Issue #1 because it further removes the perception that each division operates in a silo, and highlights the fact that the organization is one enterprise providing slightly different services.

When a customer requests a service from a particular division, the employee fulfilling the request will be in charge of updating customer information so that it is immediately available in the MDM system for other employees to see should they deal with that same customer in the future. Having all data entered once and then simply updated without having to start from scratch each time greatly minimizes the risk of data entry errors and also minimizes the level of effort and frustration on the part of the customer. Most people dread interactions with government agencies because they have the reputation of providing horrible customer service and many run-arounds; this organization can mitigate the perception by using previously gathered customer information to make the process much more simple and efficient.

In addition to implementing an MDM system, the organization should consider using a Multi-Tier High Availability for Critical Data operational pattern to manage their system. One of the key features of this pattern that make it well suited to this particular agency's needs is that it enables the overall system to service a higher application load, meaning that all divisions will be capable of

accessing the Master Data at the same time. Another key feature of this pattern is high availability disaster recovery, making the Master Data available even during a potential disaster; this is essential to minimizing the daily business operations of the organization since they run almost solely on Master Data (Godinez et al., 2010, 181-183).

**ALTERNATIVES**

The organization could consider continuing to house customer data based on which division the request came through. A mechanism could perhaps be architected so that if a customer spoke with two departments, the information could be shared between these particular divisions. However, this actually adds a layer of complexity to the technology and leaves room for error and risk that certain customers may be left unattended and may fall through the cracks. This goes against the principles of enterprise architecture that deal with shared access of real-time, accurate, complete information as needed. Having to request this data from other departments will actually cause the organization to become less efficient and will potentially lower their customer satisfaction levels.

Should the organization decide to go this route, there will be no centralized place for information to be stored, hindering management's ability to analyze customer data or to access uniform information in one spot. In addition, managing Master Data using the operational pattern as suggested is no longer feasible.

## ISSUE #3: LACK OF CONTROLS AND GOVERNANCE

**RECOMMENDED SOLUTION**

In order to counter this problem, the organization should establish a governance structure that has internal controls built in. These controls should include such mechanisms as minimal audits at periodic points in the process, as well as random checks by managers. In addition, managers must have a way to monitor each person's workflow and measure how much work they are completing daily, as well as the error rates. When no one is held accountable and managers cannot tell who is making errors or not pulling their weight, employees are not motivated to work hard and they do the bare minimum in order to keep their jobs.

The governance structure should also be in line with the planned enterprise architecture venture. In addition to holding employees accountable, it should link IT resources and information to organizational strategies, it should enable the organization to take full advantage of all resources available to them (including personnel), and it should incorporate industry best practices related to auditing, information security, and responsibility (Harrison, 2011, 117).

Enterprise architecture is about standardizing and simplifying core day-to-day processes in order to spend more time looking to the future and developing creative solutions to become market leaders. This is not feasible when managers and the leadership team spend most of their days policing data entry and workloads. With internal controls in place, they can place more trust in their employees and they are free to work on strategic initiatives.

As mentioned above, there are some internal controls that should be built around accountability. Software systems that are chosen should incorporate workflows and work delegation, employees'

names associated with each completed action, error rate reporting, and other features that automate the managers' current policing work. In addition, these reports and measurements should be incorporated into performance reviews to assess whether certain employees should be kept on the team. Employees should be held responsible for fixing their own mistakes and managers should review these mistakes with them on a regular basis; this will encourage learning from errors rather than dismissing them.

With these controls in place, the leadership team will be able to concentrate on moving the enterprise closer to their strategic goals of delivering efficient processes and being a superior customer-facing government agency while furthering their enterprise architecture initiative. Having internal controls in place is best practice for any enterprise to ensure that everyone is pulling their weight and customers and certain tasks are not being overlooked or done poorly. It also provides a framework with rules and regulations to follow in implementing new systems or new projects within the organization.

**ALTERNATIVES**

The alternative to infusing internal controls throughout the organization is to allow managers to manually implement controls by regulating all work that goes through the office. If however, managers are controlling all activities, there are no checks and balances in place to ensure that everything is being done correctly. In addition, managers are tied up with monitoring activities all day long rather than focusing on management activities such as analysis, success measures, strategic objectives, and driving the organization towards being a leader. There will be no time to focus on driving the agency towards a more mature stage of enterprise architecture because all members will be so focused on the simple day-to-day activities.

## ISSUE #4: LACK OF METRICS

**RECOMMENDED SOLUTION**

This agency should implement a Balanced Scorecard to measure metrics across the organization; these metrics should deal with everything from process to people to technology. The Balanced Scorecard methodology hinges everything on top of the overall organizational strategy and long-term vision, furthering the enterprise architecture purpose of centralizing all efforts on one single version of a common vision and mission and aligning organizational structure and IT around them.

Each division will have its own set of metrics to measure its own set of processes, but there will also be metrics that measure overall organizational success; these will include such measures as customer satisfaction, employee satisfaction, and others. Each one of these metrics should be tied back to one of the identified strategic objectives. There should be supporting documentation for each metric that includes the metric author, the metric owner, the metric's purpose, the objective that it is tied to, and how it is measured.

It is not enough to simply measure the metrics, but instead the organization must use this tracking methodology to be proactive in implementing changes or solving problems. It will allow the management team to analyze patterns and results to track their progress as an overall organization.

Measuring metrics is key to an organization's success; without this, the only "metrics" that exist are unstructured data such as customer comment cards and internal discussions. This does not provide an accurate measure of success or paint a clear picture of how the organization is doing or where they could improve.

**ALTERNATIVES**

Each division could track their own customer satisfaction to ensure that they are staying on target. This information would come solely from customer perceptions, comment cards, etc. and provide no real quantitative indication of success or failure. This perpetuates a "why fix it if it's not broken" mentality, which will lead the organization to a stagnant state of continuing to operate as it always has.

If each division were to establish their own set of specific, quantifiable metrics to track their measures, this would be a step up from the scenario described above. However, this is not in line with enterprise architecture principles of operating in a unified manner. Certain metrics should be tracked for each division separately since inherently their processes are all different; however, there are certain things that should be measured across the entire enterprise. All metrics, whether they are departmental or organization-wide, should be tied to an organizational objective established by the agency leadership team. As Mr. Johnson states in his white paper, "The Balanced Scorecard (BSC) provides the critical framework to measure, control, manage and incentivize all of what the organization exists to do" (Johnson, 2010, 8).

## ISSUE #5: USE OF EXTENSIVE SYSTEMS

**RECOMMENDED SOLUTION**

Each division is currently using multiple systems that perform very similar functions, none of which link to each other or to any kind of Master Data Management system. This is done to appease customers who have preferences about submitting requests using one system versus the other. While the customers are satisfied with this wide variety of choices, it puts a huge strain on the organization and prevents all divisions from operating efficiently or from sharing information, even within some of the departments.

Each division needs to do an analysis of all systems that are currently in place; they need to evaluate the pros, cons of each, including functionalities, ease of use, efficiency, handoffs, number of steps, and others. As a team, each department needs to decide on one single application that can handle all of their requests. This application must be able to be coupled to the chosen Master Data Management system as well.

The beauty of being a government agency is that they are the only organization to provide the services that are needed; therefore they can direct people to use the systems of their choice, since there are no other options to obtain these particular services. If the customer base is in need of a service, they must follow the rules as they are laid out by the organization and if they don't, their request will not be fulfilled. However, being that the organization is focused on providing an easy, efficient and pleasant experience for their customers, they may want to consider offering some customer orientation sessions, particularly to the customer base that is considered the "power

users," in order to teach them about the application and to educate customers on the benefits of this system versus the old ones. This may help ease customers into using this system.

Another way to persuade customers to use the systems chosen by the organization is to put financial ramifications in place for using other systems, at least for the short-term until these systems are taken down. This will persuade people to quickly move to using the desired system.

Once the organization feels it is an appropriate time to take the old systems down, they must ensure that all data previously stored in these applications is moved to the Master Data Management system to as to not permanently lose these records.

**ALTERNATIVES**

The organization could decide to continue appeasing their customers by allowing the use of several systems. There would be no learning curve for the customers or for the employees since requests will be fulfilled as usual. This would keep customer satisfaction at its current levels and would decrease the risk of unhappiness or frustration.

This solution does not encompass the ideas in enterprise architecture dealing with automating and simplifying underlying systems and would not fit within the architectural framework being developed. In addition, the complexity of using a Master Data Management system increases because there are more than double the systems that information must be pulled from.

The agency could also go the route of simply educating customers on the preferred systems and asking them to use these; this may ease the dissatisfaction levels, however it does not help the organization in any way. Most customers will continue to use the systems they have always used with no regard to the ease of processing for the organization. As long as their requests get processed in a timely manner, the majority of customers do not have any regard to the amount of work the agency must complete. Applying financial penalties or other consequences will force customers to use these systems; there may be a period at the beginning where they will express frustration or dissatisfaction with the lack of choices, but this will subside in time when they realize that using these preferred applications will actually speed up the process and make the request fulfillment more efficient.

## ROADMAP

Below is a roadmap detailing high-level next steps for the organization to take. It is recommended that the organization deal with these issues in the context of an enterprise architecture program, using the TOGAF framework. The TOGAF phases are presented in this table and the solutions detailed above are tailored around the phases of the Architectural Development Method (ADM) concept used in TOGAF (Harrison, 2011). The benefits of implementing the proposed solution following the roadmap below are presented visually in the Appendix (Benefits Diagram).

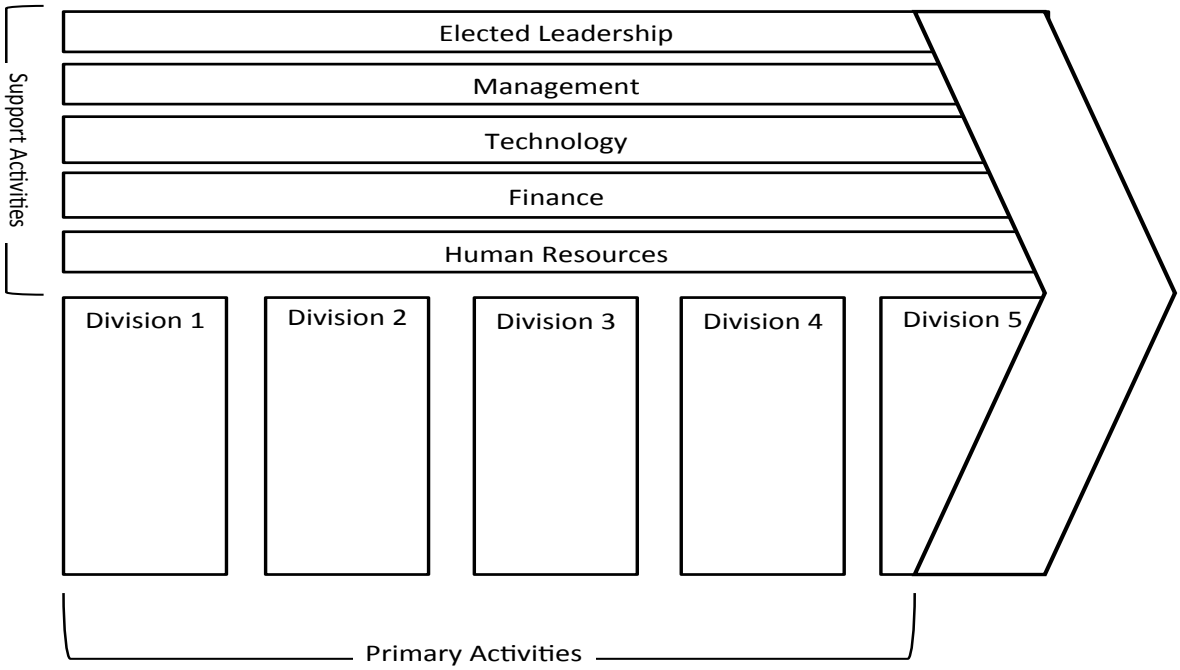
| **Phase** | **High-Level Steps** |
|---|---|
| Phase 1 (TOGAF ADM Preliminary Phase and Phase A)<br><br>Estimated length: 4 months | • Preliminary kick off meeting with all high-level stakeholders to create EA charter, scope, objectives and to obtain high-level management commitment.<br>• Prepare for future TOGAF phases by reviewing organizational context, organizational structure, architectural frameworks and tools.<br>• Define and establish organizational model (coordination operating model is recommended) (Issue #2 and Issue #5).<br>• Determine governance structure (Issue #3).<br>• Begin following recommendations to implement organization-wide culture (Issue #1).<br>• Develop high-level aspirational vision of capabilities and business value to be delivered as result.<br>• Obtain approval for statement of work that defines EA work program. |
| Phase 2 (TOGAF ADM Phase B)<br><br>Estimated length: 1 month | • Begin developing a first draft of Balanced Scorecard metrics (Issue #4).<br>• Continue emphasizing united organizational culture (Issue #1).<br>• Develop baseline architecture, target architecture, and gaps between the two for the organization as a whole.<br>• Describe and agree upon detailed, obtainable strategic objectives.<br>• Define Business Architecture, including service strategy, organizational, functional, process, information, geographic, political aspects of business environment.<br>• Continue emphasizing organizational culture (Issue #1). |

| | |
|---|---|
| Phase 3 (TOGAF ADM Phases C and D)<br><br>Estimated length: 2.5 months | • Determine all locations where information currently housed within the organization (Issue #2) as well as any relationships between applications (Issue #5).<br>• Develop base and target Information Systems Architecture, describing how it will enable Business Architecture and Architecture Vision.<br>• Analyze gaps between base and target architectures to develop a roadmap.<br>• Determine all software and hardware in use, as well as relationships between them (Issue #5).<br>• Make departmental decisions as far as which systems to eliminate (Issue #5).<br>• Develop base and target Technology Architectures and analyze the gaps.<br>• Integrate governance structure and internal controls into target Technology Architecture (Issue #3).<br>• Continue emphasizing organizational culture (Issue #1). |
| Phase 4 (TOGAF ADM Phases E and F)<br><br>Estimated length: 5 months | • General overall Architecture Roadmap.<br>• Group all gap analyses into work packages and build a best-fit implementation roadmap.<br>• Decide on approach for each project (make vs. buy, outsource, etc.).<br>• Assess priorities and dependencies between projects.<br>• Tackle one project at a time.<br>• Detail roadmap to address moving from base to target architecture – finalize Architecture Roadmap.<br>• Perform cost/benefit analysis and risk assessment for each work package/project identified.<br>• Continue emphasizing organizational culture and benefits of EA (Issue #1). |

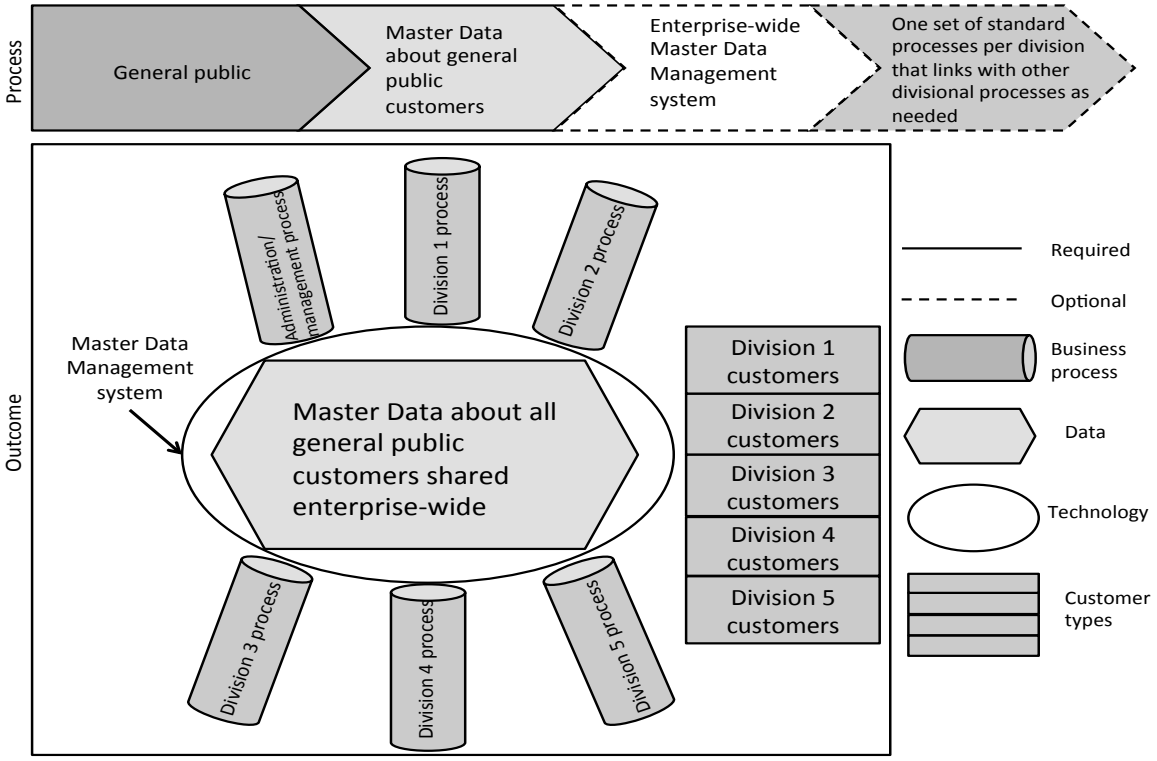
| | |
|---|---|
| Phase 5 (TOGAF ADM Phases G and H)<br><br>Estimated length: 8 months | • Revisit governance structure and internal controls based on Architecture Roadmap (Issue #3).<br>• Ensure conformance to target architecture through implementation efforts.<br>• Ensure that governance framework is maintained and that employees and management are all aligned behind common vision and goals.<br>• Ensure that changes are managed in a cohesive, structured way so as not to disrupt day-to-day business.<br>• Implement final version of Balanced Scorecard and begin monitoring metrics to assess success (Issue #4). |

## APPENDIX

**Value Chain Diagram**



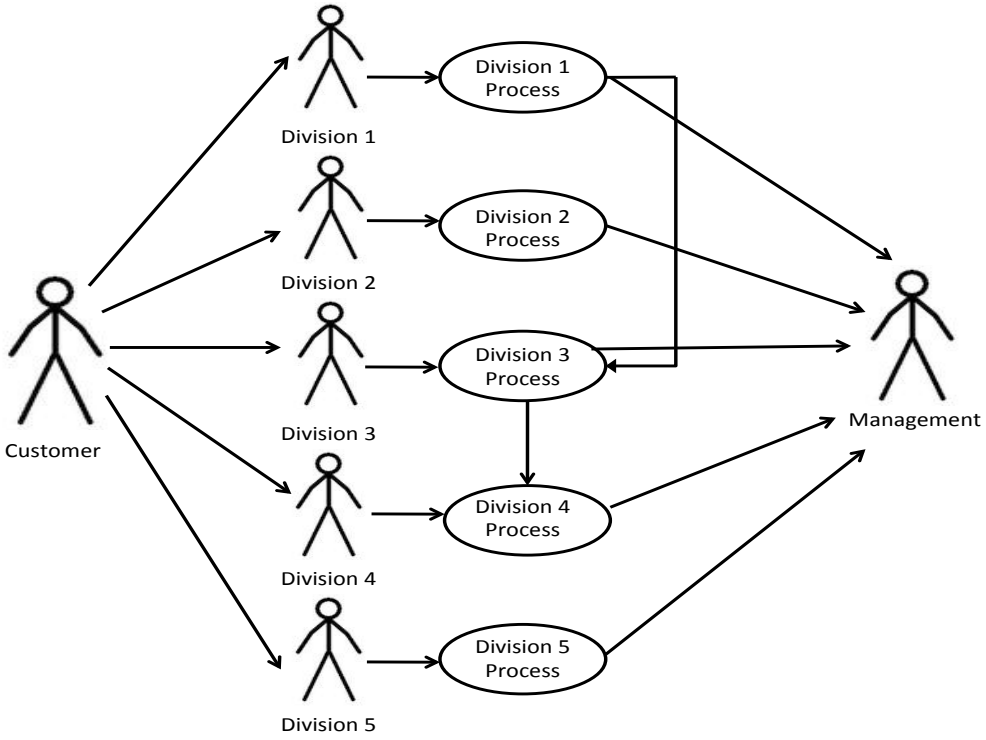
## Core Diagram



**Role/System Matrix**

| Application(Y-Axis) and Function (X-Axis) | Division 1 Employees | Division 2 Employees | Division 3 Employees | Division 4 Employees | Division 5 Employees | Management | Finance |
|---|---|---|---|---|---|---|---|
| Division 1 Applications | X | | | | | X | |
| Division 2 Applications | | X | | | | X | |
| Division 3 Applications | | | X | | | X | |
| Division 4 Applications | | | | X | | X | |
| Division 5 Applications | | | | | X | X | |
| Finance Application | | | | | | | X |

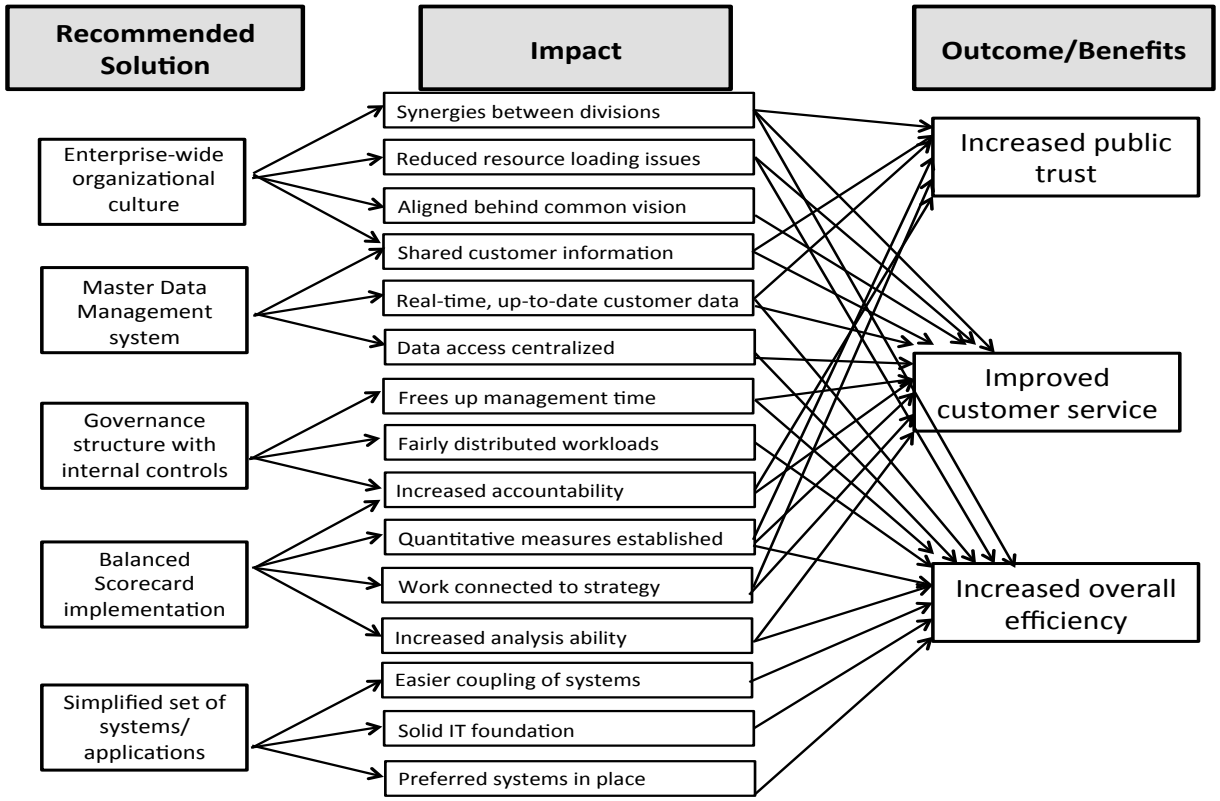
**Business Use-Case Diagram**



## Application and User Location Diagram

| Application | User Type | Internal, Customer or Partner | User Business Location | Location Address | Org Unit (User Belongs to) |
|---|---|---|---|---|---|
| Division 1 Applications | Employee<br>Manager | Internal | Organization<br>Office | Denver, CO | Division 1 |
| Division 2 Applications | Employee<br>Manager | Internal | Organization<br>Office | Denver, CO | Division 2 |
| Division 3 Applications | Employee<br>Manager | Internal | Organization<br>Office | Denver, CO | Division 3 |
| Division 4 Applications | Employee<br>Manager | Internal | Organization<br>Office | Denver, CO | Division 4 |
| Division 5 Applications | Employee<br>Manager | Internal | Organization<br>Office | Denver, CO | Division 5 |
| Financial Application | Employee<br>Manager | Internal | Organization<br>Office | Denver, CO | Finance |
| Web Request Portal | Employee<br>Manager<br>Administrator<br>Customer | Internal<br>Customer | Organization<br>Office<br>Web | Denver, CO | Information Technology |
| Web Document Search | Employee<br>Manager<br>Administrator<br>Customer | Internal<br>Customer | Organization<br>Office<br>Web | Denver, CO | Information Technology |

**Benefits Diagram**



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**Author Bio**

Sarah Nasser is a business analyst for reVision, Inc., a Denver-based IT company that provides consulting, technology integration and engineering services to a broad customer base, including local, state, federal and commercial clients nationwide. She has been working in this capacity for just over two years and has provided support to key clients in several subject matter areas including Enterprise Architecture, Performance Management and Balanced Scorecard, Governance, Business Process Reengineering and Communications Support. Sarah received a Bachelor of Science in Business Administration from the Leeds School of Business at the University of Colorado at Boulder in 2010. She is currently working towards her Masters of Science in Business Management from the Daniels College of Business at the University of Denver and expects to graduate in September of this year.

# ROBERT S. FREY: SOLUTION-ORIENTED ENTERPRISE ARCHITECTURE (EA) REPORT FOR A MID-TIER FEDERAL CONTRACTING FIRM, COMPANY ABC

## EXECUTIVE SUMMARY

Implementing Enterprise Architecture (EA)—an ongoing, evolving set of decision-support activities and integrated processes—will assist Company ABC compete more effectively and efficiently within the hyper-competitive Federal marketplace of 2012 and beyond. EA will support the organization in driving down costs associated with business activities through decreased logical and physical redundancy of Information Technology (IT) assets, higher levels of data re-use, and enhanced productivity that will result from people looking for the right data in the right places, and finding it in the right format. In addition, EA will function as a force multiplier, optimizing the throughput of current Business Development, Capture Management, Proposal Development, and Operations staff, as well as Executive Management, Human Resources/Recruiting, and Finance and Contracts professionals. Both Infrastructure and Operations units will become an integral part of an expanded value-creation engine. Applying acceptance criteria based upon the SMART mnemonic, Stage-Gate® process, and TOGAF Version 9 framework, specific recommendations were generated built upon Microsoft SharePoint 2013, SQL Server 2012, Windows Server 2008 Operating System (OS), and HP Integrity servers. Importantly, the model-based TOGAF Version 9 Architecture Development Method (ADM)—particularly Phases A and C—revealed previously unexpected value-added and sustainable benefits to Company ABC, spanning multiple business units.

## BACKGROUND: KEY CONCEPTS AND COMPANY ABC

Certain scholars suggest that knowledge is a source of value creation within an organization (Vorakulpipat and Rezgui 2007, 417). Knowledge is also perceived to be a critical business resource, and the "foundation of competitive advantage" (Carlucci, Marr, and Schiuma 2004, 576). Information technology-supported Knowledge Management (KM) systems have been shown to foster the identification of decentralized knowledge and expertise, encourage the conversion of tacit knowledge into explicit forms (e.g., narrative documents and graphics), facilitate making knowledge available for re-use, contribute to the "co-location of knowledge," and reduce the costs associated with searching for and transforming available knowledge into meaningful forms (Kautz and Mahnke 2003, 77). Gudas (2009, 281) defines KM as the "business activity intended to solve critical enterprise adaptability and competitiveness issues in a rapidly changing environment." This activity encompasses the "effective creation, storage, dissemination, and use of enterprise knowledge" (Gudas 2009, 281).

Conceptualizing a knowledge-based value-creation engine within Company ABC using Enterprise Architecture (EA) constructs and artifacts constitutes the focus of this project. A key goal is to build "ambidexterity" into this organization, that is, to combine both adaptability and alignment (Birkinshaw and Gibson 2004; see also Sarkees, Hulland, and Prescott 2010).

As a mid-tier Information Technology (IT) prime contractor in the Federal marketplace, and ranked among Washington Technology's Top 100 corporations, Company ABC has nearly 2,000 highly qualified staff professionals and subject matter experts (SMEs) who support an extremely diverse and geographically dispersed set of defense and civilian Government agencies. Currently, this organization has an extensive contract backlog of $1.5 billion, which represents more than 4 years of revenue at the current annual "run rate" of $364 million.

## BUSINESS, GOALS, AND STRUCTURE

As a support-services organization, Company ABC is essentially selling two "products"—human talent/knowledge ("know how" and "know why") and contractual experience. Its mission is to provide premier information technology, systems engineering, and scientific services support to Federal clients for maximum return on investment (ROI) and sustainable strategic advantages. Fundamentally, the organization's goal is to delight the customer through managed IT solutions. Its market focus as a mid- to high-technology firm centers on Software Engineering/Applications Development, Network Engineering/Management, End-user Technical Support, Systems Engineering and Technical Assistance, Information Assurance (IA), and Science and Engineering Support Services. (Of note, however, is that a considerable portion of the mid-technology spectrum of Company ABC's service offerings is subject to the process of commoditization. [See Sango et al. 2011 and Holmes, 2008] This challenge will have major impact on revenue sustainability and growth.) The organization's customers span the U.S. Air Force Space Command (AFSPC), Department of Energy (DOE), National Aeronautics and Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), and the Federal Aviation Administration (FAA), along with the Department of Labor (DOL), Office of Naval Research (ONR), and Defense Advanced Research Projects Agency (DARPA).

With a streamlined, customer-focused organizational structure, Company ABC has three operating divisions—Defense Programs, Civilian Programs, and Science and Engineering Programs, each under the leadership of a Division Vice President (VP). Those VPs, in turn, report to the Executive Vice President (EVP)/Chief Operating Officer (COO). The EVP/COO, who is also one of the two principal owners, works elbow-to-elbow with the President and Chief Executive Officer (CEO), the other principal owner of the company. Infrastructure supporting groups, which include Business Development, Finance and Contracts, Legal, Corporate Resources, and Systems Support and Integration, operate under the direction of the President/CEO.

## OPERATING MODEL

Company ABC exhibits a clear corporate strategy of investing in automated tools to reduce indirect expenses, while increasing productivity and efficiency. This is demonstrated by a decrease in indirect expenses as a percentage of the company's revenue from 8.37% to 6.92% over the course of 5 years. Parenthetically, indirect costs are those costs not identified with a specific project or organizational activity, but incurred for the joint benefit of both projects and other activities.

Examples of the company's investments in management systems encompass its ISO 9001:2008 Quality Management System (QMS), Deltek CostPoint Accounting and Financial Systems, Program

Manager (PM) Reports, Electronic Timesheets, Kenexa Recruiter Applicant Tracking System, and the Employee Intranet Site. The QMS, for example, delivers authoritative documentation (e.g., policies, processes, and forms) to each employee's desktop. PM Reports is available on the desktop of all Program Managers and Division VPs, and facilitates the generation of more than 65 custom reports including project information and status, revenue reporting, Purchasing and Accounts Payable, and labor and time-reporting information.

Although there has been substantial progress made in information automation within this organization, the company's "as-is" operating model remains at the level of Diversification. In effect, business process standardization and business process integration are low; only some technologies and a small subset of processes are shared. There are business unit-specific "customers," as well as business-unit-specific data.

For example, within the Business Development infrastructure group, unit-specific "customers" span Company ABC's Executive Management team, as well as external decision makers (e.g., Government Contracting Officers [COs], Contracting Officer's Technical Representatives [COTRs], Technical Monitors (TMs], and Branch Chiefs) and proposal evaluation teams (e.g., Federal agency-specific Source Evaluation Boards, or SEBs). Unit-specific data extend across characterization of potential business opportunities (e.g., Business Acquisition Council reports that include Strengths, Weaknesses, Opportunities, and Threats [SWOT] assessments, competitor analyses, Federal spending trends, past performance project descriptions along with contractual information such as dollar amount and contract type, professional resumes, and best-of breed proposal documents, including graphics.

## CORE ENTERPRISE ARCHITECTURE

In terms of "as-is" architecture maturity, Company ABC straddles the Business Silo and Standardized Technology stages (Ross, Weill, and Robertson 2006, 72). Shared infrastructure services and individual applications are both extant. The current core EA diagram for the company's Business Development Group—the original focus of this project—is presented in Appendix A, and represents processes that must be considered for digitization and standardization as part of the Foundation for Execution (FFE) (Ross, Weill, and Robertson 2006, 4). Other corporate information systems from across Human Resources/Recruiting and Contracts and Finance will also need to be tightly integrated with the Business Development system, processes, and data elements. Importantly, however, "[e]nterprise architecture is not about IT serving the business needs of the organization. Rather, it is about Information Technology and the business working together" to turn Company ABC's vision into reality (Daniel 2007).

## PROBLEM SPACE

In a world with no architecture framework, unique and duplicative data would be scattered throughout a given organization in insular, "stovepiped" pockets. Data would not be shared effectively or efficiently across business units, or with the external customer environment. No one authoritative aggregation of datasets would exist, and as Ron Toildo notes in The Art of Enterprise Information Architecture (2010, xx), data ownership would be unclear, and data stewardship would

be non-existent. Business-level operations would be far costlier than necessary, due to logical and physical redundancy of IT assets, low levels of data re-use, and lost productivity resulting from people looking for the right data in the wrong places, and then finding a data product in an incompatible format. Information Technology would not serve as a vital enabler for business success. Explicit (as opposed to tacit) data, information, and knowledge resident within the organization would not be leveraged through predictive analytics to provide meaningful, near-real-time decision support at either a tactical or strategic level. Information flow would not be "boundaryless," as The Open Group describes in the TOGAF Version 9 module (2008, xxvi). The level of IT complexity would continue to ratchet upward in an uncontrolled manner, in part due to the lack of a common lexicon about information and information-sharing among the management and staff professionals of the organization. And as Sckekkerman observes (2008, 31), complexity is an inhibitor of change. Levels of risk (e.g., quality, schedule, and cost) to the organization's business processes would increase substantially. Furthermore, business and technology strategies would not be integrated with business principles, objectives, and drivers, or with the requirements of the organization's stakeholders. Fundamentally, information visibility and utilization along the organization's value chain would be severely impaired.

Mid-tier as well as small support-services businesses are very resource-limited, particularly in terms of staffing, proposal development skill sets, and time. (To focus more closely on American small businesses, the U.S. Bureau of Labor Statistics, Business Employment Dynamics [Headd 2012] reported 175,000 small business "deaths" in 2011, that is, the voluntary or involuntary closure of a firm.) For example, when technical and operational subject matter experts (SMEs) and project or task managers are tasked with collecting information about specific projects, and writing selected sub-sections of a given proposal, that documented information must be archived, effectively searchable, and quickly retrievable. The same applies to corporate-level information such as company certifications, awards, resumes, recruiting practices and associated statistics, and cost control tools and processes. Other vital information that needs to be collected for re-use encompasses corporate "success stories"—how the company's people and their actions, enabled by processes and tools, have resulted in enhanced quality of service, adherence to schedule, control or avoidance of cost, and mitigation of potential risks on behalf of the Government. Further, the knowledge embedded in technical "white papers" that Operations SMEs develop and share with their Federal customers are another source of intellectual capital and monetizable value to the firm.

Frequently in mid-tier and small businesses, this information is found on individual computer hard drives, external drives or other media, or in a sub optimally architected and applied document management system (DMS) or collaboration tools such as SpringCM Privia, Microsoft SharePoint 2007 or 2010, Intravation Virtual Proposal Center (VPC), or Innovations InfoRouter, which generally do not offer any add-in data visualization capacity.

From a business practice perspective, there is often no support within the business culture of the organization to systematically collect and document tacit knowledge, or to share and re-use knowledge "products" (explicit knowledge). Therefore, the limited bid-and-proposal (B&P) dollars that mid-tier and small businesses do have available to develop proposals—the vehicle by which they, in turn, derive revenue—are expended in redeveloping previously generated material. This practice frequently results in interpersonal challenges and frustration, and most always in diminished productivity.

Real-world proposal development challenges were the genesis of this Final Project. But then the power of the TOGAF Version 9 Architecture Development Method (ADM) "intervened." What was essentially a uni-dimensional and somewhat parochial issue of proposal-related Knowledge Management expanded exponentially to encompass both primary and secondary actors. With the development of selected Phase A and Phase C artifacts as well as a Technical Reference Model (TRM), this "Enterprise Architect" realized that the problem space was much more comprehensive, although following Harrell and Sage 2010, 213), the "problem domain" for EA must also be limited. Even more important, as my organization-specific "Enterprise Continuum" matured (see Appendices B – I), the "opportunity space" was much more exciting and possibility-laden than ever imagined.

## IDENTIFICATION OF MAJOR ARCHITECTURAL ISSUES

Seven major architectural issues emerged from detailed consideration of the aforementioned Problem Space. These issues fall into two major areas: (1) Organizational, Management, Strategy, People, and Culture; and (2) Data, Information, and Knowledge. All of them are resolvable over time with appropriate commitment, focus, and energized and trained resources.

Issue 1: EA Cannot Follow the Trajectory of ISO 9001

> When pursuing its external ISO 9001:2000 certification, Company ABC was very diligent regarding process and interface definition, as well as requisite documentation; once implemented, however, the ISO Quality Management System became largely a mechanical "end-in-and-of-itself," at least at corporate headquarters.

Issue 2: Lack of Alignment among Business Processes and IT Systems

> Definitional as well as organizational structural issues impede the full alignment between business processes and IT assets.

Issue 3: "Stovepiped" Data Repositories across the Enterprise

> Various Company ABC business units are allowed to manage their individual IT assets in flexible and creative ways, which unfortunately involve the adoption of incompatible standards, thereby resulting in localized IT objectives not being aligned with Company ABC's overarching organizational goals and objectives (Boh and Yellin 2007, 164).

Issue 4: Strategic Planning Does Not Encompass EA Planning

> Structured semi-annual strategic planning meetings that involve a broad cross-section of senior management do not address EA planning at any level.

Issue 5: Attempting to Implement EA without Adequate Resources and Communications Mechanisms

> Despite having the capacity of nearly 2,000 staff professionals, Company ABC frequently does not allocate the right number of qualified and credentialed resources to addressing major initiatives, nor is collaborative decision making culturally normative.

Issue 6: Viewing EA as a Technical Problem

> Because ISO was perceived as a Quality Improvement Office (QIO) issue and the rollout of the Kenexa Recruiter Applicant Tracking System was viewed as a Human Resources issue, it is highly likely that EA will be seen as an IT (in Company ABC's terms, "Systems Support and Integration") issue.

Issue 7: This Organization's Operating Model Is Suboptimal. Functionally, there is insufficient definition of and commitment to how the organization will operate to deliver services and knowledge assets to its external customer set.

## ANALYSIS OF IMPLEMENTATION AND ASSOCIATED MAJOR ENTERPRISE ARCHITECTURE ISSUES

### ISSUE 1: EA CANNOT FOLLOW THE TRAJECTORY OF ISO 9001

According to the International Organization for Standardization's (ISO) Central Secretariat (ISO Central Secretariat 2012, 3), ISO 9001 management principles contribute to "[i]ncreased revenue and market share obtained through flexible and fast responses to market opportunities." Yet in general, even after several intervening years from the date of initial ISO external certification, these significant benefits have not been realized within Company ABC. To be sure, ISO-driven quality processes have contributed to excellent external customer satisfaction scores. Nevertheless, many people within the organization—particularly at corporate headquarters—perceive ISO processes and documentation to be burdensome. The entire initiative has been carried forward in a somewhat mechanical and less-than-statistically-rigorous manner. For example, with the internal business units (Infrastructure) that are evaluated by other internal business units in terms of level of service and customer care, timeliness of support, and relevant subject matter knowledge, simple arithmetic means are used to generate quantitative comparisons rather than weighted averages based upon number of respondents (n). Conclusions are drawn (literally graphed) without sufficient numbers of survey respondents to yield a representative population size with a margin of error at the 95% confidence level.

### ISSUE 2: LACK OF ALIGNMENT AMONG BUSINESS PROCESSES AND IT SYSTEMS

In Godinez et al.'s framework of Enterprise Architecture layers (2010, 26), Company ABC's "as-is" state is one in which the Infrastructure Layer contains a variety of networks and servers, the Information Layer has no authoritative datasets, and the Application Layer encompasses diverse tools with similar functionality. Boh and Yellin's empirical results (2007, 192) suggest that EA standards have significant positive impact on the heterogeneity of IT infrastructure components across business units, the replication of IT services provided by different business units, and the integration of both applications and data across the enterprise.

## ISSUE 3: "STOVEPIPED" DATA REPOSITORIES ACROSS THE ENTERPRISE

According to Gammelgård, Simonsson, and Lundström (2007, 416), in the typical business scenario, enterprise-level IT systems have not evolved over time according to the rigors of a planned or centralized approach. Instead, business units within a given organization have acquired and developed a variety of IT systems. Collectively, the enterprise IT system is an amalgamation of "poorly understood components" that store redundant data and provide similar functionality (Gammelgård, Simonsson, and Lundström 2007, 416). Company ABC reflects this commonplace business scenario across Business Development, Capture Management, Proposal Development, and Operations, as well as Human Resources/Recruiting, Contracts and Finance, and Executive Management.

## ISSUE 4: STRATEGIC PLANNING DOES NOT ENCOMPASS EA PLANNING

Having participated in multiple semi-annual, off-site Strategic Planning Management Retreats with Company ABC, I am fully aware that IT functions and assets are viewed predominately as tangential and quite separate and distinct from business processes, such as proposal development or contract administration. IT strategy, when addressed, is articulated in terms of capital planning and investments. Business processes are not envisioned as being enabled by, and embedded within, the "IT ecosystem" (Godinez et al. 2010, 26). There is an absence of a clear "line-of-sight" (Godinez et al. 2010, 15) into "value drivers" to identify new business and support services opportunities. Whereas generalized SWOT analyses are performed for the business at large, no attention is devoted to determining the look-and-feel of future-state business capabilities, which necessarily would involve a maturity assessment and gap analysis in order to generate a meaningful and sufficiently detailed roadmap.

## ISSUE 5: ATTEMPTING TO IMPLEMENT EA WITHOUT ADEQUATE RESOURCES AND COMMUNICATIONS MECHANISMS

Both Gartner (Gartner News 2009) and EAdirections (2007) assert the criticality of communication for the success of EA initiatives. TOGAF Version 9 (2008, 344) affirms "business transformation workshops" being important components of an overall EA Communications Plan (see TOGAF 36.2.12). The alignment of terminology, definitions, timeframes, and goals associated with all phases of, and stakeholders in, EA implementation is vital for long-term success. In addition, the U.S. Government Accountability Office (GAO) (2006) cites adequate human capital and funding as standing among the challenges that organizations face in realizing the benefits of Enterprise Architecture. Further, GAO notes the importance of people, processes, and tools for developing an effective architecture. TOGAF Version 9 (2008, 570) recognizes that sufficient resources must be part of the calculation of Total Cost of Ownership (TCO) of the EA.

## ISSUE 6: VIEWING EA AS A TECHNICAL PROBLEM

"Holistic EA" that encompasses business, information, and solutions architectures is a best practice cited by Gartner (Gartner News 2009). Firms need to move beyond technical domain-level

architectures only in order to tightly integrate "Business Application, Information, and Infrastructure architecture layers", each of which "describes integrated sets of architecture building blocks (ABBs). (Godinez et al. 2010, 26).

## ISSUE 7: THE ORGANIZATION'S OPERATING MODEL IS SUBOPTIMAL

By attempting to proceed with an EA approach prior to clarifying and solidifying the business process integration and standardization issues with the operating model, IT investment dollars would likely be wasted. In addition, because the value of EA as a "business vision" (Ross, Weill, and Robertson 2006, 206) will not emerge because of a short-circuited process, positive organizational change would not unfold, and the contribution of EA to the enterprise value chain would not be recognized. The entire process could be therefore abandoned, and investment dollars lost. The appropriate workflow should be in the following sequence: 1. Operating Model→ 2. EA→ and 3. IT Engagement Model. First, there must be a commitment to how the organization will operate, at which point an EA process can be applied toward building IT capabilities in alignment with that model. As a checks-and-balances system, the IT Engagement Model then continuously ensures the alignment of IT, business, and mission goals and objectives.

## BUSINESS CASE

Currently, unique and duplicative data are scattered throughout Company ABC in insular, "stovepiped" pockets. Data are not being shared effectively or efficiently across infrastructure and operational business units or with the external customer environment. "[E]nterprise architecture is the appropriate way for an organization to deal with inflexibility in its business operations; manage organizational changes; master organizational complexity; and effectively align all its aspects" (Nakakawa, von Bommel, and Proper 2011, 84). My direct experience suggests that institutionalizing EA should be done through a sound IT Governance process. IT enables the operation of business lines (mission) through a highly complex dynamic involving people, processes, technology, and knowledge. What makes IT beneficial is how well competing and complementary priorities are governed and focused.

Company ABC faces the same three external forces that Godinez et al. (2010, 3-4) identified—namely, significant increases in information volume, variety, and velocity. For example, large volumes (terabytes) of structured as well as unstructured content data (Unstructured Data Domain) exist currently within the company's proposal knowledge repository (InfoRouter). These data are arranged in hierarchical tree structure or "nested" folders. They are in the form of Microsoft Word documents, PDF files, Microsoft Excel spreadsheets, and Microsoft PowerPoint slides, as well as .jpeg, .png, .tif, .gif, .eps (Encapsulated PostScript), .8TY (Adobe PhotoShop), and .cdr (Corel) image and graphics files. Unequivocally, Metadata Management Capability will stand as the pivotal dimension for corporate proposal development information systems. Users must be able to rapidly locate content from a variety of search vectors, For example, one person may search text and graphics files for the term, "help desk." Another may employ "end-user support." And a third individual may use "service desk." All three people need to be directed—via metadata—to the same superset of files.

The value proposition or business case (see Godinez et al. 2010, 15; Molisani and Graham, 2008) for moving forward with an ongoing EA initiative and working to surmount the seven architectural issues identified above builds on the key planks shown in Table 1.

Table 1. Business Case for Pursuing an EA within Company ABC.

| Return on Investment (ROI) | | |
|---|---|---|
| Benefits of EA | Near- to Mid-Term Results<br>(6 – 18 months) | Long-Term Results<br>(18 – 36 months) |
| Additional high-quality proposals, with tightly integrated and accurate staffing and costing information, are generated per unit time. | Increased bookings and level of contract backlog (corporate "bank account"). | Increased revenue, and enhanced capacity to credibly bid on larger support service contracts for Federal customers. |
| Company ABC emerges as an ambidextrous "learning organization" (Senge 2006), leveraging its people, processes, knowledge, and tools to bring low commoditization services and thought leadership to its Federal customer set (see Appendix D). | Increased competitive advantage in a turbulent marketspace characterized by shrinking discretionary Federal budgets and commoditized services (e.g., Software-as-a-Service [SaaS] and Platform-as-a-Service [PaaS]). | Increased capacity to attract and retain superior talent to sustain innovation and competitive advantage. |

Pursuing "boundaryless" information flow, as The Open Group envisions in its TOGAF 9 module (2008, xxvi), aligns directly with Company ABC's corporate efforts to increase productivity and efficiency through ISO 9001:2008 certification and Information Technology Infrastructure Library (ITIL) V3 certification. Our Quality Council, which received the American Business Award for Best Support Team ("STEVIE" award), along with our staff company-wide who have participated in ISO internal and external audits, are prepared and will resonate with the standardization and integration initiatives associated with EA. The learning curve will be markedly lower. Fundamentally, we need an authoritative aggregation of datasets, along with clear data ownership and data stewardship (Godinez et al. 2010, xx). Ownership and stewardship mesh directly with our corporate-wide focus on accountability.

Fully documented and codified Business Architecture, Enterprise Information Architecture, and Technology Architecture—all integral components of an Enterprise Architecture—will accentuate

information visibility along our organization's entire value chain. Leveraging and connecting our ISO 9001:2008 Quality Management System, Deltek CostPoint Accounting and Financial Systems, Program Manager (PM) Reports system, and Kenexa Recruiter Applicant Tracking System will assist our Business Development organization in producing more high-quality proposals with accurate, up-to-date information collected more rapidly than ever before. EA will function as a force multiplier, optimizing the throughput of our current Business Development staff.

Given our validated 66% proposal win rate over the past 9 years, a formalized EA process through which we share authoritative and standardized data will result in a sustainable capability to increase bookings, which in turn will translate into increased contract backlog and higher annual revenues for Company ABC. Our infrastructure will be an integral part of our value-creation engine (see Appendices C, D, and E), as suggested by North, North, and Benade (2004).

## RECOMMENDED SOLUTIONS AND HIGH-LEVEL ROADMAP

In making recommendations to the Executive Management Team of Company ABC, my key criteria would encompass such "must-have" elements as: (1) alignment with "over-the-horizon" business processes, (2) Total Cost of Ownership and (3) ease of portability to the "cloud." Further, I would employ the Stage-Gate® iterative review process (see Broum, Kopecky, and Kleinova 2011) that is scalable, modifiable, and adjustable (Cooper 2008, 223) for my solution set. "Over-the-horizon" business processes refer to the following—the business processes that an organization uses today will necessarily have to be modified in the future to meet changing macroenvironmental business conditions. Therefore, it is imperative to plan the EA to meet the anticipated needs of the organization in the future, in effect, "over-the-horizon."

Leveraging Gammelgård, Simonsson, and Lundström (2007, 422), we can assign a quality attribute called "functional fit" which characterizes the fit between functional requirements and what Company ABC's IT systems actually provide. The goal here is to "minimize the gap" between the functions of the IT system and the business requirements, and also to consolidate the application and infrastructure portfolios (Gammelgård, Simonsson, and Lundström 2007, 423). Fundamentally, one of my tasks as an Enterprise Architect is to help demonstrate the value that IT management brings to our company's business processes—certainly Gammelgård, Simonsson, and Lundström would agree (2007, 432).

Gartner advises that Enterprise Architects—such as myself, for purposes of this project—work to generate effective communication with organizational stakeholders, and to "form active teams that create and agree on enterprise architecture content" (Nakakawa, Von Bommel, and Proper 2011, 84). We should strongly consider applying the Collaborative Evaluation of (Enterprise) Architecture Design Alternatives (CEADA) method that Nakakawa, Von Bommel, and Proper describe (2011, 84). Importantly, the CEADA method includes the deconstruction of requirements into explicit, SMART (Specific, Measurable, Attainable, Relevant, and Timely) objectives (Nakakawa, Von Bommel, and Proper 2011, 85) and Key Performance Indicators (KPIs). The CEADA method will allow me, as the Enterprise Architect, as well as other organizational stakeholders at Company ABC (i.e., major and secondary "actors" in TOGAF Version 9 parlance) to effectively and efficiently make collaborative decisions when creating our EA (Nakakawa, Von Bommel, and Proper 2011, 84).

### ROADMAP: KEY ACTIVITIES, ARTIFACTS, AND ALTERNATIVES

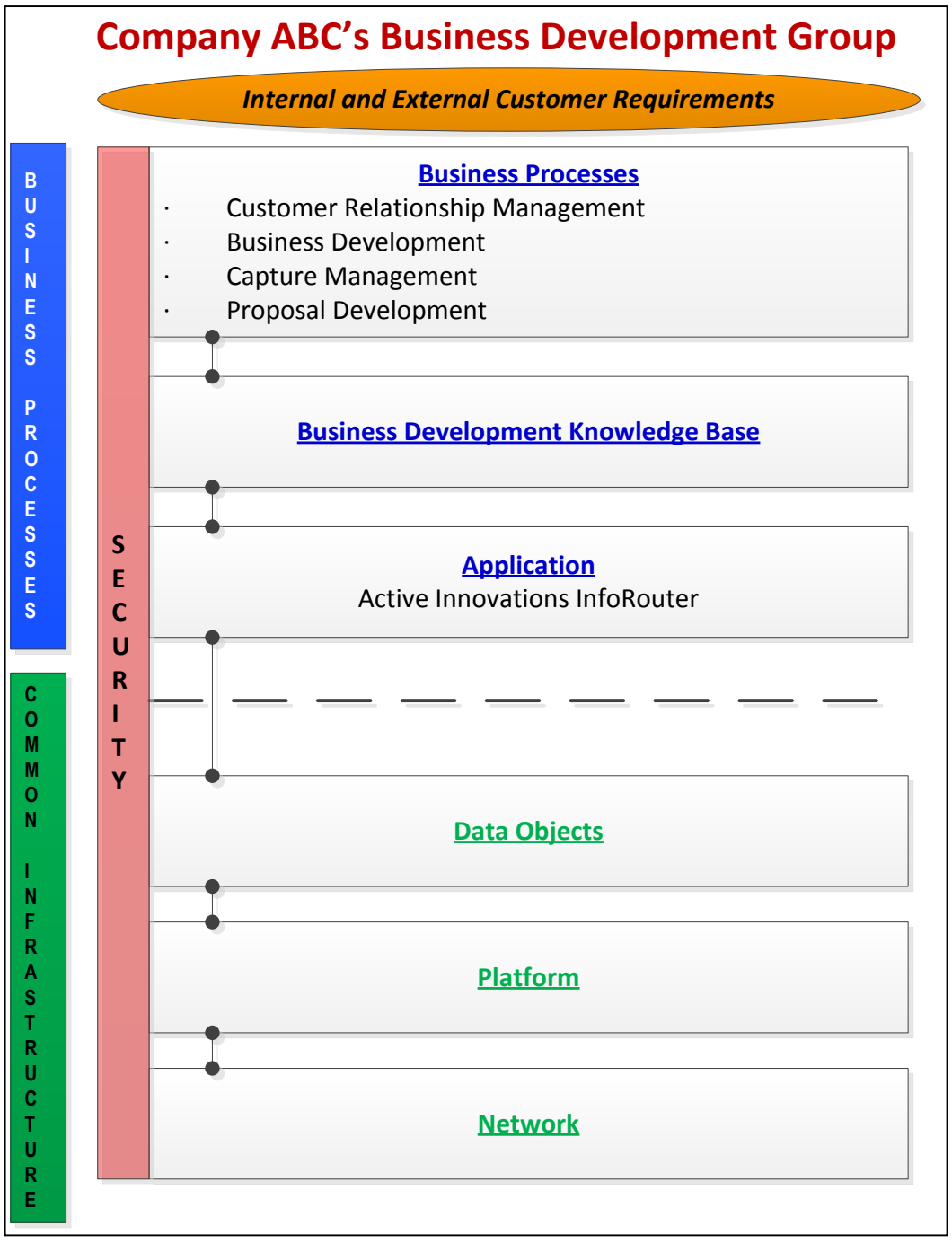
Among the primary goals of Enterprise Architecture is to define the "to-be" or target architecture for the organization, as well as to provide a roadmap for achieving the target architecture from the current "as-is" or baseline architecture. EA brings two pivotal components: (1) the planning process (i.e., "definition), and (2) tangible outputs of the planning process (i.e., "documentation," such as Business Use-Case Diagrams and Value Chain diagrams) (Tamm, Seddon, Shanks, and Reynolds 2001, 142). Eight artifacts (Appendices B – I) were developed in support of Company ABC's phased migration toward a meaningful "to-be" architecture.

Table 2 presents major activities, TOGAF artifacts, and alternatives that were considered along with a notional schedule for implementation.

Table 2. Projected Roadmap with Notional Schedule of Activities.

| Timeframe | Major Activity | Key TOGAF Artifacts | Capital Expenditures | Alternatives Considered |
|---|---|---|---|---|
| **Develop Operating Model for *Company ABC*** | | | | |
| **EA Process and IT Engagement Model** | | | | |
| Months 1-2 | • Review organizational context for conducting EA within *Company ABC*<br>• Identify primary and secondary actors and stakeholders<br>• Conduct detailed business-level Requirements Definition, including interfaces and working behaviors<br>• Evaluate *Company ABC*'s architecture maturity level<br>• Define and establish *Company ABC*'s EA Team and organization<br>• Develop Communications Plan to support change management | • Architecture Principles<br>• Tailored Architecture Framework<br>• Governance Framework | | |
| Months 2-4 | • Phase A: Architecture Vision | • Stakeholder Map Matrix (see **Appendix B**)<br>• Value Chain Diagram (see **Appendices C, D,** and **E**)<br>• Solution Concept Diagram (see **Appendix G**)<br>• Business Transformation Readiness Assessment | | |
| Months 5-6 | Phases B and C<br>• Develop Purchase Requests | • Application Communication Diagram<br>• Technical Reference Model (TRM) | • MS-SharePoint 2013<br>• Window Server 2008<br>• SQL Server 2012 with Disaster Recovery feature (Alderman, 2012)<br>• HP Integrity Servers | SharePoint Alternatives<br>• HyperOffice<br>• Alfresco (Open Source)<br>A.<br>HP Server Alternatives<br>PowerServe Duo T2000 |

**Appendix A. Current Enterprise Architecture Diagram for Company ABC.**

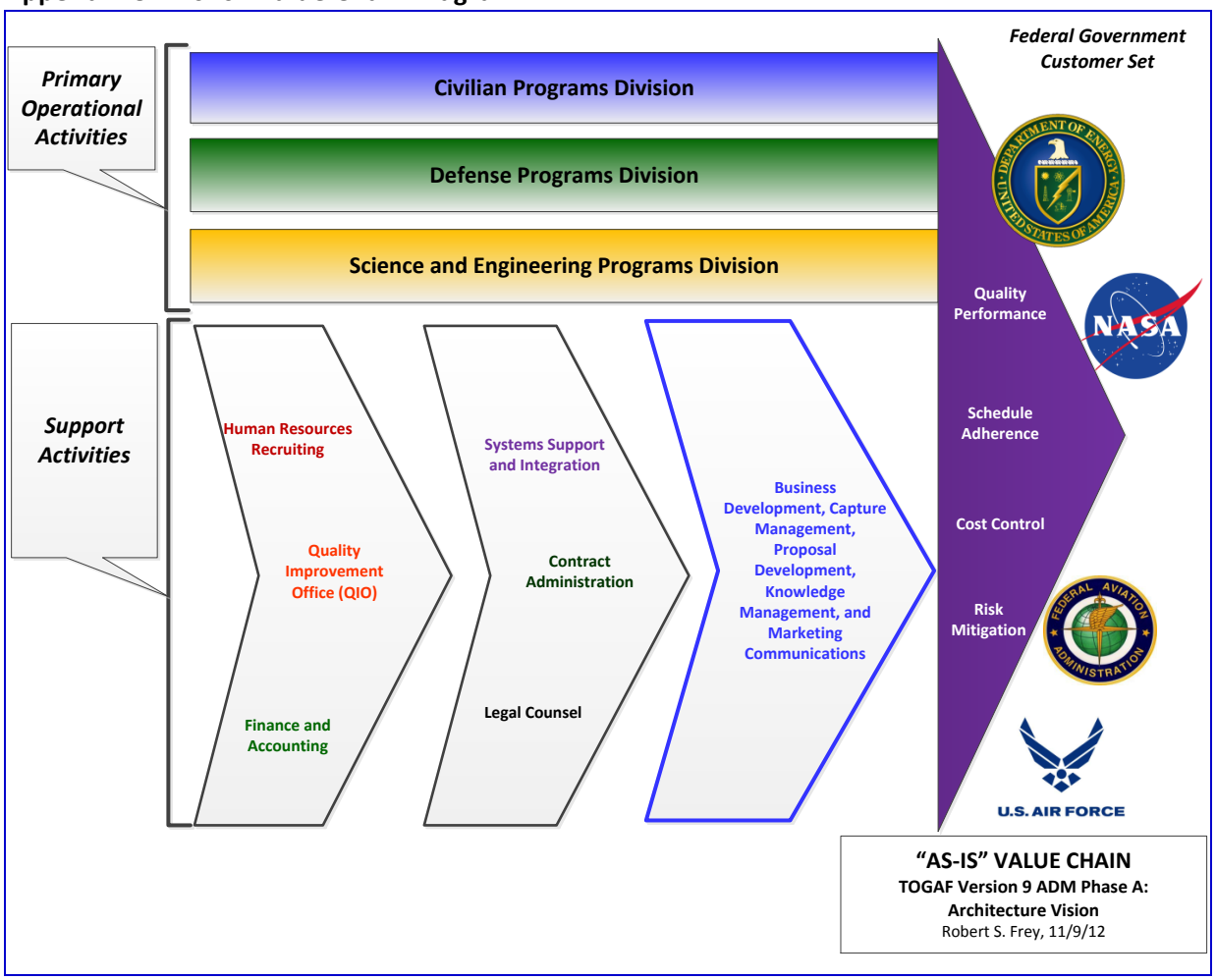


**Appendix B. Stakeholder Map Matrix based upon TOGAF Version 9 ADM Phase A: Architecture Vision.**

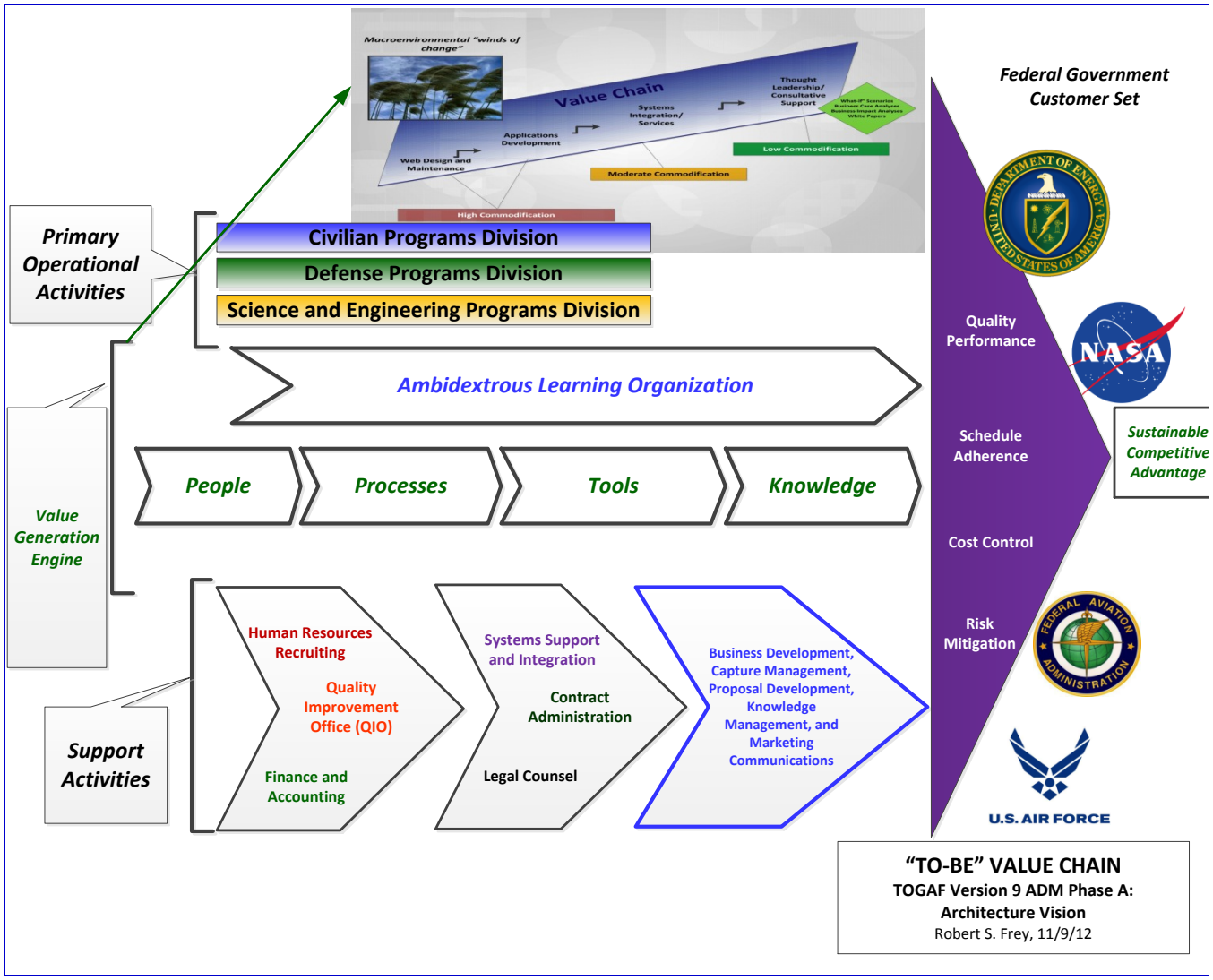
| Stakeholder | Involvement | Class | Relevant ADM Artifacts |
|---|---|---|---|
| Executive Management Team<br><br>President/CEO<br><br>Chief Operating Officer (COO)<br><br>Executive Vice President | This stakeholder group is focused on high-level external drivers, as well as corporate mission, goals, objectives, and strategies that together enhance the company's Earnings Before the Deduction of Interest, Tax and Amortization (EBITDA) expenses. This financial indicator serves as a measure of efficiency, profitability, and corporate business valuation. Perspective: IT architecture must enable the growth of contract backlog through bookings, support profit margin expansion through efficiencies of scale and speed, and enhance cash flow generation. | Keep satisfied. | Stakeholder Map Matrix (TOGAF Version 9, Phase A)<br><br>"To-Be" Value Chain (TOGAF Version 9, Phase A)<br><br>Benefits Diagram (TOGAF Version 9, Phase E) |
| Proposal Team<br><br>Proposal Managers<br><br>Proposal Solution Architect<br><br>Proposal Coordinator | MAJOR ACTORS | Keep generally informed and satisfied. | Stakeholder Map Matrix (TOGAF Version 9, Phase A)<br><br>"To-Be" Value Chain (TOGAF Version 9, Phase A)<br><br>Benefits Diagram (TOGAF Version 9, Phase E) |
| Business Developers | MAJOR ACTORS | Keep satisfied. | Stakeholder Map Matrix (TOGAF Version 9, Phase A)<br><br>"To-Be" Value Chain (TOGAF Version 9, Phase A)<br><br>Benefits Diagram (TOGAF Version 9, Phase E) |

| Stakeholder | Involvement | Class | Relevant ADM Artifacts |
|---|---|---|---|
| Capture Managers | MAJOR ACTORS | Keep satisfied. | Stakeholder Map Matrix (TOGAF Version 9, Phase A)<br>"To-Be" Value Chain (TOGAF Version 9, Phase A)<br>Benefits Diagram (TOGAF Version 9, Phase E) |
| Operations Staff | SECONDARY ACTORS | Keep satisfied. | Stakeholder Map Matrix (TOGAF Version 9, Phase A)<br>"To-Be" Value Chain (TOGAF Version 9, Phase A)<br>Benefits Diagram (TOGAF Version 9, Phase E) |
| Recruiters and Human Resources Specialists | SECONDARY ACTORS | Keep satisfied. | Stakeholder Map Matrix (TOGAF Version 9, Phase A)<br>"To-Be" Value Chain (TOGAF Version 9, Phase A)<br>Benefits Diagram (TOGAF Version 9, Phase E) |
| Proposal Knowledge Engineer | SECONDARY ACTORS | Keep fully informed and satisfied. | Stakeholder Map Matrix (TOGAF Version 9, Phase A)<br>"To-Be" Value Chain (TOGAF Version 9, Phase A)<br>Benefits Diagram (TOGAF Version 9, Phase E) |
| Marketing and Communications Professional | SECONDARY ACTORS | Keep satisfied. | Stakeholder Map Matrix (TOGAF Version 9, Phase A)<br>"To-Be" Value Chain (TOGAF Version 9, Phase A)<br>Benefits Diagram (TOGAF Version 9, Phase E) |

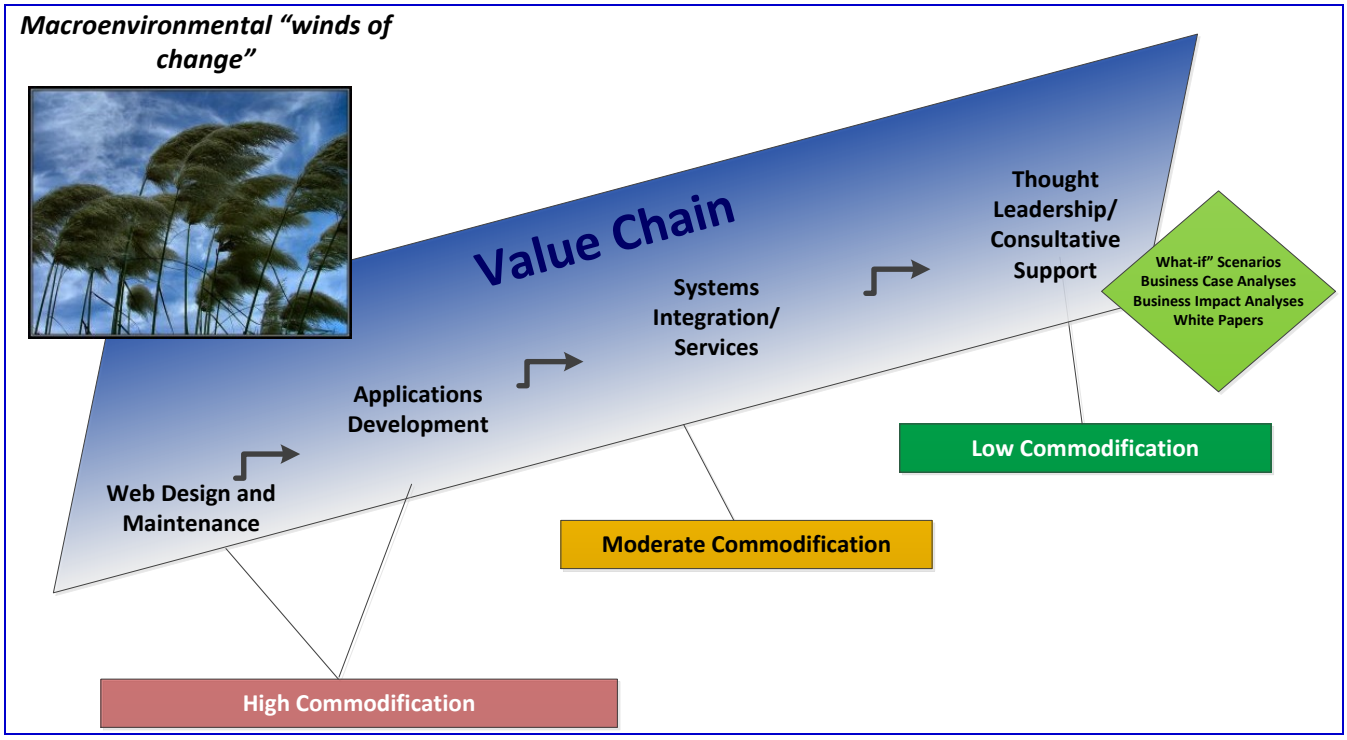
## Appendix C. "As-Is" Value Chain Diagram.



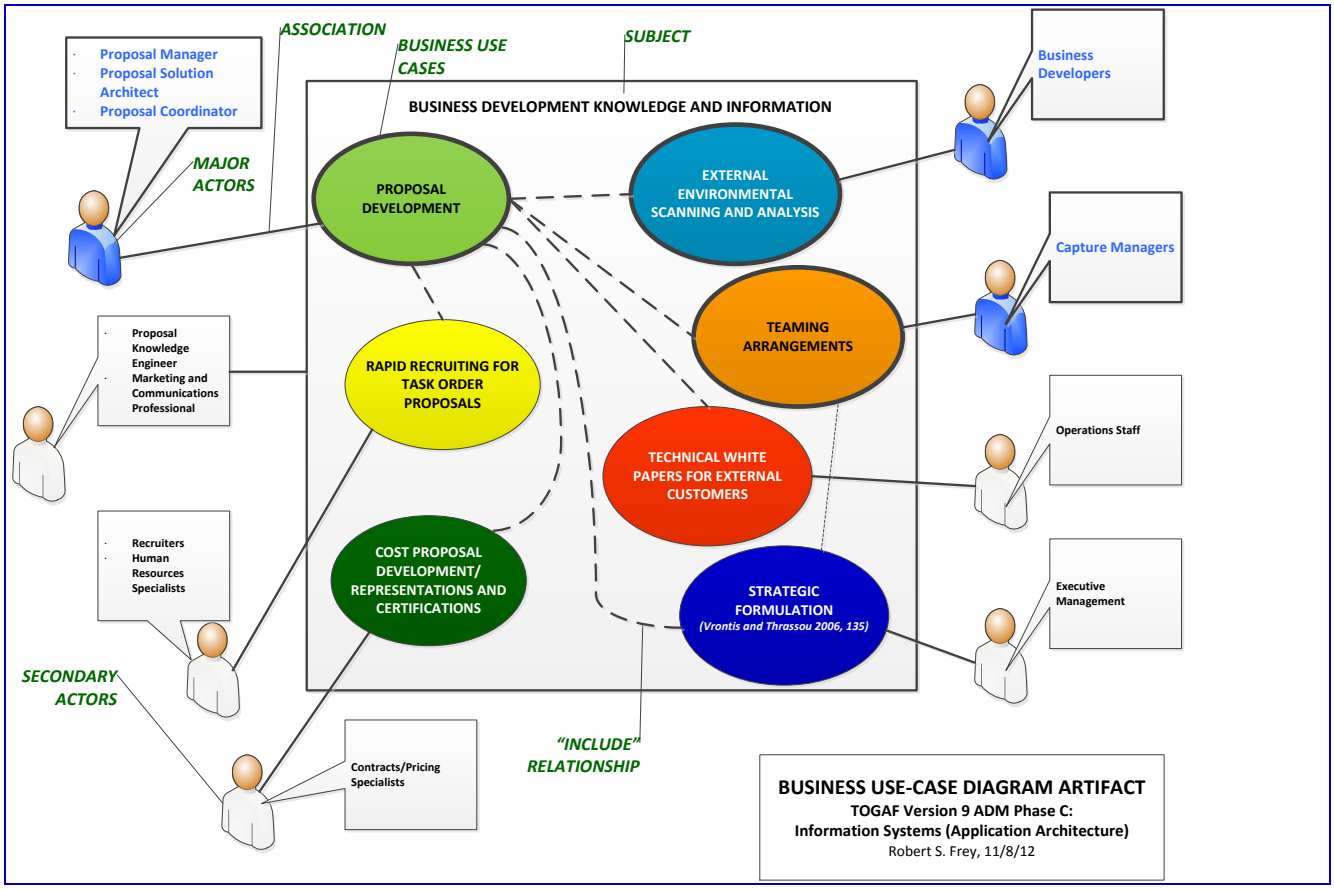
## Appendix D. "To-Be" Value Chain Diagram



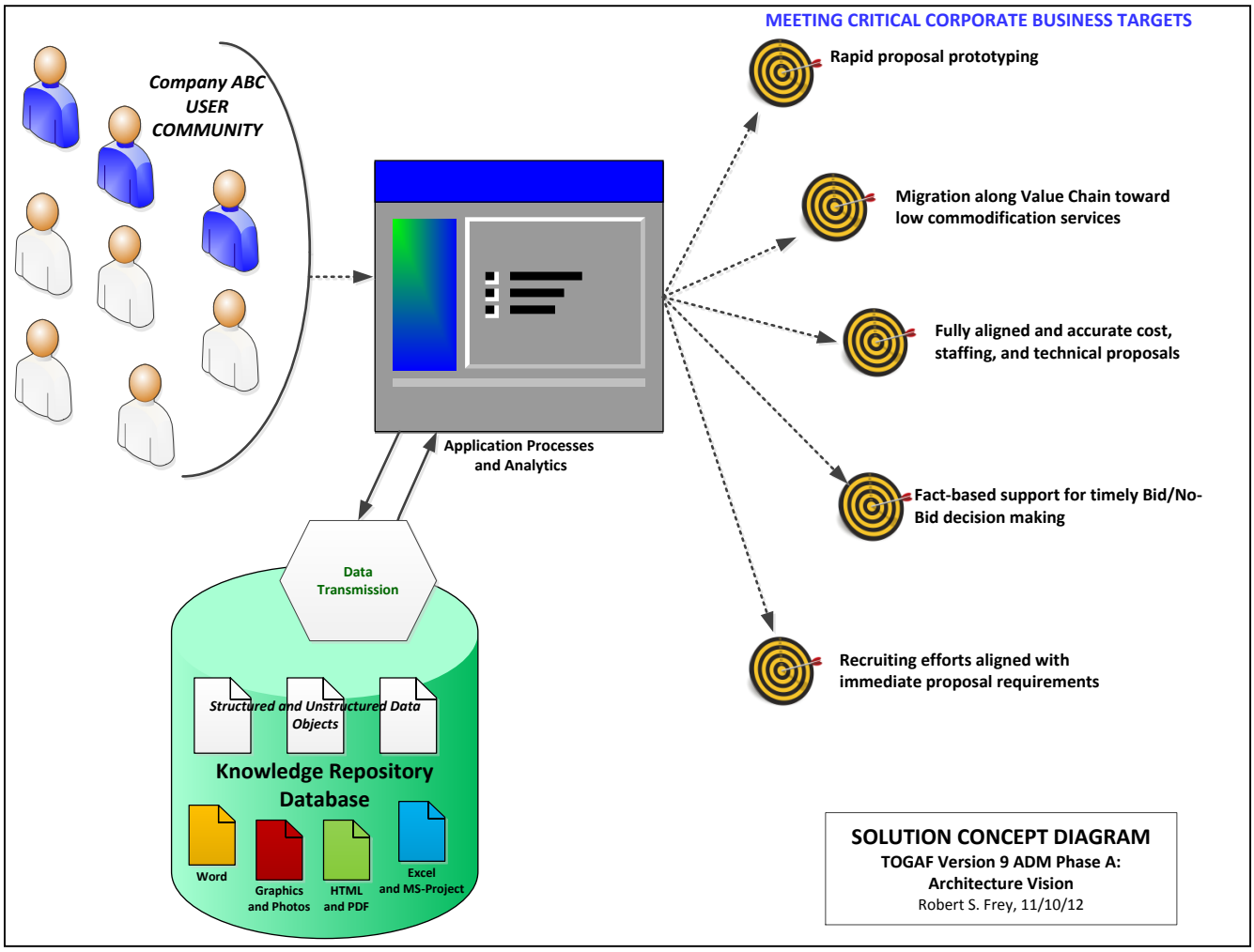
**Appendix E. Focus on Top Segment of Value Generation Engine in Appendix C.**



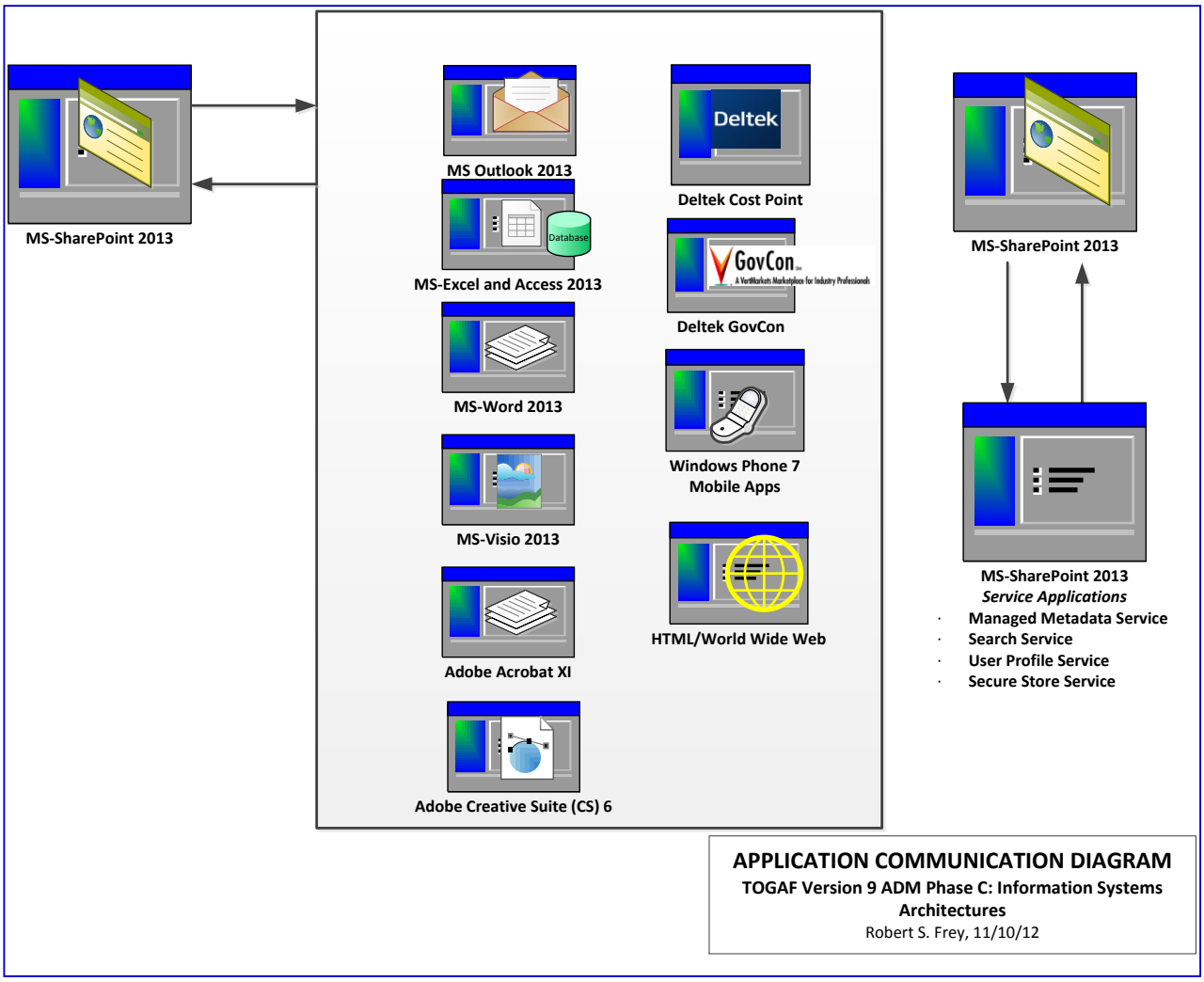
**Appendix F. Business Use-Case Diagram Artifact—TOGAF Version 9 ADM Phase C [adopted from Source Making Teaching IT Professionals].**



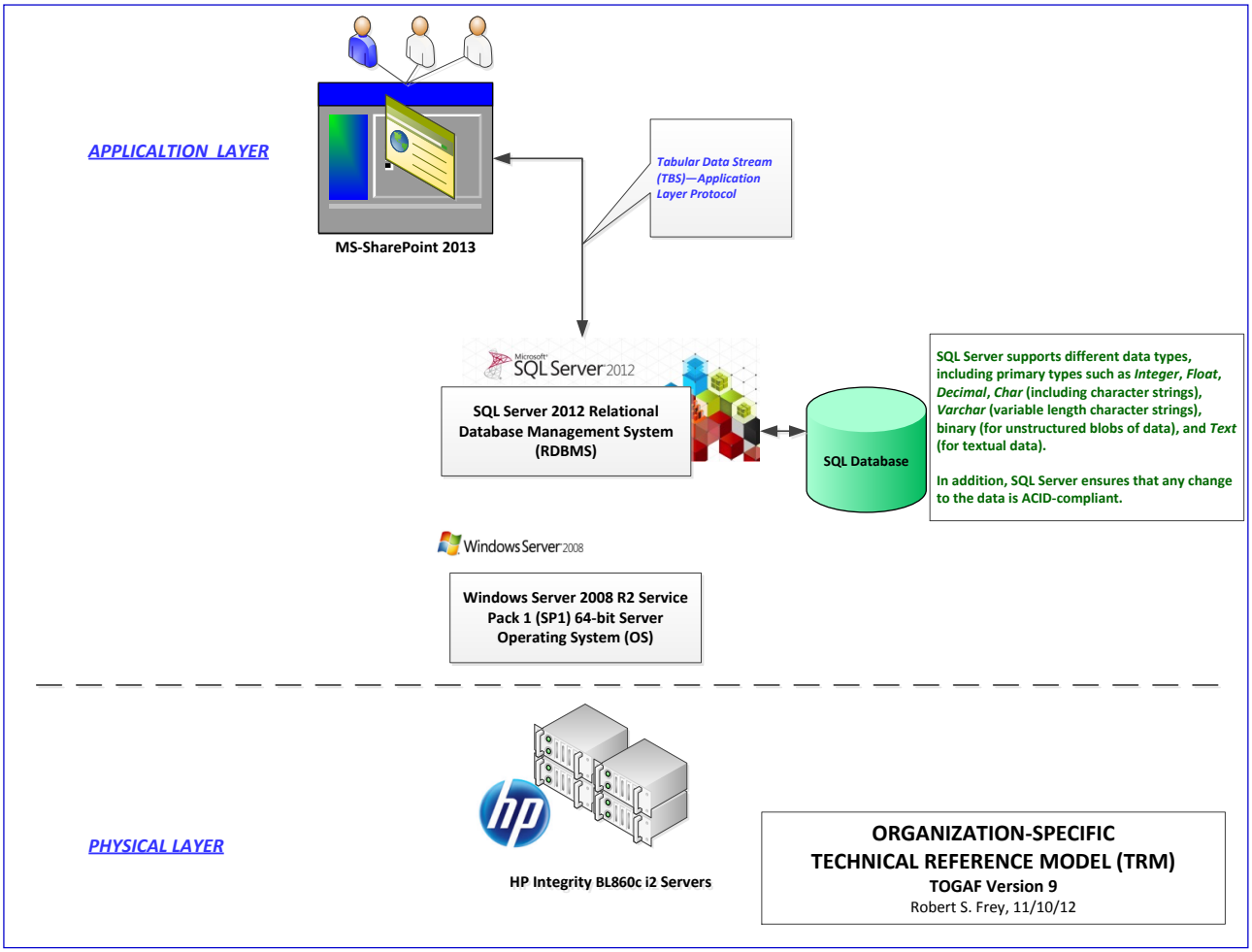
**Appendix G. Solution Concept Diagram, TOGAF Version 9 Phase A: Architecture Vision [adopted from Togaf-Modeling.org (2011)].**



**Appendix H. Application Communication Diagram, TOGAF Version 9 ADM Phase C: Information Systems Architectures. [leverages information from Balkeståhl 2012].**



## Appendix I. Organization-Specific Technical Reference Model (TRM).



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## AUTHOR BIO

**Dr. Robert S. Frey** is Principal/Co-Owner in the consultancy, *Successful Proposal Strategies, LLC,* in Virginia, founded 6 years ago, Dr. Frey has supported customers attain **$3.873 Billion** in funded, multi-year contract awards within defense, civilian, intelligence, and law enforcement agencies. The author of six editions of *Successful Proposal Strategies for Small Businesses* (Boston: Artech House, 2012), he has taught 3,500 small business professionals in proposal development. In addition, he taught proposal and grant proposal development at UCLA, George Washington University, and the University of Texas. Dr. Frey is a 2006 Fellow of the Association of Proposal Management Professionals (APMP). rfrey@proposal23.com

# PATRICK CLIFFORD: ENTERPRISE ARCHITECTURE WITH RESPECT TO AN ENTERPRISE RESOURCE PLANNING SYSTEM INSTALLATION

## EXECUTIVE SUMMARY

My company currently has an Enterprise Resource Planning (ERP) system installed on company-owned infrastructure in our data center. Over the years, as the company has grown and our various business groups needs have evolved, the ERP installation and multitude of interconnecting applications and processes has grown in complexity. We are not able to upgrade to the next version of our ERP and take advantage of new technologies unless we re-implement using more of the core functionality and drastically reduce the number of customizations currently supported by IT.

Our ERP is central to many of our business processes. As such, there are several key enterprise architecture components that must be taken into consideration as the company prepares to move forward. A strong governance model must be in place to ensure alignment of business needs and technology capabilities throughout the reimplementation process and beyond. To meet our anticipated growth needs, we need to implement a scalable infrastructure via a cloud computing model. Information is the lifeblood of any business and we must implement a business intelligence reporting solution that is flexible and adaptable to our growing business. Finally, in order to realize efficiencies in our support organizations, we have to align business processes with the core functionality of the ERP system to attain consistent and repeatable processes that are scalable as the company grows in the future.

## GENERAL BACKGROUND

My company is a global project delivery company providing consulting, design, design-build, operations, and program management services. Our markets are water, environmental, energy, transportation, facilities, and resources. The Global Enterprise Services (GES) organization supports the business in many diverse areas such as Accounting, Legal, Information Technology (IT), Payroll, and Human Resources.

My company exemplifies the diversification operating model. We have few shared customers and suppliers across the business groups. Our business groups are unique, serving many varied clients from the Federal Government to local municipalities to large global businesses. Each division and business group has autonomous business management. Each business group controls their business process design, working in conjunction with a centralized enterprise delivery excellence organization. Where we differ from the general description of the diversification operating model in the Ross text is that we have a central IT organization so few IT-related decisions are made at the business group level.

Company growth over the past several years has been through acquisitions. We have had two sizable acquisitions and several smaller ones and are currently in the process of converting and integrating another large acquisition. With each acquisition, we convert the companies into our

Enterprise Resource Planning (ERP) system and promote (and to a certain extent mandate) the use of our business processes. Historically it often took several years to integrate the acquired companies onto our systems. In the past year, however, management focus has been to convert the acquired companies within a matter of months of the acquisition date. This has meant developing more streamlined conversion and implementation processes.

While the company's focus is on converting and implementing the acquired companies to our financial systems, there are many customizations developed over the years to accommodate our varied business group requirements. These customizations make it very difficult for the GES organization to maintain adequate support of the business as the company continues to grow. With respect to architecture maturity, I feel my company is somewhere between the standardized technology stage and the optimized core stage. I feel that an enhanced EA program, via the reimplementation of an ERP system, will enable the company to move to the optimized core stage thus allowing synergies with respect to standard business processes supported by standard technology platforms.

The company published a Strategy 2015 Roadmap, setting forth a mission statement, vision, and incorporating our corporate values. One of the Strategy 2015 action items is leveraging technology and tools. Two specific enterprise-level internal initiatives related to this action item are GES Efficiencies and ERP Upgrade. To this end, management is focused on upgrading our current ERP to allow the GES organization to better support the company's vision to grow over the coming years.

## IDENTIFICATION OF MAJOR ARCHITECTURE ISSUES

1. Need for Strong Governance

   The reimplementation of our ERP is a major endeavor and strong governance is required throughout the process (and beyond) to ensure business processes and technology capabilities are aligned.

2. Cloud Computing

   As my company looks to grow in the coming years, we need a platform solution that will be scalable to meet our business needs.

3. Business Intelligence Infrastructure

   My company needs to implement a data warehouse and business intelligence reporting capability that is more flexible, timely, and responsive to business needs.

4. Standard Business Processes using ERP Functionality

   Due to past implementation and set-up issues in our ERP, many business processes are disjointed and involve manual efforts.

## ISSUE 1 – NEED FOR STRONG GOVERNANCE

**BUSINESS CASE:** Reimplementation of our ERP is a major endeavor; it is anticipated that our implementation will take about 18 months. In my company, the ERP is a major component of our core business processes – for example, procurement and commitment reporting, accounts payable, fixed assets, accounts receivable, client billing, project financial reporting, general ledger, and company financial reporting.

In our current environment, we have the following characteristics that have built up over time to create the complex systems we have today:

- About 375 ERP customizations
- About 126 custom interfaces/applications
- About 20 vendor interfaces/applications
- About 70 custom web applications

We have very aggressive plans to reduce the numbers in each of these areas and achieve the following goals:

- A simplified, robust and flexible application architecture that enables business growth strategy
- Eliminate duplicate and redundant business systems that add complexity and inhibit flexibility
- Create a cost efficient ERP system that separates Federal and Commercial business‡

The business processes must be aligned with the technology capabilities to realize the full efficiencies and benefits of the ERP reimplementation. Only through a strong governance process will we be able to realize these aggressive goals.

**BASE ARCHITECTURE:** There are currently two methodologies that constitute governance in my company today. For large IT projects anticipated to take more than 80 hours, there is a project portfolio management program. These projects require a business case with anticipated cost and efficiency benefits and are reviewed and prioritized by upper management to determine prioritization and allocation of IT resources.

For smaller initiatives, there are various change control boards that meet periodically to review and approve application change requests submitted by users. The change control boards are made up of application owner and IT representatives. The change requests are reviewed, approved, and scheduled for deployment based on future production code move dates.

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‡ Obtained from a PowerPoint presentation for my company entitled "IT Roadmap and Alignment to Strategy 2015"

A more formal governance model must be in place for the ERP reimplementation initiative in order to ensure business processes and the technology capabilities remain aligned throughout the implementation process and also into the future.

**TARGET ARCHITECTURE**: Phase G of the TOGAF architecture framework "defines how the architecture constrains the implementation process… [and]…monitors it while building it" (Harrison 2011, 88). One key activity in this phase is providing "architectural oversight for the implementation" (Harrison 2011, 88). A tool for this oversight is an "IT engagement model…[which is]…the system of governance mechanisms assuring that business and IT projects achieve both local and company-wide objectives" (Ross, Weill, and Robertson 2006, 119). As noted by Ross, Weill, and Robertson, there are three components to an effective IT engagement model:

1. Companywide IT governance
2. Project management
3. Linking mechanisms

Figure 1 provides a visual representation of an IT engagement model (Coster, 2011). For my company, the important aspect of the IT engagement model is that all three levels (strategic, tactical, and operational) are coordinated and aligned throughout the ERP reimplementation process.

The Open Group addresses several aspects and layers of governance in an organization. One level is the Architecture Board:

A key element in a successful architecture governance strategy is a cross organization Architecture Board to oversee the implementation of the strategy. This body should be representative of all the key stakeholders in the architecture, and will typically comprise a group of executives responsible for the review and maintenance of the overall architecture (The Open Group 2008, 637).

A formal architecture established at the beginning of the ERP reimplementation project will contribute to the overall success of the effort.

Gap Analysis: While the current methodologies for governance have an aspect of formality, a determination needs to be made as to where and whether these methodologies will fit into the governance model.

## ISSUE 2 – CLOUD COMPUTING

Business Case: My company' Strategy 2015 roadmap anticipates employee growth from about 23k in 2011 to 40k in 2015. A fair percentage of this growth will come from acquisitions and the associated conversions of the acquired company financial systems onto our ERP platform. We also plan to implement a global instance of our ERP that will include financial applications and a Human Resources Management System. As such, we must look at a solution that will be scalable to meet these growth needs.

One service level offered by the cloud computing model is Software as a Service (SaaS). There are several benefits of SaaS:

- Easier administration
- Automatic updates and patch management
- Compatibility: all users will have the same version of software
- Easier collaboration, for the same reason
- Global accessibility (Search Cloud Computing 2006)

In support of the above, my company makes reference to the following benefits of implementing our ERP in an on demand platform: Regulatory Updates, Tax Updates, Bug fixes and patches, Security Updates.§ In order to take advantage of future product enhancements, we have to re-implement the ERP with an eye toward the future ability to upgrade and stay current with technology changes.

**BASE ARCHITECTURE**: My Company currently maintains a central data center at our corporate headquarters in Denver, Colorado. We also maintain a hot site back-up data center about 15 miles north of our main data center. As we look at growing over the next three years and beyond, we have to take into consideration the need to purchase additional infrastructure to support the anticipated growth. We will also have to purchase corresponding infrastructure to support our disaster recovery and business continuity plans. The purchase of the hardware and the personnel costs to support the data centers is a costly proposition.

In addition, we have developed many custom software applications that we use in our company. All of these are supported and maintained by our IT organization. An assessment must be done as to the continued maintenance and support of these applications.

**TARGET ARCHITECTURE**: My Company needs a scalable ERP solution to support anticipated company growth, streamline business processes, and more quickly integrate future acquired companies. In addition, my company does a lot of work for the Federal government. As such, we must adhere to stringent data security requirements. As a part of the move to a cloud computing platform, my company must adopt a security solution which will address access controls to both applications and data and reduce exposure to potential internal fraud or external security threats.

**GAP ANALYSIS:** Understand the ERP SaaS solution and the integration of our internal software applications using a Service-Oriented Architecture (SOA) methodology. My company will make use of some of our existing tools and applications. SOA will allow for a seamless integration of these tools and applications into the ERP.

## ISSUE 3 – BUSINESS INTELLIGENCE INFRASTRUCTURE

Business Case: Complete, accurate, and timely information is very important to businesses. “Today, it is generally accepted that effective business performance measurement and monitoring can be achieved only through optimized use of information” (Godinez et al 2010, 383). In addition, “today’s global economy demands that organizations adapt to both the constantly changing needs of the

§ Obtained from a PowerPoint presentation for my company entitled “IT Roadmap and Alignment to Strategy 2015"

business and their customers" (Godinez et al 2010, 359). My company uses data from our ERP to report on many aspects of project performance: revenue, labor hours, direct expenses, indirect expenses, gross margin, purchase orders and associated commitments, estimates to completion forecasting, and client invoicing and receivables. This information is important to understanding project profitability in order to assess business group performance. We make use of a pivot table reporting tool to analyze financial performance at different levels: operating entity, region, division, business group, and down to individual department. To be useful, the data must come from a single version of the truth and must be consistent across time periods in order to accurately spot and analyze trends.

**BASE ARCHITECTURE:** In order to support our business intelligence reporting today, we have many systems in place. We developed and continually maintain an internal data warehouse sourced from our ERP. Many applications and reporting tools source their data from the data warehouse. The focus of the data warehouse is on current open and active projects. Data associated with closed projects "fall out" of the data warehouse based on set time period criteria. One of our business groups has special reporting requirements based on the needs of their projects. A custom reporting application was developed to meet their needs. Ad hoc reporting by individual departments is done using Access queries against the data warehouse using Open Database Connectivity links. Completeness, accuracy, and consistency of reporting can be impacted based on the knowledge and experience of the individual developing the Access queries.

**TARGET ARCHITECTURE:** To meet the company's growing need for information, we need to "enable the collection…of data from the business as it happens, so it can be analyzed and made available to employees, business processes, and applications to help drive decisions across the enterprise" (Godinez 2010, 362). There are several key capabilities involved:

- Speed and low latency - …system must provide answers to ad-hoc queries within the particular requirements for right-time.
- Scalability – The deployed infrastructure must be able to serve everyone in the organization who is involved in the key operations of daily business and scale easily as the number of applications grows.
- Flexibility - …infrastructure must support a variety of schemas and queries to meet the business needs…
- Embedded insights – These provide real time analytics that can be embedded in business processes (Godinez 2010, 362).

Much of our reporting today is based on the periodic data warehouse refresh schedule. Reports are generated weekly or monthly based on this schedule. There is no flexibility with this reporting. We need to have reporting capability that is timelier with respect to business needs.

Given my company's focus on growth over the next several years, especially via acquisitions, we need a system that is scalable to meet the increased data input and data users.

With our different business groups and their individual reporting needs, we need a business intelligence infrastructure that is flexible. Business groups must be able to obtain the reports they need in the way they need to see them, without IT involvement to provide customized reporting.

Standard reports based on industry and company best practices should be readily available. Ad hoc reporting should also be available but should be structured such that completeness and accuracy of the data is preserved.

The reporting generated today is available to those in offices who have access to our internal Virtual Office website. Many of our employees are mobile and traveling or are out at project sites with limited access to our network. We need a solution that will allow employees to access the reports they need using their smart phones or other mobile device.

**Gap Analysis:** Perform a detailed inventory of the current reporting in place today and map these to the capabilities available in the planned business intelligence solution.

## ISSUE 4 – STANDARD BUSINESS PROCESSES USING ERP FUNCTIONALITY

**BUSINESS CASE:** Business processes supported by standard technology capabilities are important to realizing efficiencies in the GES organization. Data must flow between the steps in the business processes. An example is the full beginning to end payment process, from the initial company bank set-up, employee/vendor bank set-up, supplier and employee expense reimbursement payments via check or Automated Clearing House (ACH), upload of the payment files to the bank, download of cleared payments from the bank, and the monthly reconciliation of the company bank accounts.

**BASE ARCHITECTURE:** Due to set-up issues done many years ago, we have not been able to take advantage of the full beginning to end functionality available in the ERP for this process. Workarounds are in place for company bank set-up. Vendor and employee bank account set up for electronic payments is done with support of an internal customization. The positive pay and ACH payment files are also the product of an internal customization. Because of how the bank set ups are done in the ERP, we are not able to receive automated cleared check files from the bank to reflect our checks as cleared in our system. The bank reconciliation process done by the general ledger group requires manual effort. Research in support of the escheatment process is also very manual.

**TARGET ARCHITECTURE:** In our ERP system, the Treasury, Accounts Payable, Cash Management and General Ledger modules together support the beginning to end process for bank set-up, supplier payments, and eventual bank account reconciliation. See Figure 2 and Figure 3 for the Role/System Matrix and the System/Function Matrix, respectively. The Role/System Matrix "depict[s] the relationship between systems…and the business roles that use them within the enterprise" (The Open Group 2008, 433). The System/Function Matrix "depict[s] the relationship between systems…and business functions within the enterprise" (The Open Group 2008, 434). These matrices provide a visual for the systems and associated business functions and roles and help ensure the impacted areas of the business have been identified.

**GAP ANALYSIS:** The main aspect to success in this area is the full understanding of each module and the upstream and downstream impacts each has on the others.

There are many other business processes that must be analyzed as part of the ERP reimplementation. The base architecture, target architecture and a gap analysis will have to be

performed for each business process to ensure the technology capabilities enabled by the ERP reimplementation sufficiently meet the needs of the business.

## RECOMMENDED SOLUTIONS

### SOLUTION TO ISSUE 1: NEED FOR STRONG GOVERNANCE

**RECOMMENDED SOLUTION:** Develop an overall company IT governance model. As part of developing the IT governance model, upper management must set the tone for the importance of governance in the company. "Governance reflects the leadership and organizational structures and processes that ensure IT sustains and extends the organization's strategies and objectives" (Raghupathi 2007, 96). To this end, I recommend the company adopt the Control Objectives for Information and related Technology (COBIT) framework. COBIT "supports IT governance by providing a framework to ensure that:

- IT is aligned with the business
- IT enables the business and maximises benefits
- IT resources are used responsibly
- IT risks are managed appropriately" (IT Governance Institute 2007, 6)

"Good IT Governance ensures that the IT group supports and extends the company strategies and business objectives" (Godinez et al 2010, 64). Given the enormity of the ERP reimplementation and the planned assertive stance in reducing the number of customizations, a formal IT governance model is warranted.

Formal goals and objectives must be set for the IT governance board. From The Open Group TOGAF 9, there are several key responsibilities and goals for the board to achieve:

- Flexibility of enterprise architecture:
- To meet changing business needs
- To leverage new technologies
- Enforcement of Architecture Compliance
- Improving the maturity level of architecture discipline within the organization
- Ensuring that the discipline of architecture-based development is adopted
- Providing the basis for all decision-making with regard to changes to the architectures (The Open Group 2008, 638)

A formal IT governance board will help ensure the company achieves the most benefit from implementing the ERP in support of business goals. Figure 4 shows a proposed matrix of participants in a governance board for my company.

**ALTERNATIVES:** Due to the critical nature of the ERP to our current and future business processes, I feel there is no alternative to a formal IT governance model as outlined above. A less formal governance model would lead to potential divergences from the overall enterprise architecture envisioned by the Chief Information Officer.

## SOLUTION TO ISSUE 2: CLOUD COMPUTING

**RECOMMENDED SOLUTION:** mplement a global ERP using an on-demand/SaaS model. Critical to this is the focus on implementing the ERP using the core functionality with only necessary customizations to support the needs of the business. With respect to implementing a cloud platform, effective IT governance is necessary "to adapt easily. Flexibility, scalability and services are changed in a cloud computing environment, enabling the organization and business practices to adjust to create new opportunities and reduce cost" (Vael 2012). Aligning business processes with the standard functionality will allow us to take advantage of system upgrades and patches that may not otherwise be available in a more customized environment. A flexible and scalable system will allow us to more effectively and efficiently implement and convert acquired companies to our systems and processes in order to realize a quicker return with respect to IT systems and personnel.

In conjunction with this, we must ensure adequate security controls are in place for company data. It is recommended that companies adopt a formal framework to assess their security needs when looking at a cloud platform solution:

Elements that should be considered for inclusion in this framework are governance, a focus on the protection of data, security policy and audit measures, management of problems, management of vulnerabilities, a focus on the authentication of users and the protection of physical assets and locations (Coleman 2011, 35).

Given the above, my company will have to work closely with the cloud computing service provider to set specific roles and responsibilities with respect to application and data security.

**ALTERNATIVES:** Implement the ERP on our current infrastructure and ensure processes are in place to monitor and gauge network load, application availability, and response times from multiple locations to ensure there is minimal service degradation. We are a global company so need to ensure our systems meet the needs of our worldwide user population. Even with this alternative approach, we would still have to ensure we implemented a solution focused on the core functionality in order to take advantage of the need for adaptability, scalability, and flexibility.

## SOLUTION TO ISSUE 3: BUSINESS INTELLIGENCE INFRASTRUCTURE

**RECOMMENDED SOLUTION:** Poll each business group and the various GES departments with respect to their reporting needs. Link each reporting requirement to a specific business need or process to ensure complete understanding of the end objective. Analyze if there are other alternatives with respect to providing the required reporting (i.e., alternatives supported by standard functionality vs. customizations).

In conjunction and in addition to the above, I suggest looking at industry best practices for ideas with respect to reporting. Godinez et al state that "organizations often turn to proven industry-specific solution templates as a starting point for their BI efforts" (Godinez et al 2010, 367). Godinez et al go on to further state "these blueprints are based on successful implementation experiences with organizations in that industry… and they ensure that the DW structures are based on industry best practices…" (Godinez et al 2010, 367). My company is one of several large companies in our

industry. I believe we can learn from the various best practices and this will enable us to implement a solution that will serve us for many years to come.

**ALTERNATIVES:** While not ideal, implement the various vanilla reports available with the ERP installation. This will meet the majority of the needs in the GES organization – trial balance reports, account reconciliation analyses, payment registers, aging reports, etc. This will most likely not be adequate for our business groups and their unique reporting needs with respect to running their businesses.

## SOLUTION TO ISSUE 4: STANDARD BUSINESS PROCESSES USING ERP FUNCTIONALITY

**RECOMMENDED SOLUTION:** Develop a full inventory of business processes and associated ERP functionality. Phase B of TOGAF suggests documenting a Business Service/Function Catalog to "identify new capabilities required to support business change or may be used to determine the scope of change initiatives, applications, or technology components" (The Open Group 2011). Figure 5 shows the start of a Business Service/Function Catalog for my company.

**ALTERNATIVES:** Oftentimes ERP applications will come with preset defaults based on best practices or what will work for most company installations. These default settings provide baseline functionality within and among the various modules. While not ideal, using the default settings will give us basic functionality for implementation and will allow us to move forward.

## ROADMAP

Provided below is a high level roadmap for each of the proposed solutions discussed above.

| | |
|---|---|
| Develop Governance Model – estimated time 3 months | 1. Assemble a team to review and document an IT governance model using the COBIT framework.<br><br>2. Present proposed IT governance model to upper management to get buy-in and support.<br><br>3. Organize approved governance board and hold initial meeting to introduce members and go over responsibilities of the board. |

| | |
|---|---|
| Cloud Computing – estimated time 3 months | 1. Negotiate agreement with cloud computing provider, including the high level categories of "service level agreements, data processing and storage, infrastructure/security…[,and]… vendor relationship" (Trappler 2010).<br><br>2. Detail out responsibilities with respect to application and data security. Ensure clear hand-offs to preserve data integrity and security.<br><br>3. Develop application security for all system users. See Figure 6 for a sample Data Security Matrix. |
| Business Intelligence – estimated time 3 months | 1. Poll business groups regarding their reporting requirements. Ensure the following aspects are gathered:<br><br>Frequency of reporting<br><br>Data requirements<br><br>Sources of data<br><br>2. Poll the GES organization regarding their reporting requirements. Capture the same information as noted above.<br><br>3. Document understanding of the business needs for each of the reporting requirements.<br><br>4. Gather industry best practices with respect to business intelligence reporting. |
| Business Processes using standard ERP functionality – estimated time 3 months | 1. Inventory business processes currently supported by the ERP. Use the Business Service/Function Catalog to provide a framework.<br><br>2. Inventory ERP system functionality. Use the Role/System Matrix and the System/Functional Matrix to provide a framework.<br><br>3. Document alignment between the business processes identified and the ERP system functionality.<br><br>4. Document the gaps identified and work toward resolution.<br><br>5. Functional owner training of the ERP functionality will need to be scheduled in order to gain proficiencies with the new functionality. |

## APPENDIX

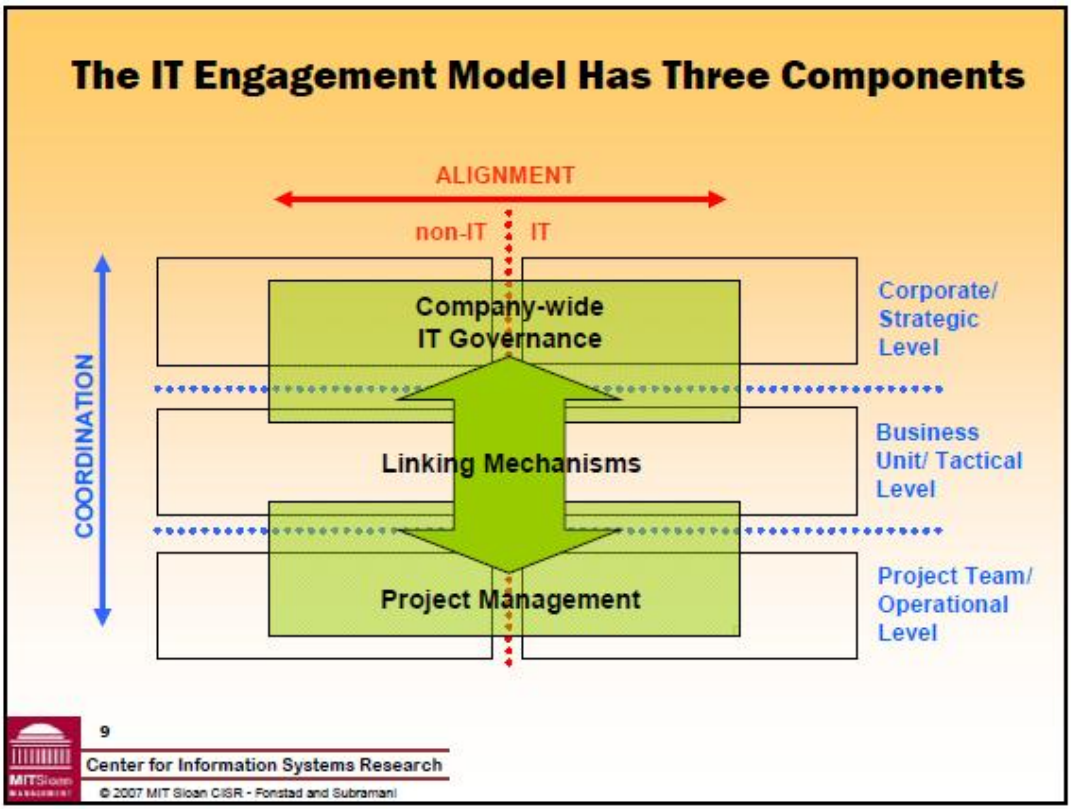


Figure 1

FIGURE ABOVE OBTAINED FROM AN ONLINE BLOG POSTED BY FRANK COSTER – REFERENCE CITED IN THE REFERENCES SECTION.

| Role/System Matrix | | | |
|---|---|---|---|
| Application (Y-Axis) and Function (X-Axis) | Treasury Analyst | Accounts Payable Clerk | General Ledger Accountant |
| ERP Treasury Module | X | | |
| ERP Accounts Payable Module | | X | |
| Bank Software | X | X | |
| ERP Cash Management Module | | | X |
| ERP General Ledger Module | | | X |

Figure 2

**System/Function Matrix**

| Application (Y-Axis) and Function (X-Axis) | Company Bank Setup | Vendor/ Employee Bank Setup | Check Payment Runs | ACH Payment Runs | Positive Pay File Upload | ACH Payment File Upload | Cleared Check Download | Bank Account Reconciliation |
|---|---|---|---|---|---|---|---|---|
| ERP Treasury Module | X | | | | | | | |
| ERP Accounts Payable Module | | X | X | X | | | | |
| Bank Software | | | | | X | X | X | |
| ERP Cash Management Module | | | | | | | X | |
| ERP General Ledger Module | | | | | | | | X |

Figure 3

Proposed make-up of governance board

| Position | Role |
|---|---|
| Chief Financial Officer | Overall responsibility for the financial reporting for the company as supported by the ERP system |
| Chief Information Officer | Overall responsibility for Enterprise Architecture vision for the company |
| Director/Project Manager - ERP Implementation | Overall responsibility for the ERP implementation and the applicable support of the Enterprise Architecture vision |
| Business Group Finance representation | Business group input - would look at business group input with respect to their applicable division within the company. Finance personnel aware of operational needs and accounting needs for their respective areas. |
| Global Enterprise Services - high level representation | Entails representation from the main areas: Accounting, Human Resources, Tax, Payroll |
| Global Enterprise Services - representation in support of individual areas | Representation from the owners of the individual application areas (Procurement, Accounts Payable, Accounts Receivable, General Ledger, Project Accounting, etc.) |

Figure 4

| Business Service/Function Catalog | | | |
|---|---|---|---|
| Organization Unit | Business Function | Business Service | Information System Service |
| Accounts Payable | Check payments | Check payment schedule | ERP payment run functionality |
| Accounts Payable | ACH payments | ACH payment schedule | ERP payment run functionality |
| Accounts Payable | Vendor invoice processing | Manual entry or upload capability | ERP invoice entry capability |
| Project Accounting | Paper-based client invoices | Client invoice schedule | ERP Project Billing functionality |
| General Ledger | Balance Sheet Account Reconciliation | Monthly reporting schedule | ERP Subledger detail reporting |
| Accounts Receivable | Application of client payments | Daily posting of payments | ERP Accounts Receivable and Payment application |

Figure 5

| Data Security Matrix | | | | | |
|---|---|---|---|---|---|
| Actor | Job Function | Function | Business Service | Location | Type of Access |
| Data Entry Clerk | Data Entry | Entry of Data into ERP | Accounts Payable | GES Center - Denver, CO | Add, Change |
| Payment Processing Clerk | Payment Processing | Paying of invoice from ERP | Accounts Payable | GES Center - Denver, CO | Add, Change |
| Project Accountant | Project accounting | Client invoicing | Project Accounting | U.S. | Add, Change |
| Project Support Specialist | Project support | Supporting project | Business groups | U.S. | Inquiry only |
| Customer Service Associate | Vendor inquiries, PO adjustments, release of invoices from hold | Employee, vendor, and project support | Accounts Payable | GES Center - Denver, CO | Add, Change |
| General Ledger Accountant | Account reconciliation | Reconciliation of all balance sheet accounts | General Ledger | GES Center - Denver, CO | Add, Change |

Figure 6

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## AUTHOR BIO

Patrick K Clifford graduated from the University of Denver in 1986 with a major in Accounting. Patrick has many years experience in financial auditing and Accounts Payable management. He is currently working for a large global engineering and consulting firm in Englewood, CO. He is actively working on the reimplementation of the company's ERP system.

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