



IT Consumerization & Enterprise Architecture: An Exploratory Case Study

by

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Abstract

IT Consumerization is the phenomenon of consumer-originated and consumer-oriented technologies entering organizations and their corresponding organizational impacts, risks, and opportunities. IT Consumerization has fundamentally changed the way organizations respond to the technology needs of business users as well as the corresponding governance, management, and operational maintenance of information technology. Enterprise Architecture (EA), a practice and body of knowledge that views organizations and enterprises through architectural layers, has been posited as an effective tool in supporting the needs of IT Consumerization. This thesis addresses the question of what roles EA can play in the context of IT Consumerization as well as the general effectiveness and comprehensiveness of current EA frameworks in addressing IT Consumerization needs. Using a single case study design, this research study applied directed content analysis and a deductive thematic analysis approach to answer these questions. The initial set of codes and themes were derived from sensitizing concepts within The Open Group Architectural Framework (TOGAF). Findings from this research suggest that IT Consumerization is a complex domain characterized with unpredictability, unknown decision variables, and no single correct answer in the context of problem solving and decision making. Our research suggests that in order for an EA practice to help in IT Consumerization initiatives, organizations must ensure that EA practices are not limited to technical problem solving, and that they have the resources and skills required for business problem solving. While EA has often been positioned as an information technology function within many organizations, we argue that based on our findings, EA's role within organizations can go beyond this traditionally technical focus, to include both advisory and strategic roles leveraging business skillsets to solve business problems. Our EA role framework is a significant departure from the widespread belief that EA practices start at the translation of business strategy to technology strategy, by proposing that EA can play a valuable role earlier in strategic processes such as business strategy development, direction setting, and change prioritization. This inquiry highlights some of the key interrelationships between EA and IT Consumerization.

Table of Contents

Abstract.....	ii
Table of Contents.....	iii
Table of Figures.....	vi
0 Abbreviations and Acronyms.....	vii
1 Introduction.....	1
1.1 Context.....	1
1.2 Research Motivation.....	3
1.3 Research Objective & Questions.....	4
1.4 Overview of the Methodology.....	4
1.5 Structure of the Thesis.....	5
2 Literature Review.....	6
2.1 IT Consumerization Perspectives.....	6
2.1.1 Market Perspective.....	6
2.1.2 Individual Perspective.....	9
2.1.3 Organizational Perspective.....	11
2.1.4 Industry Perspective.....	12
2.2 IT Consumerization Strategies.....	12
2.3 IT Consumerization and Change.....	16
2.4 Enterprise Architecture.....	17
2.4.1 Federal Enterprise Architecture Framework (FEAF).....	20
2.4.2 Zachman Framework for Enterprise Architecture.....	23
2.4.3 The Open Group Architecture Framework (TOGAF).....	25
2.4.4 Gartner Enterprise Architecture.....	27
2.4.5 Lens of Analysis - Framework Effectiveness.....	28
3 Methodology.....	29
3.1 Research Design.....	29
3.2 Data Collection.....	30
3.3 Directed Content Analysis.....	32
3.3.1 Deductive Thematic Analysis.....	33
3.3.2 Semantic and Latent Themes.....	34
3.3.3 Coding Methods.....	34
3.4 Research Validity Criterion.....	35

3.4.1 Validity and Credibility	35
3.4.2 Reliability and Dependability	35
3.4.3 Generalizability and Transferability	36
3.4.4 Objectivity and Conformability	37
3.5 Ethical Concerns and Procedures.....	37
3.5.1 Voluntary Participation and Informed Consent.....	37
3.5.2 Professional Integrity and Safety of Participants.....	38
3.5.3 Silencing and Plagiarism.....	39
4 Empirical Findings	40
4.1 Lens of Analysis - The Cynefin Framework	40
4.1.1 Simple Context	41
4.1.2 Complicated Context.....	42
4.1.3 Complex Context.....	42
4.1.4 Chaotic Context.....	43
4.2 IT Consumerization is Complex.....	43
4.2.1 Unpredictability	43
4.2.2 Unknown Unknowns.....	45
4.2.3 Lack of a Single “Right Answer”	47
4.2.4 Failing When Trying to Impose Order	50
4.2.5 Success Through Probe, Sense, and Respond.....	53
4.3 An EA Role Framework for IT Consumerization.....	57
4.3.1 IM/IT Architect	59
4.3.2 Advisor	63
4.3.3 Strategist.....	66
4.3.4 Potential Maturity Paths of EA.....	70
4.4 Summary of Empirical Findings.....	72
5 Discussion.....	73
5.1 Theory Matching.....	73
5.1.1 What Function Does EA Play In The Context of IT Consumerization?	73
5.1.3 How Well Do Current EA Practices and Frameworks Support IT Consumerization?.....	74
5.2 Key Takeaways and Recommendations.....	79
5.2.1 IT as a Complex Decision Making Context	79
5.2.2 EA Role Perspectives as a Guiding Framework.....	79

5.3 Limitations of the Study	81
5.4 Suggestions for Further Research	82
6 References	84
7 Appendix	90
7.1 Interview Questions	90
Enterprise Architecture.....	90
IT Consumerization	90
7.2 An EA Role Framework for IT Consumerization.....	92
7.3 Ethics Approval	93

Table of Figures

Figure 1 – How Technologies are Introducing into Organizations- (Leclercq-Vandelannoitte, 2015).....	8
Figure 2 - Conceptualizing Consumerization Through Ownership and Purpose - (Niehaves et al., 2012) .	10
Figure 3 - Examples of IT Consumerization.....	13
Figure 4 - IT Consumerization Strategies - (J. Harris et al., 2012)	14
Figure 5 - EAM Implementations in Literature - (Löhe & Legner, 2014).....	19
Figure 6 - Federal Enterprise Architecture Framework - (US Office of Management and Budget, 2012)..	21
Figure 7 - Zachman Framework for Enterprise Architecture – (Zachman, 2008)	24
Figure 8 - TOGAF 9 Components - (The Open Group, 2009)	26
Figure 9 - Enterprise Architect's Dilemma - (Sessions, 2007)	28
Figure 10 - Interviews for Research Study	31
Figure 11 - Procedure for a Deductive Approach to Qualitative Content Analysis – Based on (Cho & Lee, 2014)	33
Figure 12 - Cynefin Framework - (Snowden & Boone, 2007)	41
Figure 13 - An EA Role Framework for IT Consumerization (Appendix 7.2)	58
Figure 14 - An EA Role Framework for IT Consumerization (Focus Areas)	59

0 Abbreviations and Acronyms

The following table includes definitions for any unique abbreviations or acronyms that are used in the document.

ADM	Architecture Delivery Model
BCG	Boston Consulting Group
BYOD	Bring Your Own Device
CYOD	Choose Your Own Device
COPE	Corporately Owned Personally Enabled
CRM	Customer Relationship Management System
DoDAF	Department of Defense Architecture Framework
EA	Enterprise Architecture
EAM	Enterprise Architecture Management
FEA	Federal Enterprise Architecture
FEAF	Federal Enterprise Architecture Framework
GEA-NZ	Government Enterprise Architecture for New Zealand
HR	Human Resources
IaaS	Infrastructure as a Service
IM/IT	Information Management / Information Technology
IT	Information Technology
IFEAD	Institute for Enterprise Architecture Development
IBM	International Business Machines
KPMG	Klynveld Peat Marwick Goerdeler Company
PaaS	Platform as a Service
ROI	Return on Investment
SaaS	Software as a Service
SAP	Systems, Applications, and Products Company
TRM	Technical Reference Model
TOGAF	The Open Group Architecture Framework
ZIFA	Zachman Institute for Framework Advancement

1 Introduction

1.1 Context

IT Consumerization, loosely defined as the diffusion of consumer devices and applications into enterprise computing environments, is an increasingly evident trend that is affecting many organizations worldwide. The drivers and challenges associated with IT Consumerization have been examined (J. Harris, Ives, & Junglas, 2012; Niehaves, Köffer, & Ortbach, 2012), and within the academic community there is some understanding of the impacts and opportunities associated with the consumerization of IT (D'Arcy, 2011; Köffer, Ortbach, Junglas, Niehaves, & Harris, 2015). There is consensus that IT Consumerization is unavoidable due to the almost ubiquitous access and availability of high-speed internet, cheaper yet increasingly powerful devices, and a vast multitude of different applications offering increasing functionality that may often be perceived as better alternatives to corporate IT solutions.

In 2010, Gartner surveyed 512 U.S.-based knowledge workers, and found that “33% of respondents used their personal devices while at work during the past 30 days (of the date of the survey)” (Gartner, 2010). Similarly, Accenture conducted a survey of 4,017 employees in March 2011 and found that roughly half of the surveyed employees used their personal devices for work related activities (J. Harris et al., 2012). The study also found that only 13% of respondents thought the hardware devices and software applications provided by work were more useful than the ones they used personally (J. Harris et al., 2012). In addition, only 33% of respondents worried about their organization’s IT policies when deciding which technologies to use for work (J. Harris et al., 2012).

The IDG Enterprise also conducted a study in 2014 identifying some of the consumer tools found in organizations with or without IT approval. Some key highlights included 90% of respondents using consumer or individual services such as LinkedIn and Skype for work with only 49% of them obtaining IT approval, 79% of respondents using file-sharing and collaboration tools such as Dropbox also with only 49% of them obtaining IT approval, and 57% of respondents using enterprise-focused social network tools with only 34% of them obtaining IT approval (IDG, 2014). “The proliferation of personal devices being used for work purposes

has required the majority of organizations to make changes (82%), from creating policies to technology investments” (IDG, 2014).

Some authors have referred to IT Consumerization as an “IT Revolution” (J. G. Harris & Junglas, 2012; J. Harris et al., 2012), others calling it a “transformation and/or phenomenon” (Castro-Leon, 2014; Köffer et al., 2015), with one author even going as far as describing IT Consumerization as biblical; “It’s like you’re tied to the tracks of the enterprise and the freight train of the future is coming at you and it’s not only got no brakes, someone has jammed the throttle full on. Now, that’s biblical” (Gibbs, 2011).

It is obvious that IT Consumerization requires change at various levels within an organization. In order to effectively and efficiently implement change agendas, holistic and strategically - aligned execution is both important and necessary. While there are many ways to approach IT Consumerization, Enterprise Architecture has been positioned as a tool in enabling enterprise change.

There are varying perspectives on the definition of Enterprise Architecture both in practitioner and academic literature. In 2012, the US Federal government institutionalized Enterprise Architecture (EA) as a mandatory practice in government, defining EA as “the management best practice which can provide a consistent view across all program and service areas to support planning and decision making” (US Office of Management and Budget, 2012). Some academic literature has described Enterprise Architecture as being different from Enterprise Architecture management (Kappelman, McGinnis, Pettite, & Sidorova, 2008; Löhe & Legner, 2014; Radeke, 2011), architecture being “the fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution”(Institute of Electrical and Electronics Engineers, 2000).

Gartner, taking a more practice-oriented approach, describes Enterprise Architecture as “a discipline for proactively and holistically leading enterprise responses to disruptive forces by identifying and analyzing the execution of changes toward desired business vision and outcomes. EA delivers value by presenting signature-ready recommendations to achieve target business outcomes that capitalize on relevant business disruptions”(Gartner, 2016b).

Despite the lack of an accepted definition, literature has conferred that Enterprise Architecture is acknowledged as a discipline to drive organizational change, improve IT landscapes' transparency, and align business and IT (Kappelman et al., 2008; Löhe & Legner, 2014; Schmidt & Buxmann, 2010). Naturally, for organizations adopting, embracing, battling, or struggling with IT Consumerization, Enterprise Architecture is potentially positioned to play a useful role in achieving business objectives. This study will seek to explore these concepts and understand EA's role in IT Consumerization.

1.2 Research Motivation

There are many Enterprise Architecture frameworks and methodologies that have been established to date, some driven by professional organizations (e.g. IFEAD, TOGAF, ZIFA, etc.), and others by government initiatives (e.g. FEAF, DoDAF, GEA-NZ, etc.). Many of these frameworks are generally compared with each other based on the artifacts, methodologies, and frameworks contained within their respective bodies of knowledge (Sessions, 2007; Urbaczewski & Mrdalj, 2006). Academic activity in the domain of EA has remained comparatively modest, and existing studies tend to focus on the applied aspects of Enterprise Architecture, namely how to plan and represent it (Tamm, Seddon, Shanks, & Reynolds, 2011).

While there is some practitioner literature establishing EA's relevance to IT Consumerization (Bossert & Laartz, 2016; The Open Group, 2009) and most large global management consulting firms offer EA-related services (e.g. Accenture, BCG, Capgemini, Deloitte, Ernst & Young, Gartner, IBM, and KPMG), there still is little applied research validating EA's role in these disruptive transformation initiatives such as IT Consumerization, and how EA's role changes as the discipline evolves (Hafsi & Assar, 2016; Radeke, 2011; Tamm et al., 2011). Even though studies suggest that consumerization poses challenges for IT departments, there is little theoretical and empirical research on the challenges for IT departments (Koch et al., 2014)

As IT Consumerization and modern EA practices are relatively new, they present challenges at every level of organizational maturity and every industry, challenging traditional methods for managing and implementing change efficiently and effectively. While there are studies on rather silo-ed perspectives and IT Consumerization, such as change management,

organizational culture, and IT, there seems to be no conclusive discussion on frameworks, roadmaps, or guidelines. There also is little to no research that specifically investigates using EA as a tool for IT Consumerization.

1.3 Research Objective & Questions

This research project intends to understand the role of Enterprise Architecture in an organization, specifically in the context of IT Consumerization.

Our objective was to investigate EA's role in IT Consumerization and validate how effective EA frameworks are as a tool in addressing the needs of IT Consumerization. This research aims to provide insights on the cross-section of EA and IT Consumerization, providing a better understanding to the following research questions:

- What role does Enterprise Architecture play in the context of IT Consumerization?
- How well do current EA best practices and frameworks support IT Consumerization?

1.4 Overview of the Methodology

The research design for this study comprise an exploratory and descriptive single-case study of an organization from which qualitative data was collected, and analysed through content analysis. First, an in-depth literature review was conducted to establish academic and industry perspectives of both IT Consumerization and Enterprise Architecture. Second, research was carried out using the single-case study approach. Specifically, architecture practitioners within the case study organization were recruited and interviewed, to collect data that provided an understanding of the cross-section of Enterprise Architecture and IT Consumerization. Data analysis was performed using directed content analysis, specifically deductive thematic analysis. The study focused on one organization that was affected by IT Consumerization and had a formal Enterprise Architecture practice. Formal EA practice is hereby defined as having a business unit within the organization titled Enterprise Architecture with at least 1 practitioner within that business unit with the job title "architect".

1.5 Structure of the Thesis

Section 2 of this Master's Thesis consists of the literature review. The section begins by introducing the literature on IT Consumerization perspectives, which helps the reader understand the various lenses by which IT Consumerization can be viewed. This section includes literature on strategies to address the needs of IT Consumerization, and what tools enterprises can use to address IT consumerization change. The four leading Enterprise Architecture frameworks are also included, and a description of which EA framework lens this research uses is discussed.

Section 3 introduces the methodology in more detail, which begins by presenting the research design, and the actual methods in which the research was conducted. The relevant content analysis methods as well as the research validity criterion and ethical concerns are also discussed.

Section 4 presents the empirical findings of the research. The section begins with by discussing the nature of IT Consumerization and situating it within the Cynefin Framework and Enterprise Architecture. After discussing some of the key characteristics of a complex problem with respect to the Cynefin Framework, an EA Role Framework for IT Consumerization is presented. This framework also presents key focus areas for the various roles, and two potential maturity paths of EA.

Section 5 begins by discussing our empirical research findings in comparison to the previous literature. This will follow with a conclusion of our findings with respect to the two research questions. Limitations of the study will be discussed, and recommendations for future research will be presented.

2 Literature Review

2.1 IT Consumerization Perspectives

To the best of our knowledge, the term IT Consumerization originated in a position paper recognizing consumer IT and its increased usage within the enterprise context (Moschella, Neal, Opperman, & Taylor, 2004). Since then, IT Consumerization has been discussed within practitioner literature using varying definitions (Niehaves et al., 2012). Academic literature has suggested 3 main perspectives – market, individual, and organizational (J. Harris et al., 2012; Köffer et al., 2015). These perspectives are helpful in understanding and conceptualizing what IT Consumerization is by focusing on three different aspects: the origin or intended market of the technology, the ownership of the IT tool, and whether or not there is permission to use private IT tools for work purposes (Köffer et al., 2015). Although the three perspectives can seem different, they overlap and affect one another (Köffer, Ortbach, & Niehaves, 2014). Industry also offers a fourth perspective on consumerization, where IT Consumerization is the collection of impacts that result from the multi-faceted nature of this trend. The following sections will discuss the 4 perspectives of IT Consumerization, with an emphasis on understanding the scope and context of what this study refers to as the IT Consumerization phenomenon.

2.1.1 Market Perspective

Focusing on the origin or intended market of the technology (Köffer et al., 2015), IT Consumerization within this context refers to the adoption of consumer applications, tools, and devices into enterprise organizations (J. Harris et al., 2012; Yevseyeva et al., 2014). The key factor being that these technologies originate in the consumer marketplace, and eventually are introduced into organizations as enterprise solutions. With that said, IT Consumerization also historically encompassed the opposite trend where enterprise technologies started being used by consumers.

Desktop computers and laptops have been posited as enterprise tools, originally developed without the consumer market in mind (Köffer et al., 2015). Köffer et al., (2015) argue that “[desktop and laptop computers] have been widely used within organizations, long before the

term IT Consumerization was first mentioned by Moschella et al. (2004)". Other examples of tools originating in the enterprise market include business software such as PeopleSoft, SAP, and Salesforce CRM. Communications and computing infrastructure such as corporate-grade networking, computing, and storage devices and industry specific hardware such as point-of-sale systems, scanners, payment terminals, network-enabled sensors, are also examples of technologies that are targeted to and originate in an enterprise context. The first reference to IT Consumerization was used in the context of describing this increasing trend where technology originally marketed to enterprises, would eventually be used by both businesses and consumers (Moschella et al., 2004). While this has since materialized, as these technologies have since made their way into the hands of customers as consumer devices, there is a different wave of IT Consumerization that has also emerged.

More recently, consumer oriented technologies have made their way into organizations as enterprise tools. Dropbox, Microsoft Skype, Google Docs, Apple iPads, Apple iPhones are all examples of technologies that were initially targeted to consumers as a Business to Consumer product or service. Since their release and proliferation in the marketplace, these consumer-oriented technologies have also made their way into enterprises.

Emerging from this is a bidirectional flow of technology and its intended market: enterprise technologies being used by consumers, and consumer technologies being used by enterprises. While the market perspective views IT Consumerization as being bidirectional, it is acknowledged that consumerization should focus on one direction, i.e. the use of consumer technologies in a work context (Niehaves et al., 2012). In the market perspective, the focal point is on technologies originally targeted to the consumer market, and the eventual adoption of consumer technologies in the workplace (J. Harris et al., 2012).

Most consumer technologies that exist within organizations are either introduced by corporate change agendas, or user-driven initiatives. Shadow IT, roughly defined as technologies that are used within organizations by users but not IT sanctioned are still considered user-driven initiatives. This is because the consumer is the originating point where this IT Consumerization related change arises from. As such, corporately-driven and user-driven IT Consumerization

related change have been viewed as two processes of how technologies are introduced into organizations, compared and contrasted as top-down and bottom-up approaches (Leclercq-Vandelannoitte, 2015; Niehaves, Köffer, & Ortbach, 2013):

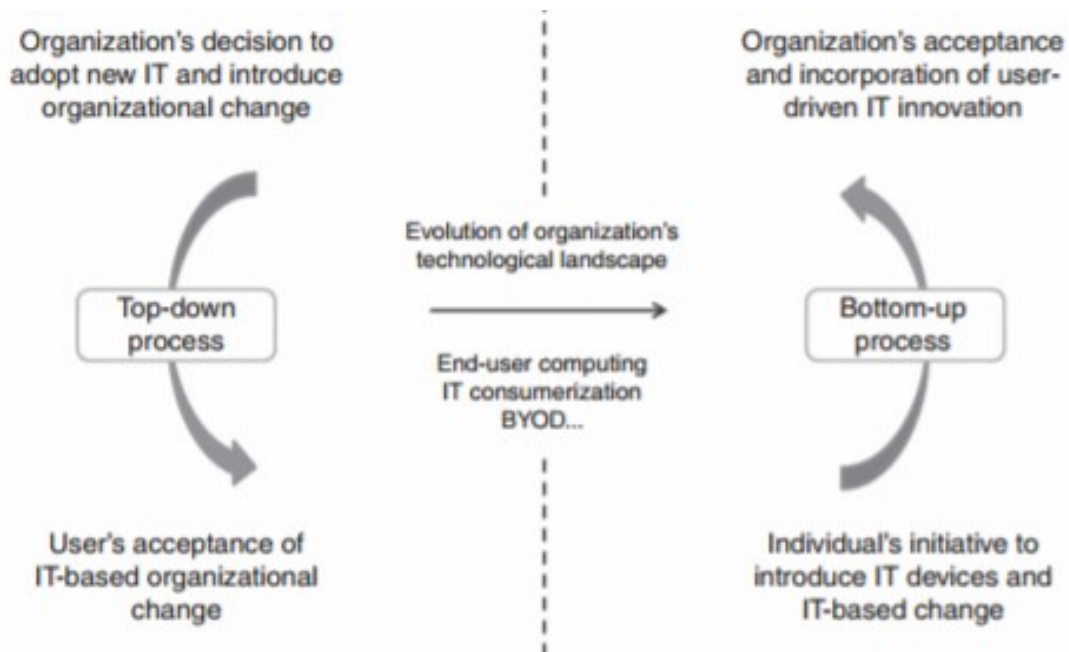


Figure 1 – How Technologies are Introducing into Organizations- (Leclercq-Vandelannoitte, 2015)

Figure 1 focuses on successful IT consumerization examples arising out of the top-down and bottom-up processes. While some initiatives, whether corporately-driven or user-driven may not ultimately be accepted, this diagram shows the flow, assuming the initiatives are accepted. The left side of Figure 1 identifies an organization's decision to adopt new IT and introduce change, which is a top down process potentially resulting in users' acceptance of IT-based organizational change. On the right side of Figure 1, a bottom-up process arising from an individual's initiative to introduce IT devices and IT-based change such as a user –request, potentially resulting in an organization's acceptance and incorporation of user-driven IT innovation.

Applying the market perspective, focusing on the consumer-oriented aspect of IT, there are many benefits and disadvantages associated with consumer technologies and their adoption in

organizations. Consumer technologies are often perceived by users to be easier to use and more intuitive (J. Harris, Ives, & Junglas, 2011; Niehaves et al., 2012), thus resulting in easier and quicker adoption by employees when organizations choose to embrace and deploy consumer-oriented technologies. Studies have shown an increase in employee work satisfaction when users are able to use consumer technologies (Dell & Intel, 2011). Some disadvantages of consumerization include increasing support complexity for organizations due to an increase in the volume and variety of devices and applications hosted internally and/or externally, owned corporately or privately, as well as the organizational changes that result from IT Consumerization initiatives which continuously execute against an organization's existing architectures. Security, reliability and performance of consumer applications and devices compared to enterprise-grade solutions have also been examined as a potential disadvantages (Niehaves et al., 2012).

2.1.2 Individual Perspective

As most academic literature describing IT Consumerization tends to agree that the concept of consumer technologies is difficult to grasp and agree on, ownership of a technology is often the distinguishing factor to which the definition is anchored to (Castro-Leon, 2014; J. Harris et al., 2011; Niehaves et al., 2013).

The individual perspective emphasizes ownership as key factor, defining IT Consumerization as bringing private IT to the enterprise and using it for business purposes (Köffer et al., 2015). The main concept at the core of the individual perspective are the individual experiences with consumer technologies that influence and affect experiences with workplace technologies (J. Harris et al., 2012; Moschella et al., 2004).

For example, modern day employees expect to be able to pick and choose the software and devices that best suit their work, and no longer accept being forced by IT to adopt and use a certain solution (Dell & Intel, 2011). Employees are also prone to expecting the same functionality and ease of use as consumer tools from tools offered by the enterprise (D'Arcy, 2011). When this same level of user experience is not available, consumerization of information

technology in this context refers to “privately owned IT resources, such as devices or software, that are ‘co-used’ for business purposes” (Niehaves et al., 2012).

Niehaves et al., (2012) presented a conceptual framework differentiating privately owned technologies for personal or work purposes, with device ownership and purpose of use as the two key dimensions, shown below:

ownership	<i>private</i>	Use of private IT for private purposes (e.g. accessing social networks with private laptop)	Consumerization (e.g. use of private smartphones to access corporate eMail)
	<i>business</i>	Use of enterprise IT for private purposes (e.g. accessing social networks at enterprise workstation)	Traditional use of enterprise IT for work (e.g. use of terminal with access to ERP systems, corporate eMail,...)
		<i>private</i>	<i>business</i>
		purpose	

Figure 2 - Conceptualizing Consumerization Through Ownership and Purpose - (Niehaves et al., 2012)

Research has found substantial evidence supporting a positive relationship of IT Consumerization on work performance (Niehaves et al., 2013), as well as enhanced innovation and increased productivity as a result of consumer technologies entering organizations (J. Harris et al., 2011; Köffer et al., 2015). A research study carried out by Accenture found 24 percent of employees admitted to coming up with their own consumer technology solution to help solve a business problem , 43 percent felt comfortable and capable of making their own technology decisions for work, and 27 percent claimed they would even be prepared to pay for their own devices and applications to use at work (J. Harris et al., 2011).

2.1.3 Organizational Perspective

The organizational perspective focuses on organizational permission to use private IT tools for work (Köffer et al., 2015). In this perspective, the implications of IT Consumerization are wide ranging, and refer to the “plethora of devices and applications used within the corporate firewall that may not be part of a company-sanctioned list and/or have not been formally approved and that may be seen as a threat or an opportunity” (J. Harris et al., 2012). In this perspective, IT Consumerization refers to the aspects of IT associated with the granting, rejecting, or negotiating of permission of the usage of private IT tools for work.

There are some industry studies and management recommendations carried out by large technology providers and management consulting firms on the topics of consumerization in the enterprise context (Castro-Leon, 2014; D’Arcy, 2011; Dell & Intel, 2011; J. G. Harris & Junglas, 2012). Many of the issues in the organizational context stem from the fact that IT Consumerization’s individual and market perspectives, which focus on device ownership and whether the technology was purposed for personal or corporate use, result in varying levels of complexity making it difficult and confusing for organizations to identify, secure, adopt, or even endorse using standard policies, practices, and technologies.

Practitioner literature examining device provisioning models highlight some of the key organizational complexities, recommendations, and strategies with respect to IT Consumerization (Castro-Leon, 2014; Chang, Ho, & Chang, 2014; D’Arcy, 2011; Harteveld, 2012; Leclercq-Vandelannoitte, 2015). Device eligibility, sanctioned devices, service availability, roll-out, cost sharing, security, support and maintenance are all considerations that enable a complete strategy for BYOD, CYOD, or COPE (Citrix, 2015). During the first wave of consumerization, Bring-Your-Own-Device (BYOD) was at one point a hot IT management topic focusing on Corporate IT programs and policies. As industry practitioners struggled with gaining consensus on approach and overcoming corporate governance mechanisms focused on information and device security, a new corporate device model emerged. Organizations started offering multiple devices, allowing employees an option to Choose-Your-Own-Device (CYOD). This model helped address many of the security issues and information ownership issues from a legal perspective, as device ownership and control was given back to organizations in this

provisioning model. However, some of the disadvantages of this model were that devices provisioned in this manner, were still not truly consumer-oriented devices, and did not fully harness the benefits and opportunities powering the IT Consumerization movement. More recently, a new device provisioning model has emerged, known as Corporately Owned Personally Enabled (COPE). In this model, employees can use corporate issued devices for personal tasks that are not work related. “While the nuances of BYOD, CYOD and COPE can vary, including their approach to cost sharing and compensation, they share most of the fundamental principles... IT must ensure that effective policies and technologies are in place to protect business information – without impeding the experience or productivity of the user” (Citrix, 2015).

2.1.4 Industry Perspective

Industry definitions of IT Consumerization are usually anchored on a combination of the individual, market, and organizational perspectives. For example, Gartner’s definition of IT Consumerization: “Consumerization is the specific impact that consumer-originated technologies can have on enterprises. It reflects how enterprises will be affected by, and can take advantage of, new technologies and models that originate and develop in the consumer space, rather than in the enterprise IT sector. Consumerization is not a strategy or something to be ‘adopted’. Consumerization can be embraced and it must be dealt with, but it cannot be stopped” (Gartner, 2016a). This definition is broad enough to encompass all of the aspects and overarching perspectives of IT Consumerization mentioned above. It provides an abstracted view where we can see IT Consumerization as the collection of impacts that result from the multi-faceted nature of this domain. Forrester’s definition of IT Consumerization is also anchored on a combination of the individual, market, and organizational perspectives: “Consumerization is defined variously as using personal devices for work, pay-per-use payment models, spending personal money for work-related cloud services, and employee self-provisioning of IT capacity outside the oversight of IT” (Gillet, 2011).

2.2 IT Consumerization Strategies

In order to respond to the consumerization of IT, strategies are at the forefront, and must be developed and implemented in order to safeguard enterprise information and continuously

realize value from IT investment. Below is a table which provides a few examples of IT Consumerization:

Category	Examples
Software as a Service (SaaS)	Facebook, Skype, Google Drive, Dropbox
Platform & Infrastructure as a Service (PaaS, IaaS)	Microsoft Azure, Amazon Web Services, Google Cloud Platform
Hardware Devices	Tablets, Laptops, Smart Phones

Figure 3 - Examples of IT Consumerization

IT Consumerization can come in many shapes and forms. Any technology that is marketed to a consumer can be considered part of the IT Consumerization phenomenon. A few examples of IT Consumerization in the Software as a Service (SaaS) space are Facebook, Skype, Google Drive, and Dropbox. These are all consumer oriented technologies that have made their way into enterprises, sometimes sanctioned, and sometimes not. Similarly, at the platform and infrastructure computing layers, there are also cloud based services that are available to average users. Examples in the Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) include Microsoft Azure, Amazon Web Services, and the Google Cloud Platform. Examples of IT Consumerization within the hardware device category include tablets, laptops, and smartphones. IT Consumerization challenges organizations in various dimensions with respect to technologies as those shown above, from deployment methods, to service offerings, and even end-user training.

Whether an organization wishes to embrace or reject IT Consumerization, it has already committed to a strategy. When organizations don't have defined strategies and there is no clear policy, many issues can occur. Shadow IT, which Gartner defines as "IT devices, software, and services outside the ownership or control of IT organisations" (Gartner, 2016c), is one of the many problems for businesses where business users wish to circumvent IT policies and procedure. Strategies do not have to be all or nothing either, rather J. Harris et al., (2012) describe 6 strategies for responding to IT Consumerization, which are summarized on the next page:

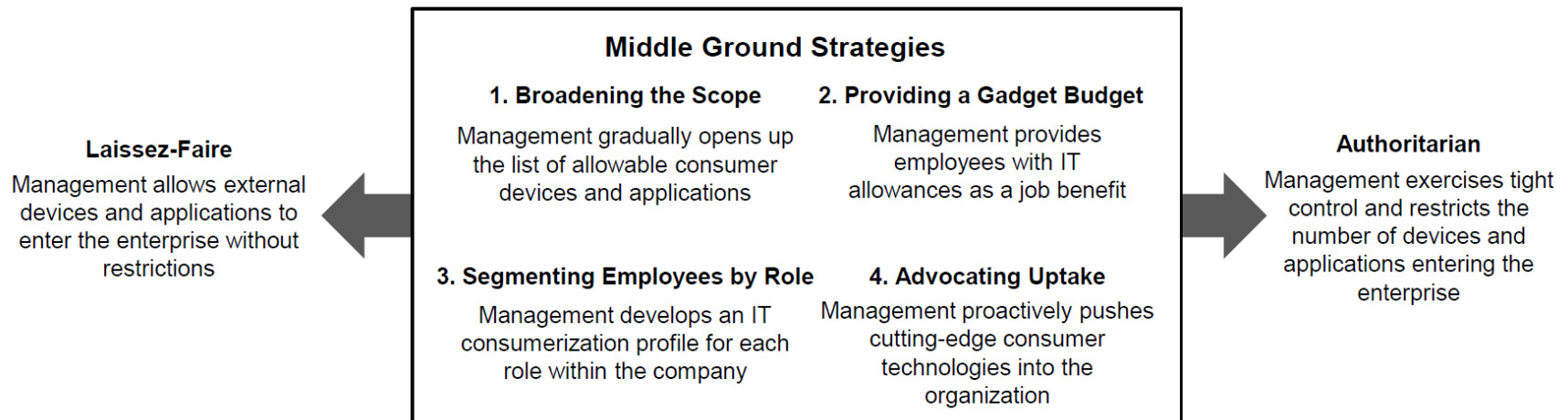


Figure 4 - IT Consumerization Strategies - (J. Harris et al., 2012)

On the far left, is the laissez-faire strategy which literally translates to “let people do as they think best” (Dictionary.com, 2017b). In this strategy, there are minimal, if any, enterprise constraints to how external devices and applications are used within the organization. On the far right, is the authoritarian strategy which is defined as “exercising complete or almost complete control over the will of others” (Dictionary.com, 2017a). In this strategy, there is strict control around how devices and applications are used within the organization. In between these two strategies, are mixes of middle-ground strategies, which provide a blend of both laissez-faire and authoritarian principles from different perspectives.

The various strategies summarized above are applicable to different organizations and different contexts. There is no “best” or “worst” strategy. Whether using laissez-faire, middle ground, or authoritarian strategies, depending on the context, each will enable organizations to reach their own objectives whilst satisfying their own risk appetite and business requirements. For example, the Canadian Government often has a Canadian data residency requirement for sensitive data that is stored in the cloud. As such, allowing external devices and applications to enter the organization without restrictions would not be a compliant approach. An appropriate strategy for a highly confidential and private government department such the Department of National Defence may more closely align to an Authoritarian strategy.

Microsoft has suggested 9 key enterprise considerations, representing potential opportunities or risks, for a successful consumerization of IT strategy: business value, financial and tax, level of consumerization, employee benefits, organization policy, legal and privacy, IT infrastructure, software licensing, and support (Harteveld, 2012). IT Consumerization comes in many shapes and forms. With various technologies such as smartphones or tablet PCs, Facebook, LinkedIn, Skype, or Dropbox, recognizing that IT Consumerization is taking place is neither an obvious nor simple task. “Sometimes it is camouflaged as a social media strategy, or arrives under the covers of a BYOD initiative. At other times, it comes as a senior executive who wants to use his new iPad on the corporate network, or an employee who advocates the use of YouTube for training” (J. Harris et al., 2012). It is important as the next wave of consumer electronics and applications make their way into organizations, that there are strategies defined for decision makers to anchor and align to. Strategic alignment and a line of sight to a clear enterprise

positioning is crucial when a BYOD initiative is raised, or a new cloud application is being considered by a line of business within a large organization. Strategies form a key part of setting direction for an organization, even something as specific as whether or not a user should be allowed to check an enterprise e-mail account from a personal smartphone. Regardless of which strategy an organization chooses to set forth with, IT Consumerization impacts will always span across multiple domains and business functions both raising new business requirements and creating various architectural considerations and impacts.

2.3 IT Consumerization and Change

As IT Consumerization greatly affects an organization's landscape and environment, there are various implications and considerations related to organizational change management. There is a general dearth of academic literature specific to the organizational change management aspects of IT Consumerization. A more generic industry adopted framework is Prosci's change management methodology, which offers a set of tools called the five organizational change management levers: Communication plan, sponsorship roadmap, coaching plan, training plan, and a resistance management plan (Prosci, 2017). Prosci's change management methodology is structured into 3 sequential phases, respectively: preparing for change, managing change, and reinforcing change. While this approach has emerged as one of the industry standards for change management, there seems to be a lack of guidance in terms of how to assess the impact of change initiatives, and the roles associated with decision making facilitation.

Enterprise Architecture has been described as a method and tool for enabling and facilitating structured architecture changes into organizations. For example, the TOGAF Enterprise Architecture framework includes an architecture change management process, which ensures that changes to an organization's architecture are managed in a cohesive and architected way (The Open Group, 2009). While there seems to be potential in applying EA frameworks specific to IT Consumerization, one of the areas this research may seek to evaluate include current Enterprise Architecture methods and how they are applied in the context of IT Consumerization related change.

2.4 Enterprise Architecture

Enterprise Architecture, in its early phases in the 2000s, was rather perplexing and ambiguous to non-architects. Some of the early industry metaphors and analogies used to describe the role of EA included building architecture and city planning (Burke, 2004; Gartner, 2002). The similarities anchored on the fact that both EA and city planning were accountable for defining standards, guidelines, and frameworks by which solution architects and building architects, respectively, had to comply with. Architecture principles and guidelines for an organization could also be compared with building codes, and building permits similar to an approval granted to change initiatives deemed compliant through some architecture review process (Burke, 2004).

Though these comparisons can help a non-expert audience understand what architecture is at a meta-model or conceptual level, they are not fully accurate descriptions or comparisons of the role that Enterprise Architecture plays in an organization (Gartner, 2002; Jeff Scott, 2010). For example, building architects and city planners alike are not accountable for implementation, whereas successful Enterprise Architecture practices should be (Jeff Scott, 2010; The Open Group, 2009; US Office of Management and Budget, 2012).

While Enterprise Architecture and Enterprise Architecture management are two concepts that have both been used synonymously and interchangeably, due to the lack of accepted definitions of these basic terms (Radeke, 2011), Enterprise Architecture is “the fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution”(Institute of Electrical and Electronics Engineers, 2000). Comparatively, *Enterprise Architecture management* is the “overall process of maintaining and developing these *Enterprise Architectures* in a holistic and purposeful manner”(Radeke, 2011).

The discipline of Enterprise Architecture management (EAM) defines today with frameworks, standards, tools and practical expertise; a quite large set of different views and perspectives often leading to a “heavy EA approach”, which is not always the most feasible approach to supporting IT initiatives within a living and changing business system environment

(Zimmermann, Schmidt, Jugel, & Möhring, 2015). Despite this criticism, literature acknowledges Enterprise Architecture management (EAM) as a discipline to drive organizational change, improve IT landscapes' transparency, and align business and IT (Kappelman et al., 2008; Löhe & Legner, 2014; Schmidt & Buxmann, 2010). Naturally, for organizations battling, embracing, or struggling to make sense of IT Consumerization, Enterprise Architecture is positioned as a potential tool to help realize business objectives.

Based on qualitative content analysis of existing academic literature, Löhe & Legner, 2014 summarize four perspectives of Enterprise Architecture management implementations, shown on the next page:

Approach	Description	Examples
1. EAM initiatives	Setup and building blocks of EAM programs. Mostly, model-driven, i.e. focusing on a dedicated EA life cycle (as-is EA documentation, to-be EA planning, etc.)	<p><i>EA frameworks and model-driven EA approaches:</i> TOGAF (The Open Group 2009)*, FEAF (CIO Council 2001; FEA Program Management Office 2007b)*, SEAM (Wegmann et al. 2007), Zachman (Zachman 1987; Sowa and Zachman 1992)*</p> <p><i>EAM initiatives' scope and success factors:</i> Bricknall et al. (2006), Bussells (2006), Janssen and Hjort-Madsen (2007), Matthee et al. (2007), Seppanen, et al. (2009)</p>
2. EAM processes	Typical EAM processes and activities that enterprises should establish when introducing EAM	<p><i>EAM activities and functions:</i> Buckl et al. (Buckl et al. 2009b, 2010a), Schmidt and Buxmann (2011), van der Raadt and van Vliet (2008)</p> <p><i>EAM processes:</i> Dern (2007)*, Hafner and Winter (2008), Keller (2007)*, Niemann (2005)*.</p>
3. EAM application scenarios	Stakeholder-oriented approach defining the relevant concerns and viewpoints as well as application of EA models	<p><i>EAM patterns:</i> Buckl et al. (Buckl et al. 2008; Buckl et al. 2010b), Moser et al. (2009)*</p> <p><i>Concern-driven EA modeling:</i> Lankhorst et al. (2005)</p> <p><i>Exemplary usage of EA models:</i> Bucher et al. (2006), Aier et al. (2008a), Hjort-Madsen and Pries-Heje (2009).</p>
4. EAM governance	EAM roles and committees as well as the introduction of EAM principles and standards	<p><i>EAM roles:</i> Strano and Rehmani (2007), Niemi (2007), Sauer and Willcocks (2002). <i>Organizational structures for EAM:</i> Findlay (2006), Venkatesh et al. (2007), Hoogervorst (2009)</p> <p><i>EAM principles and standards:</i> Boh and Yellin (2007), Winter and Schelp (2008), Greefhorst and Proper (2011)</p>

* Practitioner-oriented literature

Figure 5 - EAM Implementations in Literature - (Löhe & Legner, 2014)

For the purpose of this study, the first approach, using EA frameworks and model-driven EA approaches as a tool in the context of IT Consumerization is the most relevant. A quick search of “Enterprise Architecture Frameworks” on Wikipedia resulted in the identification of over 30 architecture-related frameworks; some open-source or consortia-developed, and others created by the US government or industry leading suppliers such as IBM and SAP (Wikipedia, 2016). There are, however, a few bodies of knowledge which have attempted to, and quite successfully, establish a complete set of concepts and activities that embody the EA domain. Academic literature tends to describe and analyze the more prominent and adopted ones, namely: the Federal Enterprise Architecture Framework (FEAF), the Zachman Framework for Enterprise Architecture, Gartner Enterprise Architecture, and The Open Group Architectural Framework (TOGAF) (Löhe & Legner, 2014; Sessions, 2007; Urbaczewski & Mrdalj, 2006). The following sections will discuss these 4 perspectives of Enterprise Architecture, with an emphasis on understanding the scope and context of what this study refers to as an EA Framework.

2.4.1 Federal Enterprise Architecture Framework (FEAF)

In 2002, US federal law and policy required Agency Heads to develop and maintain an agency-wide Enterprise Architecture¹. The Federal Enterprise Architecture Framework (FEAF) was created and purposed to provide guidance for a common approach to the practice of Enterprise Architecture within the U.S. Federal Government (US Office of Management and Budget, 2012).

The FEA framework describes primary outcomes, levels of scope, basic elements, sub-architecture domains, reference models, current and future views, transition plans, and a roadmap, summarized on the next page:

¹The E-Government Act of 2002 updated and revised congressional mandates for IT architecture in the Clinger-Cohen Act of 1996 to reflect Enterprise Architecture (US Office of Management and Budget, 2012)

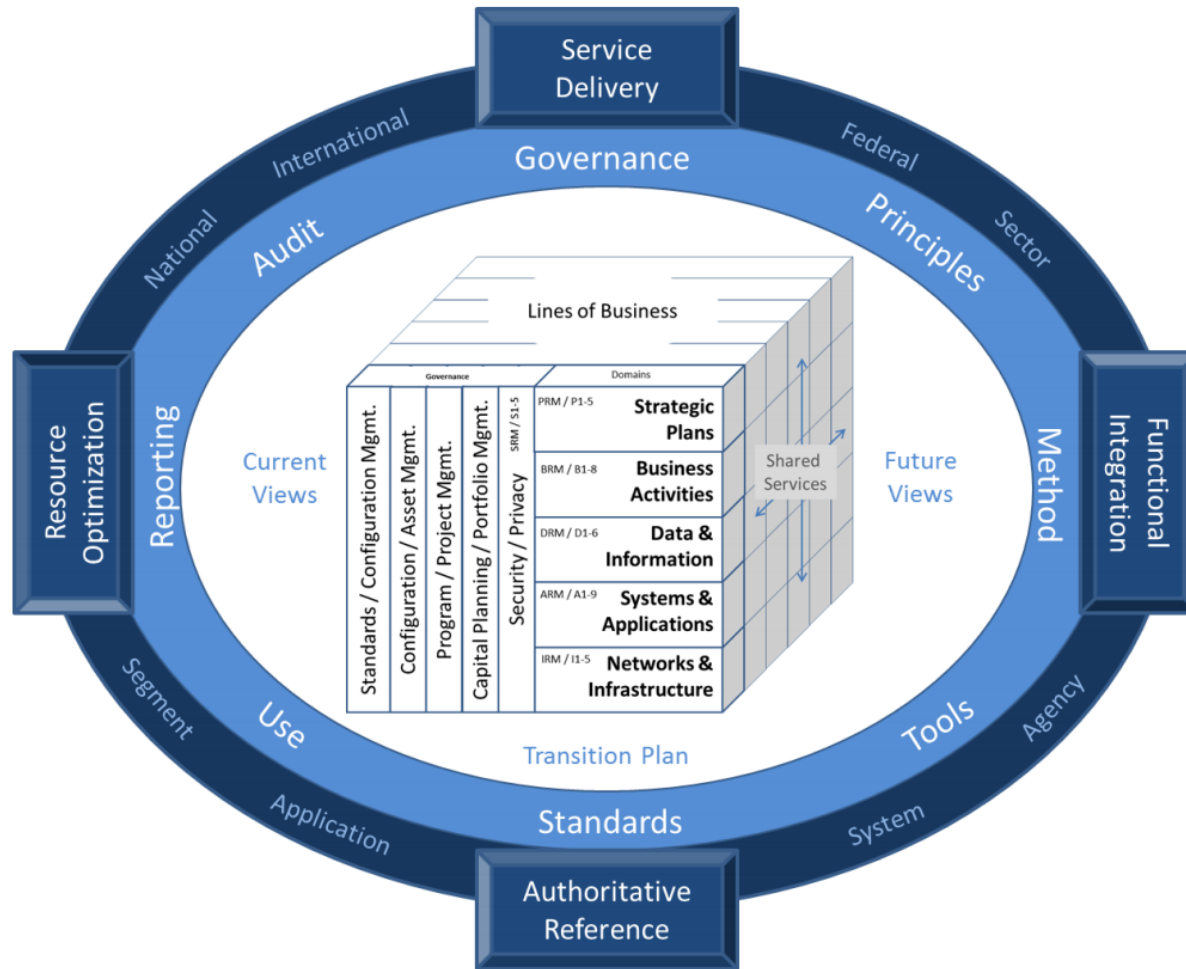


Figure 6 - Federal Enterprise Architecture Framework - (US Office of Management and Budget, 2012)

There are four primary outcomes that FEA emphasizes: service delivery, functional integration, resource optimization, and authoritative reference. There are many positive outcomes that EA contributes to, but these four outcomes are 'primary' in that they represent areas of direct positive impact that architectures can make within government (US Office of Management and Budget, 2012).

There is criticism that FEA is another arduous and exhaustive methodology that is documentation heavy, lacking the agility to provide quick benefits realization (Sessions, 2007). Nine years after EA was mandated in government, an official report to the U.S. Congress in 2011 reported that "most departments and agencies reported they expect to realize the benefits from their respective Enterprise Architecture programs sometime in the future. What this suggests is that the real value in the federal government from developing and using Enterprise Architectures remains largely unrealized" (Dodaro, 2011).

The FEA framework is the only one out of the 4 industry-leading EA frameworks identified in this study which offers any guidance on measuring organizational success in using Enterprise Architecture (US Office of Management and Budget, 2012). While the Federal Enterprise Architecture Program EA Assessment Framework measures Enterprise Architecture maturity, it focuses on only three dimensions: architectural completion, architectural use, and architectural results (Sessions, 2007). This maturity framework assumes that documenting all of the architecture, having all of the architecture processes, and measuring benefits of using the architecture are sufficient in assessing Enterprise Architecture maturity. There is no assessment of the framework's suitability in achieving business objectives, which inherently presumes that the FEA framework is the most optimal framework for organizations. Organizations that have a smaller EA practice less focused on architecture documentation would be presumptively assessed as less mature than a large documentation-heavy EA practice in another organization. FEA does not provide any guidance on its framework's effectiveness in solving problems; rather it assumes the framework is the optimal state by which performance is measured against how much of the framework is utilized.

2.4.2 Zachman Framework for Enterprise Architecture

John Zachman published the Zachman Framework for Enterprise Architecture in 1987 (Zachman, 1987). He is both considered to be one of the pioneers of this domain and regarded as the person who first introduced the idea of information systems architecture (Goethals, Lemahieu, Snoeck, & Vandenbulcke, 2006).

The Zachman Framework is a reference model that provides an enterprise a formal and structured way of viewing and describing essential components of an “object” with respect to its creation, operation, and change. This “object” can be the enterprise, a department, a project, or even a solution (Zachman, 2008). Unlike many of the other Enterprise Architecture frameworks, the Zachman Framework is not rooted in IT. “Since the Zachman Framework classification was observed empirically in the structure of the descriptive representations (the architecture) of buildings, airplanes, and other complex industrial products, there is substantial evidence to establish that the Zachman Framework is the fundamental structure for Enterprise Architecture and thereby yields the total set of descriptive representations relevant for describing an architecture”(Zachman, 2008).

The framework is anchored on two key dimensions, the audience perspective, and the primitive interrogatives. The primitive interrogatives are the What, How, Where, Who, When, and Why.

The framework is shown on the next page:

The Zachman Framework for Enterprise Architecture™

The Enterprise Ontology™



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Figure 7 - Zachman Framework for Enterprise Architecture – (Zachman, 2008)

The Zachman framework is not a methodology. It is “actually a taxonomy for organizing architectural artifacts (in other words, design documents, specifications, and models) that takes into account both who the artifact targets (for example business owner and builder) and what particular issue (for example, data and functionality) is being addressed” (Sessions, 2007). Zachman posits that the framework is the basis for architecture processes, as “processes without ontological structures are ad hoc, fixed, and dependent on practitioner skill sets (e.g. Alchemy, based on trial and error)... whereas processes based on ontological structure will be predictable and produce repeatable results (e.g. Chemistry, based on the periodic table) (Zachman, 2008). As such, the Zachman Framework for EA does not actually contain any guidance on governance, management, or delivery processes associated with architecture representations it identifies. In the context of utilizing EA frameworks as a tool to address IT Consumerization, the Zachman framework provides the foundational layer, a common reference architecture and framework for identifying, classifying, and right-sizing all of the artifacts that are necessary and relevant to an issue being addressed by an organization. This provides the foundation, on which other model-driven EA frameworks can build on, by providing guidance on other Enterprise Architecture issues that are not necessarily centric around artifacts and their intended audience.

2.4.3 The Open Group Architecture Framework (TOGAF)

TOGAF, currently at version 9.1, is perhaps the most popular Enterprise Architecture framework used in industry (Bloomberg, 2014), with more than over 500 memberships from organizations all over the world including Capgemini, Fujitsu, Hewlett Packard Enterprise, Huawei, IBM, Oracle, Tata, Exxon, and Microsoft (The Open Group, 2016).

At a high level, TOGAF is composed of 6 key components, shown on the next page:

TOGAF® 9 Components

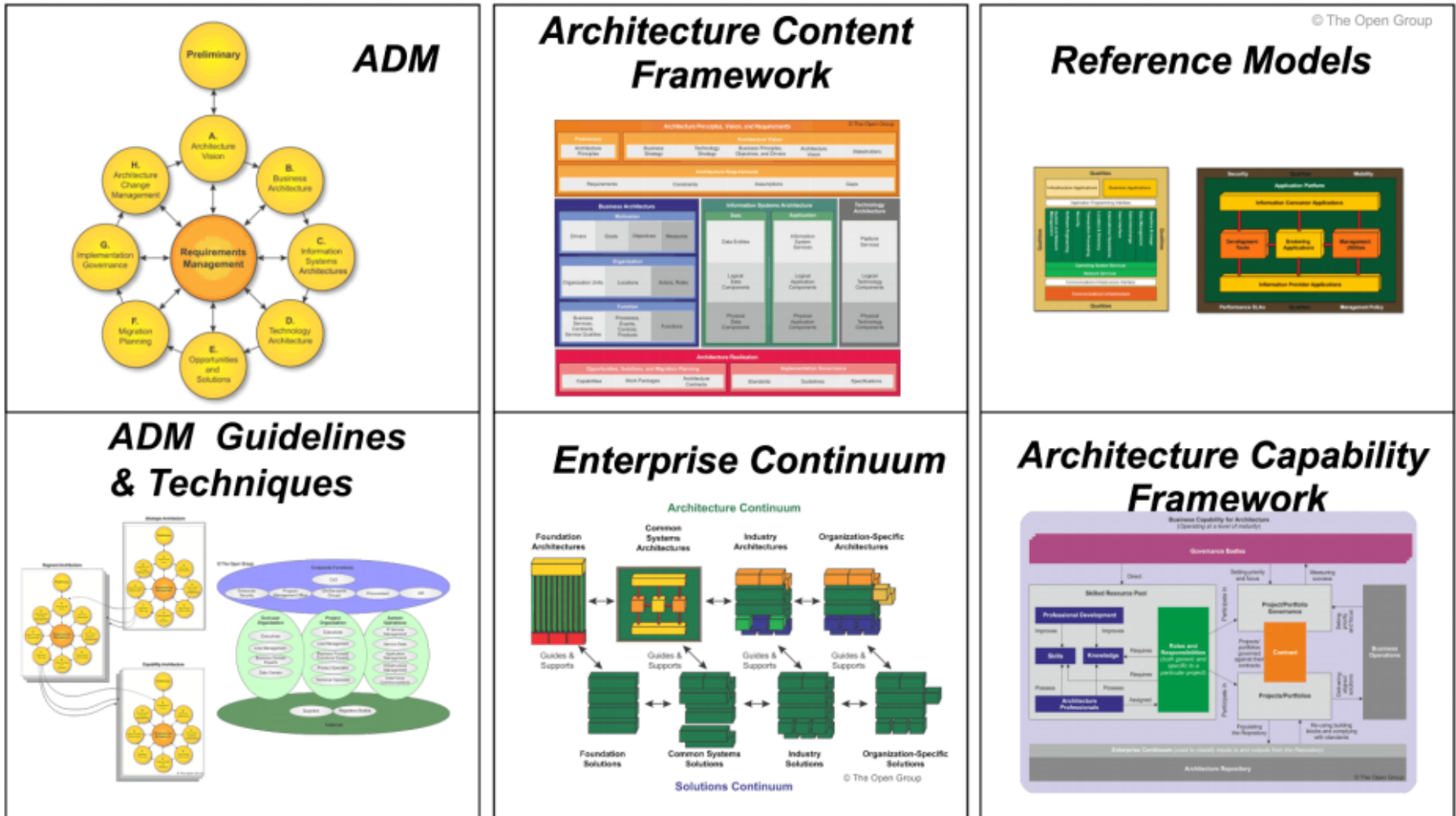


Figure 8 - TOGAF 9 Components - (The Open Group, 2009)

The key component is the Architecture Delivery Model (ADM), which forms the core of the overall framework, describing a method for developing and managing the lifecycle of Enterprise Architecture. The Enterprise Continuum provides a common vocabulary and reference model ultimately aiding in communicating and understanding of the Enterprise Architecture, and enabling re-use of knowledge assets. For example, the Technical Reference Model (TRM) is a reference model, described within the enterprise continuum, identifying a framework for an organization's technology services. The Architecture Content Framework provides a structural model for architectural artifacts and content, allowing for greater consistency and reusability by providing a detailed open standard for how architectures should be described.

TOGAF clearly states that TOGAF is not intended to compete with other Enterprise Architecture frameworks such as Zachman Framework for EA or FEAF, rather "it is intended to perform a unique role, in distilling what other frameworks have to offer, providing a generic ADM that can be adapted for use with any of these [Enterprise Architecture] frameworks"(The Open Group, 2009). Compared with the other Enterprise Architecture frameworks, TOGAF provides rather flexible guidance on how it is to be applied within organizations. "The TOGAF ADM does not prescribe any specific set of Enterprise Architecture deliverables ... Rather, TOGAF is designed to be used with whatever set of deliverables the TOGAF user feels is most appropriate. That may be the set of deliverables described in TOGAF itself; or it may be the set associated with another framework, such as the Zachman Framework, FEAF, etc." (The Open Group, 2009).

2.4.4 Gartner Enterprise Architecture

Gartner describes Enterprise Architecture as "a discipline for proactively and holistically leading enterprise responses to disruptive forces by identifying and analyzing the execution of changes toward desired business vision and outcomes. EA delivers value by presenting business and IT leaders with signature ready recommendations for adjusting policies and projects to achieve target business outcomes that capitalize on relevant business disruptions"(Gartner, 2016b). This definition provides a larger scope and perspective than the other EA frameworks presented, as it embodies many additional intangible aspects of Enterprise Architecture.

Gartner's Enterprise Architecture methodology is different from the other frameworks, as it is a practice which also emphasizes other dimensions such as experience, training, and ongoing relationships with colleagues (Sessions, 2007). These are dimensions of Enterprise Architecture that are not clearly or specifically called out in some of the other frameworks, which Gartner Enterprise Architecture encompasses. For example, there are many challenges for Enterprise Architecture practitioners, also described as the "Enterprise Architect's Dilemma", shown below:

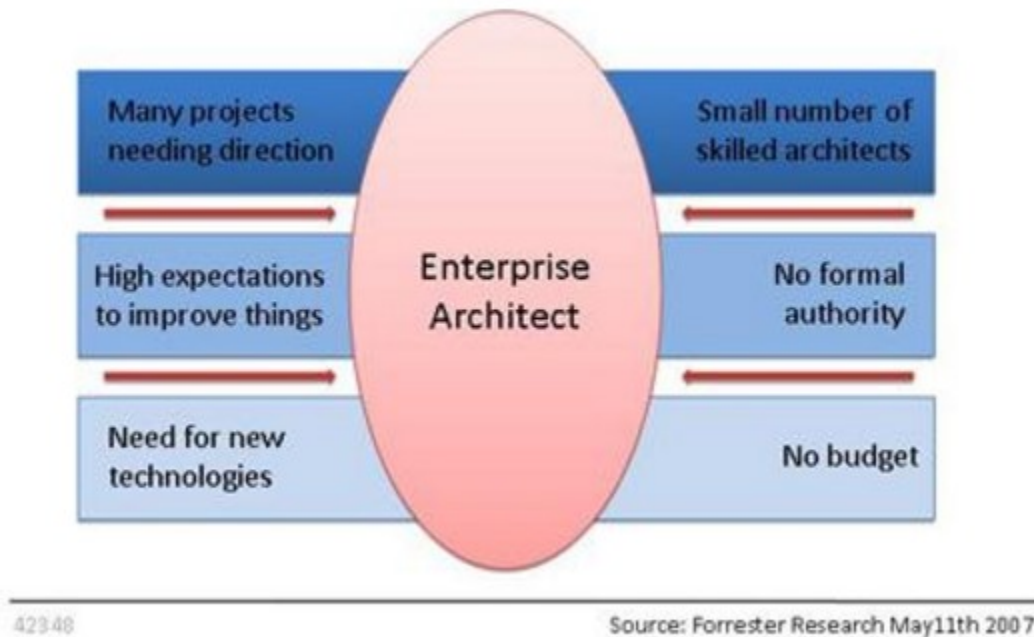


Figure 9 - Enterprise Architect's Dilemma - (Sessions, 2007)

These problems identify a different perspective of Enterprise Architecture, one which highlights organizational barriers and seemingly unbalanced expectations that seem "overlooked" in the other EA frameworks. Gartner Enterprise Architecture is the most practice oriented view of EA, as it includes and takes into consideration some of key aspects of EA that are not clearly addressed in other frameworks.

2.4.5 Lens of Analysis - Framework Effectiveness

Out of the 4 EA frameworks discussed, the main one that was selected to be used in our research was the TOGAF framework. This choice was made for two reasons. The first reason was the market penetration of the framework, with TOGAF emerging as the dominant industry

leading framework for Enterprise Architecture. The second reason is the researcher's level of familiarity with the framework from both professional education as well as professional experience applying the framework, which ultimately enabled better identification of sensitizing concepts. This is discussed in the analysis section of the following section.

3 Methodology

3.1 Research Design

For the purpose of this qualitative research, we used a single case design as opposed to a multiple case design. Generalisation of results from case studies, either single or multiple designs, stems on theory rather than sampling logic (R. Yin, 1994). While single-case design research has been criticised as being unable to provide a reliable generalising conclusion due to the lack of evidence through replication, and multiple case design enhances and supports better generalizations, "in cases where there are no other cases available for replication, the researcher can adopt the single-case design" (Zainal, 2007). As there was difficulty identifying multiple organizations with the same criteria (e.g. size, industry, established EA practice, IT Consumerization initiatives), this research project adopted a single case study design.

Yin (1984) notes 3 categories of case studies: exploratory, descriptive, and explanatory (R. K. Yin, 1984). Exploratory case studies set to explore any phenomenon in the data which serves as a point of interest to the researcher, asking general questions that are meant to open the door for further examination of the phenomenon observed (Zainal, 2007). Descriptive case studies set out to describe the natural phenomena which occur within the data in question, beginning with a descriptive theory to support the description of the phenomenon or story (Zainal, 2007). And finally, explanatory case studies examine the data closely both at a surface and deep level in order to explain the phenomena in the data (Zainal, 2007). Given that there was little empirical research examining the EA's role in IT Consumerization and EA framework effectiveness in the context of IT Consumerization, the case study for this research was descriptive and exploratory.

Interpretive and evaluative case studies were another dichotomy of case studies categories relevant to this research (McDonough & McDonough, 1997). The interpretive case study

approach was the most relevant for this research, as it enabled interpretation of data through the development of conceptual categories (Zainal, 2007).

The descriptive and exploratory single-case approach is well suited for this study for two reasons. First, while there is some practitioner and academic literature positioning Enterprise Architecture as playing a critical role in IT Consumerization (Bossert & Laartz, 2016; The Open Group, 2009), there is little empirical evidence validating its value-add to organizations (Tamm et al., 2011). Second, organizations are in the early stages of understanding IT Consumerization's organizational impacts (J. Harris et al., 2012; Koch et al., 2014; Niehaves et al., 2012), and there is little theoretical and empirical research on the challenges it presents for various organizations (Koch et al., 2014). Using the descriptive and exploratory multi-case study approach enabled us to ask questions and gain a preliminary understanding of what organizations are doing. While explanatory research would have been focused on the why, our exploratory and descriptive research focused on the what, opening the door for further examination.

3.2 Data Collection

The primary data collection method was through in-depth semi-structured open-ended qualitative interviews conducted face to face, lasting roughly 30 minutes to 40 minutes. Open-ended interviews had no specific response format, allowing participants to justify their answers using examples from their own experiences (M. Q. Patton, 2002). Semi-structured interviews allowed researchers to ask additional follow-up probing questions on certain topic areas when questions did not seem well-addressed by the interviewee. A semi-structured approach made the interviews rather conversation-like to let the interviewee and interviewer discuss anything that may have related to the question at hand. Probing questions were also changed based on the responses from previous interviews and added to subsequent interviews.

The interviews were voice recorded, then transcribed to text. Due to the amount of data, along with the need to preserve the interviewees' anonymity, the transcriptions of the interviews are not provided in this research study as appendices. However, any sections used for this research

will be available upon request. The following table provides the job role classification, industry classification of the organization, and interview dates.

Person ID	Role	Industry	Interview Date
P01	Enterprise Architect	Financial Institution	May 11, 2017
PO2	Enterprise Architect	Financial Institution	May 12, 2017
PO3	Senior Enterprise Architect	Financial Institution	May 12, 2017
PO4	Senior Solution Architect	Financial Institution	July 17, 2017
PO5	Senior Solution Architect	Financial Institution	July 17, 2017

Figure 10 - Interviews for Research Study

Research participants were recruited through a combination of theoretical and purposive sampling techniques. Purposive sampling is a technique widely used in qualitative research for the identification and selection of information-rich cases for the most effective use of limited resources (M. Q. Patton, 2002). First, the principal investigator and the supervisor polled employees from organizations that were prime candidates based on convenience and criteria identified in the paragraph below. Second, additional participants were recruited through a snowballing technique where the participants recommend other colleagues who may have also been contacted to partake in the study.

There were two criteria that the case study organization had to meet: the organization must have had some level of IT Consumerization and a formal Enterprise Architecture practice. Formal being defined as having a business unit within the organization titled Enterprise Architecture, and at least 1 practitioner within that business unit with the job title “architect”.

IT Consumerization is pervasive and affects organizations in every industry. Similarly, Enterprise Architecture methodologies, like project management, are generally applied in multiple industry verticals as well. Given the general dearth of literature in this space, we did not feel that there was any benefit from choosing an organization within a specific industry to explore concepts within the context of this descriptive and explanatory research. Future research may

benefit from choosing case studies within a specific industry to validate generalizations specific to that industry.

The case study organization was headquartered in Canada, and also operated overseas. This could be beneficial when comparing research results between organizations that only operated within Canada, should the differences be important.

Five participants from the case study organization's Enterprise Architecture business unit were recruited. Due to the shifting scope of an enterprise architect's role in an organization, often due to variables such as skills availability, organizational structure, politics, and maturity, there was valuable insight gained with employees that are "practitioners of EA". These individuals were defined as those who assisted in the delivery of EA related practices and advocated its uptake. This provided a slightly varied perspective within the organization on the role that EA plays in IT Consumerization.

3.3 Directed Content Analysis

Data collected from the interviews was transcribed from voice into text files. This transcribed data was saved in a technology consumable format, which was then analyzed through directed content analysis. Directed content analysis is well suited for validating or extending conceptually a theoretical framework or theory, where existing theory can provide predictions about the variables of interest or about the relationships among variables, thus helping to determine the initial coding scheme or relationships between codes (Hsieh & Shannon, 2005)). Qualitative content analysis goes beyond counting word frequencies for the purpose of classifying large quantities of text into categories that represent similar meanings (Hsieh & Shannon, 2005; Weber, 1990).

While qualitative content analysis is a method of textual data analysis (M. Q. Patton, 2002) well suited for data that require some degree of interpretation (Schreier, 2013), qualitative content analysis seeks to extract categories from data (Cho & Lee, 2014), ultimately aiming to systematically describe the meaning of materials in a certain respect that the researcher specifies from research questions (Schreier, 2013). Qualitative content analysis is quite broad, offering the flexibility of using either, or both inductive and deductive approaches in data

coding and analysis, offering the ability to extract semantic and latent themes (Cho & Lee, 2014). These concepts will be discussed in the following sections.

3.3.1 Deductive Thematic Analysis

In the deductive approach, preconceived codes or categories are derived from relevant theory, research, or literature, whereas the inductive approach draws codes, categories, or themes directly from the data (Cavanagh, 1997; Cho & Lee, 2014; Kondracki, Wellman, & Amundson, 2002). Thus, inductive thematic analysis is a data-driven strategy for extracting categories by examining the data without trying to fit it into a pre-existing coding frame, or the researcher’s analytic preconceptions (Braun & Clarke, 2006). In contrast, deductive thematic analysis are tend to be driven by the researcher’s theoretical interest in the area, and as a result is theory-driven (Braun & Clarke, 2006).

One consideration worth noting is that while inductive approaches are generally better suited for exploratory research, this study followed a deductive approach. The reason for this is twofold. First, as the primary researcher has a background in Enterprise Architecture with knowledge of various industry frameworks, this study aimed to map some of the sensitizing concepts and themes from the TOGAF body of knowledge to the collected interview data. Second, in order to understand how well current Enterprise Architecture frameworks support the needs of IT Consumerization, it was important as a starting point, to validate and conceptually map some of the key themes from existing enterprise architecture frameworks.

Following the descriptive and exploratory single-case study design, for the purpose of this study, a deductive approach was followed, shown below:

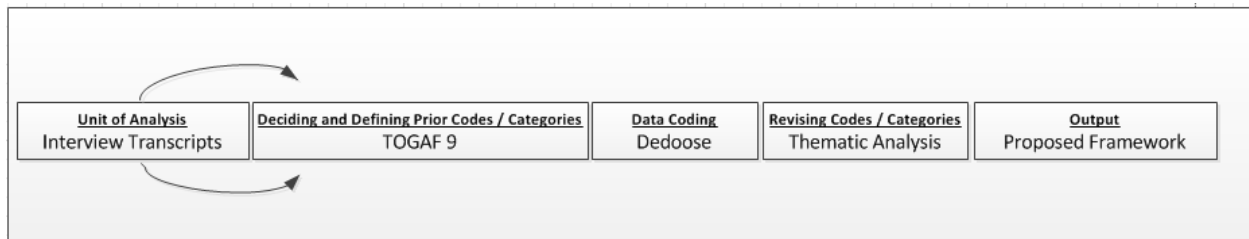


Figure 11 - Procedure for a Deductive Approach to Qualitative Content Analysis – Based on (Cho & Lee, 2014)

Interview transcripts were selected as the unit of analysis, and as previously mentioned, based on semi-structured face to face interviews that were recorded then transcribed to text. By applying the TOGAF perspective of Enterprise Architecture, forming the initial set of codes using the TOGAF body of knowledge, we described this overlap between IT Consumerization and Enterprise Architecture. Data coding was done using Dedoose, and thematic analysis was used to revise codes and categories. The final output of the analysis is a proposed framework.

3.3.2 Semantic and Latent Themes

There are two “levels” of themes in thematic analysis, semantic and latent. While semantic themes code the visible and surface meanings of the data, latent themes code the underlying ideas, assumptions, ideologies, and conceptualisations of the text (Graneheim & Lundman, 2004). Thematic analysis typically focus exclusively or primarily on one level (Graneheim & Lundman, 2004).

Given the descriptive and exploratory nature of this study, this research followed a deductive analysis approach seeking to identify semantic themes primarily and latent themes secondarily. When searching for semantic themes, “the analytic process involves a progression from *description*, where the data have simply been organised to show patterns in semantic content, and summarised, to *interpretation*, where there is an attempt to theorise the significance of patterns and their broader meanings and implications” (M. Patton, 1990), often in relation to previous literature (Braun & Clarke, 2006). In order to identify the *descriptions* and *interpretations*, data coding was used, which are discussed in the following section.

3.3.3 Coding Methods

This research leveraged a *computer assisted qualitative data analysis* (CAQDAS) package called Dedoose, which provided many advantages when compared with a non-technology enabled approach. By freeing researchers from tedious managing tasks, it allows researchers to focus on the data and their reactions to it (Talanquer, 2014). CAQDAS also provides dynamic and simultaneous access to different components of the data analysis, from excerpts to codes to annotations (Talanquer, 2014). In addition, using a computer-assisted approach allows users to get closer to the data and further explore its intricacies (Talanquer, 2014). It is important to note that CAQDAS does not carry out the researcher’s core qualitative tasks such as identifying

meaningful segments of text, building and applying codes, or identifying overarching themes (Talanquer, 2014). As a result, researchers have full control and responsibility over the analytical and interpretive processes (Talanquer, 2014).

3.4 Research Validity Criterion

The research validity of this qualitative research can be evaluated through four main aspects: validity and credibility, reliability and dependability, generalizability and transferability, and objectivity and conformability (Lincoln & Guba, 1985). The latter of each pair have been promoted as suitable synonyms for assessing the soundness of qualitative research when compared to the more traditional quantitatively-oriented criteria in the first of each pair (Lincoln & Guba, 1985).

3.4.1 Validity and Credibility

Validity and credibility determines whether the research results truly measure that which it was intended to measure and how truthful the research results are (Golafshani, 2003). As qualitative research seeks to describe or understand a phenomenon of interest from the participant's eyes, credibility could be established by validating that the research results are true from their perspective and other readers of the study. By conducting a thorough and well-informed literature review using numerous sources, along with multiple interviews in the case study organization, this research demonstrated that a true picture of the phenomenon under scrutiny was being presented to ensure validity and credibility (Shenton, 2004). The initial literature review and theory matching phases during the analysis of the data also offered a useful basis for describing and elaborating the qualitative analysis results, and provided further credibility to the findings in this study.

3.4.2 Reliability and Dependability

Research reliability and dependability focus on repeatability and reproducibility. Truly establishing reliability and dependability would require thorough and consistent research in the field (Lincoln & Guba, 1985), which is one of the limiting factors that contributes to why qualitative studies often lack in the ability to demonstrate reliability and dependability (Shenton, 2004). In addition, the difficulty of recreating the ever-changing business environment the case study organization's face within which this research will occur is also a

limiting factor. However, with that said, this research explored some of the criteria relevant to establishing repeatable results when examining EA and IT Consumerization. Ultimately, this research strived to enable future investigators to repeat the study, in effort to meet the reliability and dependability criterion (Shenton, 2004).

For this research project, coding of data involved more than one judge so that the coding of each category was examined for reliability. For example, reliability of the coding system can be evaluated through computation of coefficients and agreement between multiple judges or coders (e.g. Kappa and Phi). In order to establish reliability and dependability, the code and category changes as well as the rationale behind changes, were tracked within a memo.

3.4.3 Generalizability and Transferability

Generalizability and transferability refer to the degree which the research results will hold true in different context and settings. When compared with a single case study approach to answering the research problem, a single-case study approach lacks in generalizability of the empirical evidence.

In the context of this qualitative research, there are many ways of viewing and categorizing the many concepts within this study. For example, organizations can be analyzed by size (e.g. small, medium, large), geographical region (e.g. USA, China, Russia), industry (e.g. financial, telecom, health), or age (e.g. 5 years, 10 years). Similarly, concepts such as Enterprise Architecture can be analyzed by maturity (e.g. low, medium, high), type (federated, non-federated), authority (formal, informal), or scope of responsibility (management, operations, governance). “Since the findings of a qualitative project are specific to a small number of particular environments and individuals, it is impossible to demonstrate that the findings and conclusions are applicable to other situations and populations (Shenton, 2004).

While having only one case study within one industry (financial, telecom, etc.) may have limited certain generalizations about EA or IT Consumerization across the broader range of industries, this research still contributed to current academic understanding given the general lack of literature in this area. Although each case may be unique, it was still an example within the broader group, and as a result, the prospect of transferability should not be immediately

rejected (Denscombe, 1998; Denzin & Lincoln, 1994). This research sought to explore the criteria and factors that are relevant to cross examining EA and IT Consumerization, building the foundations for establishing dimensions to support true generalizability and transferability of future research in this space. By providing sufficient detail of the context of the fieldwork for a reader to decide whether the prevailing environment is similar to another situation with which he or she is familiar, and whether the findings can justifiably be applied to the other setting, this research can better meet the generalizability and transferability criterion (Shenton, 2004).

3.4.4 Objectivity and Conformability

In empirical research, objectivity is the criterion of neutrality (Lincoln & Guba, 1985). Similarly in qualitative research, in its purest sense, objectivity and conformability assume that a truth or independent reality truly exists as postulated, outside of any investigation or observation (Association of Qualitative Research, 2017). As this is difficult to measure, this research took steps to demonstrate that findings emerged from data and not the researcher's predispositions (Shenton, 2004). By analyzing multiple sources of evidence including an in-depth literature review and interviews, paired with logical un-biased interpretations of empirical findings, this research was objective by remaining impartial to the outcome of the research.

3.5 Ethical Concerns and Procedures

There are various ethical guidelines that are considered during any research study, some of the key ones being: voluntary participation and informed consent, professional integrity and safety of participants, and silencing and plagiarism (Eriksson & Kovalainen, 2008). All research procedures for this study were reviewed by the University of Ottawa's Research Ethics Board to ensure compliance with the Tri-Council Policy Statement on the Ethical Conduct for Research Involving Humans issued by the Government of Canada.

3.5.1 Voluntary Participation and Informed Consent

Informed consent is closely related to voluntary participation and emphasizes that the interviewee is aware of what he or she is participating in. The basic information that was made available to the participants included the purpose of the study and its basic procedures, the roles and identities of researchers and their possible sponsors or other beneficiaries, such as external financiers, and the use of the data that is collected (Eriksson & Kovalainen, 2008). There

were no external financiers for this study. Basic information in the context of voluntary participation included knowing that they could withdraw from the study at any point, and that this information (whether a person is participating or refusing to participate, or withdrawing from participation) would not be shared (Eriksson & Kovalainen, 2008). This basic information and the offer to answer further questions were important in order for potential participants to formulate an opinion about their participation and get further information should they need to (Eriksson & Kovalainen, 2008).

Relevant to these ethical considerations, this research study had two administrative phases. First, a Call for Participation was emailed to potential participants, and was posted on the research supervisor' University of Ottawa website. This call for participation provided in summary the research study, procedures involved, and clarification that participation is voluntary. It is important to note, that at any time during the research study, especially during the interview, participants were allowed to withdraw if they chose to.

Second, each participant was required to read, sign, and submit an Information & Consent Form, indicating his/her agreement. This Information & Consent Form provided in detail, the basic information, mentioned in the paragraph above, required for giving informed consent. At the beginning of each interview, consent for the interview, voice recording, and transcription was confirmed on paper all interviews.

3.5.2 Professional Integrity and Safety of Participants

Professional Integrity, which in the context of academic research, describes the ethics and rules needed specifically in order to protect the rights of persons being studied or researched (Eriksson & Kovalainen, 2008). Research did not bring any harm to participants, and it was extremely important to respect and protect the integrity and confidentiality of the data generated from said research (Eriksson & Kovalainen, 2008).

Further to this, respecting the anonymity and privacy of those involved in the interviews, especially as this had been agreed upon from the beginning of the interview with each person and company (Eriksson & Kovalainen, 2008). The data collected as part of this research was stored on a secure computer, only accessible to the student researcher and thesis supervisor.

The interview questions and collected responses contained no personally identifiable information. To facilitate this, “face-codes” were assigned to each participant based on their job role and industry. For example, the first interviewee in Figure 10 of Section 3.2 was referred to as “P01 Enterprise Architect” in all phases of data collection, analysis, and the subsequent production of this final thesis. These “face-codes” also help readers understand which statements and quotes are made by the same person when referenced, while ensuring interviewees retain their anonymity.

3.5.3 Silencing and Plagiarism

The ethical concerns of silencing, and more severely, plagiarism, are also important ethical considerations in academic research. Silencing can be summarized as not giving due credit to researchers who have contributed in any way, shape, or form to your research. “Referring in a right and proper way to other researchers’ scientific input and results, and acknowledging their intellectual property rights, is an important part of academic research activity” (Eriksson & Kovalainen, 2008). Plagiarism is often seen as something even more serious, as presenting someone else’s work as your own can be considered an intellectual property crime in many countries, even though within the research community it is often seen as an ethical issue (Eriksson & Kovalainen, 2008). As a result, this research study was extremely careful with respect to properly citing the work of others, and giving credit to the sources that were used in the development of this research initiative to avoid silencing and plagiarism.

4 Empirical Findings

This chapter presents empirical findings of the 5 interviews conducted for this research project. These interviews covered various topics within two main domains: Enterprise Architecture and IT Consumerization. As the primary purpose of the interviews was to better understand the various roles of Enterprise Architecture in the context of IT Consumerization, only the themes that are relevant for this research study are presented. This section will present the findings related to IT Consumerization, then the role that Enterprise Architecture can play within IT Consumerization. Note that some sections may include references to new concepts that are relevant to the analysis of our findings. As previously mentioned, face-codes are used for both the interviewees and organization in order to ensure anonymity and privacy.

4.1 Lens of Analysis - The Cynefin Framework

This research project's findings with respect to IT Consumerization were largely oriented around the complexity of decision making, consensus, and strategic direction setting. While trying to understand the role that Enterprise Architecture plays in the context of IT Consumerization, there were some difficulties associated with understanding the various decision making contexts that existed, and how that potentially affected some of the key concepts. In order to make sense of what we found, we used the Cynefin framework as the lens of analysis.

While the Cynefin framework originated in the practice of knowledge management as a means of talking about the interaction of formal and informal communities with structured processes and uncertain conditions, it has since outgrown this and has been used in consultancy and action research in strategy, management, training, cultural change, policy-making, product development, market creation, and branding (Kurtz & Snowden, 2003). It also has been applied to areas of leadership, customer relationships management, as well as supply chain management (Kurtz & Snowden, 2003). As such, the Cynefin Framework is a useful framework developed to allow executives and leaders to see things from new viewpoints, assimilate complex concepts, and address real-world problems and opportunities (Snowden & Boone, 2007). There are four main contexts within which decisions are made, shown below: Simple,

Complicated, Complex, and Chaotic. In the original model, the contexts were called domains (Kurtz & Snowden, 2003).

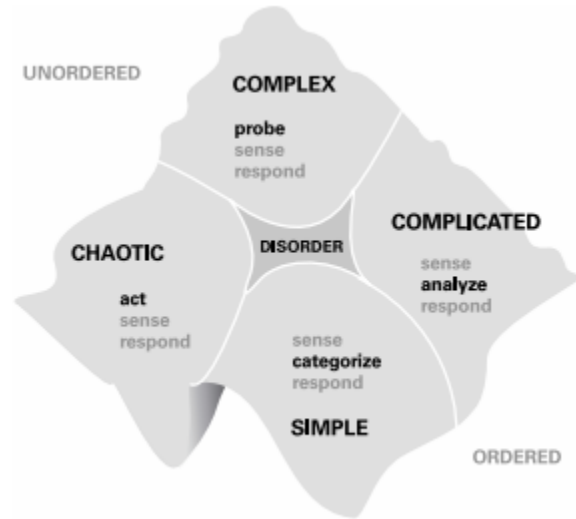


Figure 12 - Cynefin Framework - (Snowden & Boone, 2007)

The following sections will provide an overview of the 4 decision making contexts. After that, the empirical findings related to classifying the IT consumerization phenomenon based on observations within our data will be presented.

4.1.1 Simple Context

The simple decision making context is characterized by repeating patterns and consistent events, and clear cause-and-effect relationships evident to everyone, because there is a right answer that exists (Snowden & Boone, 2007). The relevant variables for decisions making are also known, and the decision making style is fact-based. Leaders facing simple problems should “assess the facts of the situation, categorize them, and then base their response on established practice” (Snowden & Boone, 2007). Examples of simple problems include a payment that is inaccurately applied, where the employee can look up a policy to see how to respond properly. Another example of a simple problem would be a standard IT incident ticket that has a fix. The help desk employee simply needs to categorize the problem to identify the solution. The simple context was called the known domain in the original model, similarly characterized with

standard operating procedures and cause effect relations that are repeatable, perceivable, and predictable (Kurtz & Snowden, 2003).

4.1.2 Complicated Context

The complicated decision making context requires expert diagnoses, as the cause-and-effect relationships are discoverable but not immediately apparent to everyone and there is often more than one right answer possible (Snowden & Boone, 2007). In this context, the relevant variables for decision making are “unknown”, but this is a known fact, and as such, with the proper diagnoses and understanding, a fact-based management style is appropriate. “Complicated contexts, unlike simple ones, may contain multiple right answers, and though there is a clear relationship between cause and effect, not everyone can see it” (Snowden & Boone, 2007). Complicated decision making should start with sensing, then analyzing, then responding. Examples of complicated decisions include choosing a telecom provider given the many options available with variables such as price, quality of service, and others. In the original model, the complicated context was called the knowable domain, characterised with systems thinking and scenario planning and issues around whether or not an organization can afford the time and resources to move from the knowable to the known (Kurtz & Snowden, 2003).

4.1.3 Complex Context

In contrast, the complex decision making context is slightly less ordered. It is characterized with unpredictability, where there are no right answers, and unknown unknowns (Snowden & Boone, 2007). In this context, there is a need for creative and innovative approaches due to the many competing ideas that may emerge. Compared with the complicated decision making context that has at least one right answer, the complex context may not have a right answer. “It’s like the difference between say, a Ferrari and the Brazilian rainforest. Ferraris are complicated machines, but an expert mechanic can take one apart and reassemble it without changing a thing. The rainforest, on the other hand, is in constant flux – a species becomes extinct, weather patterns change – and the whole is far more than the sum of its parts” (Snowden & Boone, 2007). It is key to note that Snowden & Boone (2007) state that leaders who try to

impose order in a complex context will fail, thus the approach to dealing with these problems is to probe, sense, and respond.

4.1.4 Chaotic Context

The chaotic decision making context has no clear cause-and-effect relationships, so “searching for right answers would be pointless” (Snowden & Boone, 2007) . The variables here are simply “unknowable”, and there are many decisions to make with little time to think. Snowden and Boone give the terrorist attack on September 11, 2001 as an example of a chaotic decision context. “In the chaotic domain, a leader’s immediate job is not to discover patterns but to stanch the bleeding. A leader must first act to establish order, then sense where stability is present and from where it is absent, and then respond by working to transform the situation from chaos to complexity, where the identification of emerging patterns can both help prevent future crises and discern new opportunities” (Snowden & Boone, 2007).

4.2 IT Consumerization is Complex

Based on the Cynefine framework, our findings indicate that IT Consumerization is complex based on few key dimensions and characteristics identified in the previous section: unpredictability, unknown unknowns, and the lack of a single “right” answer. As previously mentioned, Snowden and Boone also state that when leaders try to impose order in a complex context, they will fail, and thus the approach to dealing with these problems is to probe, sense, and respond (Snowden & Boone, 2007) . This section will share the empirical findings in our data with respect to these characteristics and dimensions of a complex decision making context.

4.2.1 Unpredictability

At the case study organization, business users were allowed to submit “small software requests”. Small software were essentially applications that business users wanted to use that were not offered corporate wide, and did not serve as an enterprise application or authoritative system of record. These requests driven by end-users, ultimately introduced technologies into organizations from the bottom-up, as discussed in Section 2.1.1 of this research study. Our research found, however, that many of these user requested applications often presented challenges that were representative of non- enterprise grade technologies. Consumer-grade technologies entering organizations, one of the key challenges associated with IT

Consumerization created issues with security among other concerns such as unpredictability of these technologies, ultimately increasing the complexity of management and governance of IT Consumerization strategies.

“We have learned that by trying to support any app, through like a small software request, it almost always fails when it gets to security. These things are not enterprise grade.”

– P03 Senior Enterprise Architect

Business and technology user expectations with respect to functionality, user interface, usability, among other relevant criteria pertaining to technology solution selection, were also seemingly unpredictable. It was noted that these expectations continuously change, and many times these expectations were simply unreasonable for an organization to assist in achieving.

“The grass is greener on the other side, the more you can’t have something, the more you think it is a panacea, because we’ve had people ask for apps, and then we show them how to use the apps we have, and they say, oh that’s what I was trying to do, it’s just that my neighbor showed me this, or I use this in my personal life.”

– P03 Senior Enterprise Architect

When asked what some of the key IT consumerization challenges the case study organization faced, unpredictability of requirements emerged as a key finding in another one of our interviews. This was evident through an observation that one of the biggest challenges in the BYOD context was defining a legitimate and minimum requirement.

“Enabling a BYOD environment, yet maintaining, I’m going to call it a minimum, but really truly defining a legitimate minimum requirement in terms of care and control, and I think that’s the biggest challenge”

– PO1 Enterprise Architect

IT Consumerization as a phenomenon was also observed as being unpredictable in the sense that some of the consequences and implications were not clear to employees both who were or weren’t actively engaged in an IT governance, management, or operational role. For example, one of the employees at the case study organization had unknowingly handed over publishing rights of organizational data by signing up for a free service.

“There’s a lot of consequences to some of these choices and in some cases, people, even when there’s no exchange of money, somebody signed up for a free service, and by doing that, it passed over rights to content that [case study organization] was authoring to the provider. So they could use our content as a result of the agreement. That was something that should have never happened.”

– PO4 Senior Solutions Architect

IT Consumerization from an Enterprise Architecture role perspective had also presented some operational uncertainties, as the nature of the problems was not always clear or predictable. Clarity around roles and responsibilities of various types of architects in the context of IT consumerization had also been unclear.

“Because we have so many different levels of architecture here, it’s not always, we don’t always have consensus on who’s supposed to be doing what at what level, so that can become a challenge just because role definitions aren’t necessarily the same across the board.”

– PO1 Enterprise Architect

4.2.2 Unknown Unknowns

A key finding that emerged through our research was that it was evident that there is not a holistic or comprehensive understanding of all the variables involved in the IT Consumerization phenomenon. While there seemed to be a preliminary understanding in industry and academic literature as discussed in Section 2.1, it was observed that many of IT consumerization variables may actually be use-case specific, and even industry specific.

“I think there are a lot of variables that we don’t think about. We generalize a lot, but there’s a lot of concrete cases, and specific to each piece of technology that are not necessarily [addressed]. I don’t think that we dive deep enough to each use case, to really understand what all the different variables are.”

– PO5 Senior Solution Architect

Industry standard best practices such as whitepapers and research articles that currently exist also were observed to not adequately address the IT Consumerization phenomenon, suggesting there is no comprehensive or holistic understanding of all the variables involved, or a clear understanding of the possible right ways to address these problems. It is evident there are still unknown unknowns.

“I don’t think anyone can fully enumerate all of that stuff, and that a lot of it is contextual. So what they do is they provide a lot of thinking points, so that you can really figure out how it’s applicable to your particular context. But I don’t think you can just go and download an answer sheet for exactly how you should do any of these things.”

– PO4 Senior Solution Architect

For example, as discussed in Section 2.1.3, many frameworks for IT Consumerization highlight data sensitivity and security as a key concern that management should be focused on. One of the key challenges for Enterprise Architecture practices within the case study organization was the lack of frameworks enabling consistent risk assessments towards variables such as data.

“I would say our lack of frameworks that allow us to do risk assessments on things like our data [is the biggest challenge]. That’s a huge deal, every time we do it, it’s like we’ve done it for the first time. Doesn’t matter how many times we do it, we do not have a repeatable pattern there, it’s very difficult to assess sensitivity of things to gauge privacy concerns.”

– PO4 Senior Solution Architect

During the course of our research, one of the areas that warranted additional probing was focalized around transferability of IT Consumerization variables across different industries and organizations. It was observed that unlike other disciplines like project management and engineering, variables that were relevant in the context of IT consumerization were different across industries and organizations.

“No, I think that [the variables relevant in the context of IT Consumerization are] going to be market specific, geography, workforce specific, demographics, all of things need to be taken into consideration.”

– PO4 Senior Solution Architect

In the context of decision making at the case study organization, the Enterprise Architecture practice was often working in an environment with unknown unknowns, and no formal direction. As EA is often referred to as a practice that executes business strategy, it was observed that in the IT Consumerization phenomenon, there was no formal direction or understanding. As such, the EA practice often worked in unknown unknowns as well, given the emergent nature of IT Consumerization, and the lack of business leadership. An analogy of

“known unknowns” would be one child not knowing how to run but having the opportunity to see how it is done by his parents and understanding the concept of running. In contrast, a second child who has not seen the parent run does not even understand the concept of running. The variables involved with the concept of running to the latter child would be referred to as unknown unknowns. Similarly, EA cannot use previous business direction and apply those concepts to current IT Consumerization contexts; rather these unknowns must be identified. One assumption or theory could be that some of these unknown variables to EA were also unknown to business leaders and even more broadly, industry.

“Lot of times, EA has basically had to reverse engineer what the corporate direction is, because it hasn’t been provided in a very straightforward consumable way. So it’s more looking at things like the Corporate Plan, and sort of infer what direction that really means for us and what things will be necessary in order to get there, and then what things we have versus what things we lack, and of the things we have are they suitable for purpose or not. So a lot of that has been going despite direction, as opposed to because of direction.”

– PO4 Senior Solution Architect

4.2.3 Lack of a Single “Right Answer”

When asking if there was more than one right approach to addressing and responding to IT Consumerization, it was evident there was no “right” answer, but rather, many. This observation was well aligned with the Cynefine Framework’s classification of a complex decision making context.

“Absolutely [there is more than one right approach to responding to IT Consumerization].”

– PO5 Senior Solution Architect

Our data also validated two key stances, or philosophies, as presented by J. Harris et al. (2012) in Figure 6, Section 2.2 of this research study, that the case study organization had towards IT Consumerization: enablement-oriented and restriction-oriented.

“We are starting to look at a different way of ‘controlling’ the environment. The situation is the environment will always be changing, we must be adapting, and we must, we have to look at the controls we have in place, the methodologies we’re using those controls to enforce. We need to make sure those are enabling, and not controlling. And I think that’s the biggest shift,

we're starting to see that in a security perspective. We're looking at providing capabilities opposed to taking away capability or restricting capability."

– PO1 Enterprise Architect

While some architects were more suggestive than others that there may or may not be a right approach currently, we felt that categorizing an organization's approach to IT Consumerization as either restrictive or enabling was difficult to measure based on criteria. For example, another architect had suggested that the organizational philosophy was still rather restriction oriented, and that the transition to an enablement stance had not fully materialized yet.

"I think the biggest fear that [IT has] here is, we don't know, we don't have an understanding of what the devices are, we fear the unknown, and instead of turning it around to be "I'm going to be enabling these devices" it's a little still "how are we going to restrict these devices", so it's a mindset. Today, it's sort of the difference between a white list and a black list. I think BYOD has been misunderstood, and we still tend to put security and constrain technologies around the client, as opposed to the back end systems. I think that's a shift we can do."

– PO1 Enterprise Architect

Some architects did not even identify with either of those, and took a more trade-off oriented perspective, suggestive of the middle ground strategies as identified by J. Harris et al. (2012) in Section 2.2 of this research study.

"We'd allow anybody to use any app they wanted, but the key is, if you're going to use our data we got to be able to know where is it, [and] who's looking at it."

– PO2 Enterprise Architect

It was evident that there was no right answer, as the data revealed that the stance towards IT Consumerization related issues had changed over time and arguably still undergoing change. Whether a function of maturity of the organization, or if the industry practices had changed, it was clear that there was no single "right answer" when addressing these issues. It was evident that at one time there was a restrictive approach that eventually changed to an enablement approach. Both of which were valid at their times of implementation for various reasons, but overall, it still wasn't clear whether or not enablement was the right answer either. There were multiple shifts and changes in policy indicating that there was no right answer.

“Everything was kept completely separate. So that sort of shifted to, okay well you can actually use your current box for it, and we started to virtualize machines. So that led to another big shift, then we started going mobile ... So there’s been a pretty big shift from onsite, oversight, to just get your work done and do it wherever you have to.”

– PO4 Senior Solution Architect

Another interesting finding in the data was closely related to the ownership and purpose matrix as presented by Niehaves et al., 2012 in Figure 5, Section 2.1.2 of this research study. We observed that the case study organization had also changed its position and stance on device ownership and purpose and their authorizations with respect to how they are used.

“So in the last year there has been a more formal separation between company issued devices and personal devices, that we do not support personal devices. So it used to be that there was a best effort made, but there are too many personal devices now, and they are too disparate, and it’s using up too much time. The company does not want to pay for someone to bring a device, if they’ve already issued them a perfectly good device”

– PO3 Senior Enterprise Architect

This clearly shows that there is no right answer when it comes to how to provisioning BYOD. While the previous stance was inclusive of personal devices, the current stance only allowed for corporate devices to be used for both personal and work purposes. Given the change in stance, it is evident that the current choices made may not be the “right answer”. Many other options could have potentially been viable, such as those presented in Section 2.1.3.

Another observation was the stance around employees accessing work systems remotely, and how employees were allowed to telework. The policy around this had also been changed over the years, in response to the needs of IT Consumerization, also suggestive that there is potentially more than one right answer when approaching various IT Consumerization decisions.

“Well when I got here, even a simple thing like development tools. You had a physically separate machine, and you connected to a segregated domain, it wasn’t the corporate domain. So everything was kept completely separate. So that sort of shifted to, okay well you can actually use your current box for it, and we started to virtualize machines. So that led to another big shift, then we started going mobile. And everybody had devices that existed outside of the organization, and there was some reluctance with large portions of management to have anybody work outside the office walls unless it was absolutely necessary. To now, people are

freely encouraged to do that stuff and work happens anywhere. So there's been a pretty big shift from onsite, oversight, to just get your work done and do it wherever you have to."

– PO4 Senior Solution Architect

4.2.4 Failing When Trying to Impose Order

A key characteristic of complex decision making contexts, as per The Cynefine Framework, is that due to the unpredictability, unknown unknowns, and lack of a "right answer", when leaders try to impose order in a complex context, they will always fail. Our findings that are presented in this section with respect to this characteristic further validate this statement.

It is important to note that failure here is being defined as including changing a previously made "order" or policy to adapt to new environmental variables. For example, IT Consumerization is a constantly changing environment, and methodologies on how to approach the problem have changed. As such, the methodology that was once implemented was changed because it was wrong or was about to fail. The criteria for establishing that things have "failed", will be based on whether or not the original implementation of it has changed significantly in a theoretical sense. For example, the case study organization realized that imposing a restrictive policy towards IT Consumerization had resulted in people circumventing controls, giving rise to issues such as shadow IT, or in other words, unsanctioned IT. Thus, the restrictive policy itself would be considered as failing to achieve the business outcome it was expecting.

"We're looking at providing capabilities opposed to taking away capability or restricting capability. So by providing the right capability to [the] user, anticipating, at least anticipating the needs, and providing the capability in order to consume those needs, they're less likely to bother trying to look at how they can go around the restrictions we are trying to place on them, and in fact, they tend to start working with you to say 'hey my needs have changed' so then you can incidentally change the capability if necessary. I think that the big shift, we have to stop treating the alternatives (i.e. the things we don't have) as that's bad, that'll never happen here, to okay, I don't understand what the impact about that is. It's going to happen, so how can I help it to happen here, in a way that's not going to hurt us."

– PO1 Enterprise Architect

It is evident that in the complex context, both restrictive and enablement perspectives have their own failures. As previously exemplified by the example where an employee of the case study organization had unknowingly signed over rights to organizational data for a free service,

there are still serious concerns associated with an enablement approach to IT Consumerization. In addition, it was noted that shadow IT continued to exist under both of these philosophical approaches. While the EA practice was aware of these scenarios, it was evident that there were still users circumventing corporate policies that existed. When asked how aware their organization was of non-corporate sanctioned devices and apps (shadow IT), it was clear that there was disagreement.

“We don’t have a, no I don’t think we have a really, really good view. We have a pretty good view about how much information egress there is, so the use of drop box, and the amount of emails with attachments that leave the building. Devices, if they’re not enrolled, we don’t know. We certainly know that the web client is accessed a lot, but you can access the web client from a corporate device. So it’s difficult, so I would say we have a pretty poor data view of that, just anecdotal.”

– PO3 Senior Enterprise Architect

This compared with another architect’s perspective, of the same issue suggested misalignment of expectations within the organization of what “success” looked like. It is our opinion that the absence of clear success and consensus that success was met, is indicative of failure.

“I would say, very aware [of Shadow IT].”

– PO1 Enterprise Architect

While the transition of stances has not necessarily contributed to addressing shadow IT concerns, it is evident that these policies may have not achieved their intended purpose, as the policies have been centric around identifying what applications and technologies user should be able to use.

“ I think that when it comes to things like document sharing, any kind of Dropbox, that type of functionality, that people are probably freelancing a little bit with their own personal stuff, because they find it more convenient than the corporate standard, so that’s probably going to be a shift that the corporation needs to make, that’s going to be a driver, like we know people are doing things they shouldn’t, but we don’t have the solution to provide, we’re going to have to get better at that.”

– PO4 Senior Solution Architect

It was also clear that gaining consensus and common agreement across leadership and approval bodies for IT Consumerization related standards also proved difficult. Even when the standards were approved, getting them adopted, in the sense that the organization would obey and proactively adhere to them, was another hurdle. Many of the standards were just focused on the fact that technology shouldn't be an afterthought, but rather something that the business leadership should have engaged architects with earlier prior to making decisions. This validated the top down IT thought leadership from the business as discussed in Section 2.1.1 of this research study. The context of our research findings, however, was that Enterprise Architecture as a practice may not have always been engaged early on enough for an effective decision to be made. This observation identified that standards, the organizational method of imposing order, had many challenges of their own, to the point that some may consider it unsuccessful.

“The absence of certain standards here at [case study organization], the imposition of standards where there's previously been no standards, so trying to get adoption and things like that [have been some of the biggest IT Consumerization challenges]. Basically trying to be involved early enough to ensure that technology's not an afterthought in the conversation so that we're positioned to be successful for the business when they need us to be.”

– PO4 Senior Solution Architect

There have also been issues where problems arise due to a lack of a formal decision or policy, which has triggered responsive action by the IT organization, suggesting that these are not simple problems that standardized approaches can always foresee and predict. These reactive measures are to limit damages and are often made with little time available, suggesting that IT Consumerization may even exhibit traits of a chaotic context, as defined in the Cynefine Framework. Again, the observation here was an employee who signed up for a free service, which unknowingly gave the technology solution provider rights to all of the data that was stored on the platform. This required swift action to minimize the damages and reduce the risk of policies that had previously failed. A key finding was that policies were sometimes ineffective in the IT Consumerization space because users continuously tried to circumvent this “imposed order”.

“I think the reality was people were, the savvy user base, was actually enabling themselves. And, they kept trying to put holes, and corral, and corral the cats, and plug the holes, and people were just actually more technologically savvy than the actual capabilities we had to corral it.”

– PO1 Enterprise Architect

The policies that were implemented also did not seem to be adequate, given the evolving nature of IT Consumerization, reinforcing the fact that in IT Consumerization contexts, there is no complete holistic way to impose order while addressing all relevant concerns.

“I think there are cases where there’s not adequate policy, and you have to address and write as you see these trends emerge.”

– PO5 Senior Solution Architect

4.2.5 Success Through Probe, Sense, and Respond

One of the key findings evident through the changes of policy and management approach with respect to device ownership and corporate IM/IT access, highlighting the enablement vs. restriction management and governance philosophies, suggested that the probe, sense and respond methodology had been effective in allowing the case study organization to address the needs of IT Consumerization. While the original implementations of policy in Section 4.2.4 were considered to have failed in this research based on the key criteria that they were later changed due to their ineffectiveness, there is evidence that the revision of corporate stances and policies themselves exemplified the case study organization’s ability to probe, sense, and respond. Had they implemented order one single time, it would have failed. However, due to the continual probing, and sensing, and responding, adjusting their stances and policies has proven to be an important factor contributing to success in EA and IT Consumerization context. Our research suggests that effectiveness of tools, business perception of IT as a partner were good measures of success in the IT Consumerization context.

“I think, it’s the, there’s an overarching metric, which is, the business’ perception of how effective their tools are. So whether it be fully delivered by the enterprise or whether it be completely bring your own tools in, it’s really about their satisfaction. So we wouldn’t have to support any consumerization if the business was happy, but if they bring us something they think is better, and we can’t, or choose not to deliver that, then their perception goes down. So, I would say the metric must stay at a very high level, or you have not succeeded.”

– PO3 Senior Enterprise Architect

In addition, business perception and speed of delivery of the technology tools themselves also emerged as measures of success for IT consumerization. Perception of quality and the speed of delivery for additional functionality and enhancements were observed to be underpinning measures of success. Underperforming in these areas would lead to users focusing towards workarounds for the solutions they were given whereas having users leverage the tools and working with IT to grow the solution they had were key to success in IT Consumerization.

“I think honestly when people are not focusing on how I work around what I’ve been given, but start actually how can I enable and leverage and grow what I have, in terms of a solution here, I think that’s how we know we’re at least on the right path.”

– PO1 Enterprise Architect

Return on investment, employee satisfaction, as well as workforce productivity, also provided important insight to the success of how well an organization had met IT Consumerization needs.

“I think ROI, we are spending a lot less on our internal assets versus allowing people to bring their own and pay for that. I think client satisfaction for sure, every user has a tendency to like their own device and personalizing it, so employees are happy, the workforce is happy, therefore we’re more productive. I think that’s about it.”

– PO5 Senior Solution Architect

The following section will provide details around the aforementioned observed scenario of probe, sense and respond within our research data which ultimately contributed to a more successful IT Consumerization outcome. The evolving governance and policy landscape highlighted below indicates there were iterative development cycles of policy and enterprise stance.

“Everything was kept completely separate. So that sort of shifted to, okay well you can actually use your current box for it, and we started to virtualize machines. So that led to another big shift, then we started going mobile ... So there’s been a pretty big shift from onsite, oversight, to just get your work done and do it wherever you have to.”

– PO4 Senior Solution Architect

Success measures were identified through our research, but it is clear that many of the measures are still subjective in nature, and thus to empirically conclude IT Consumerization success within this complex decision making context is very difficult. However, there is qualitative evidence that suggests a probe, sense, and respond approach has contributed to the overall success of IT Consumerization within the case study organization.

Probe

The case study organization implemented various technology tools that enabled IM/IT related probing of information movement within the organization's network, environments, and devices.

"We can scan data through the network [and] we can scan [Microsoft] Exchange to see what's leaving. We have a very good understanding of data entering and leaving our, crossing our firewall."

– PO3 Senior Enterprise Architect

The amount of insight the tools offered were still limited, making it difficult to easily identify cause-and-effect relationships.

"[The organization has] a pretty good view about how much information egress there is, so the use of drop box, and the amount of emails with attachments that leave the building. Devices, if they're not enrolled, we don't know."

– PO3 Senior Enterprise Architect

It was quickly evident that the non-enrolled devices accessing corporate networks resulted in data and security risks. As opposed to immediately taking corrective action, the organizations took the time to "sense" and observe the phenomenon.

Sense

While probing led to an understanding of how data was moving, there was still a need to understand the underlying patterns in this complex decision making context. For example, the organization realized that there was a pattern of business users who were circumventing corporate controls. Corporate phones had policies that were enforced on them, however business users would remove the SIM cards to use in their personal devices, and thus circumventing corporate controls.

“The biggest violation we’ve ever had is people pulling the SIM cards out of their corporate phones and putting them in their personal phones. Because then we don’t have control over the phone, or even how well configured it was. And we don’t know how many people were doing that.”

– PO3 Senior Enterprise Architect

As device and corporate access problems became more of a concern, the organization set out to engage third party expertise to help rationalize and validate patterns, impacts, and relevant factors in addressing some of the issues they encountered.

“We have been very heavily dependent on external resources coming in from the industry, or from different organizations to help tell us how we should be assessing the impacts, and guesstimating those, what those impacts will be.”

– PO1 Enterprise Architect

In comparison to a more standardized approach tailored to the simple and complicated contexts, the organization remained patient, looked for patterns, prior to responding, as opposed to trying to control the situation by immediately insisting a plan of action.

“I think we’ve been trying to figure out what our stance should be by experimenting with a lot of alternatives.”

– PO1 Enterprise Architect

Respond

Based on the case study’s organization rationalization and synthesis of patterns, they decided to change the corporate stance on device policies as well as implement technology solutions to help address user circumvention of these policies as well. As opposed to a direct response by enforcing the policies stricter, they took time to “sense” or observe and rationalize the decision context. Similar to how Snowden & Boone (2007) describe the complex decision making context, it was seemingly impossible to identify a single “correct” solution.

“So I think it became a necessity. They had to figure out something, they had to draw the line in the sand, and they chose to adapt a new technology platform and a new technology stance.”

– PO1 Enterprise Architect

The new technology stance included a formal positioning that personal devices were no longer supported. This was a small step with respect to the larger IT Consumerization phenomenon, but was reflective of a complex decision context as solutions emerge based on patterns that are observed, as opposed to implemented directly in response.

“There has been a more formal separation between company issued devices and personal devices, that we do not support personal devices. “

– PO3 Senior Enterprise Architect

This formal stance change helped provide guidance to subsequent technology implementations that were aligned with the organizational strategy. New technology platforms included a Mobile Device Management (MDM) solution which provided more capabilities with respect to policy enforcement and device immobilization.

“We now have technology that fries the SIM card as soon as you pull it from the phone, but we didn’t have that, that’s MDM, we didn’t have that until this year.”

– PO3 Senior Enterprise Architect

In addition to an MDM solution, additional COTS and 3rd party applications were implemented to assist in overall management of the IT environment with respect to IT Consumerization.

“Today, heavily leveraging COTS and 3rd party applications to enforce policy, ensure usage compliancy, and control connectivity and availability. “

– PO1 Enterprise Architect

4.3 An EA Role Framework for IT Consumerization

Based on our empirical findings, we have developed a proposed EA Role Framework for IT Consumerization. This framework describes the various roles that an Enterprise Architecture practice plays within an IT Consumerization context. The x-axis represents the subject matter domain of expertise an EA role would have, which in the context of IT Consumerization is generally either technology oriented or business oriented. The y-axis represents the problem solving domain for which an Enterprise Architecture role would be focused on. Note, that that both ends of the x and y axis are not intended to be mutually exclusive, and not representative of a scale. Rather, as it is a general assumption that most, if not all, enterprise architects have

some level of business and technology problem solving focuses and skillsets. As such, these scales are meant to contrast the relative emphasises in the 3 EA roles in IT Consumerization. The two red lines represent industry architect titles and their relative mappings against an enterprise's architecture roles within IT Consumerization. Our research suggests that Enterprise Architecture should encompass all 3 of these roles, and a holistic Enterprise Architecture practice would ideally would be competent in both business and technology subject areas, and provide value to both enterprise level business and technology problem solving.

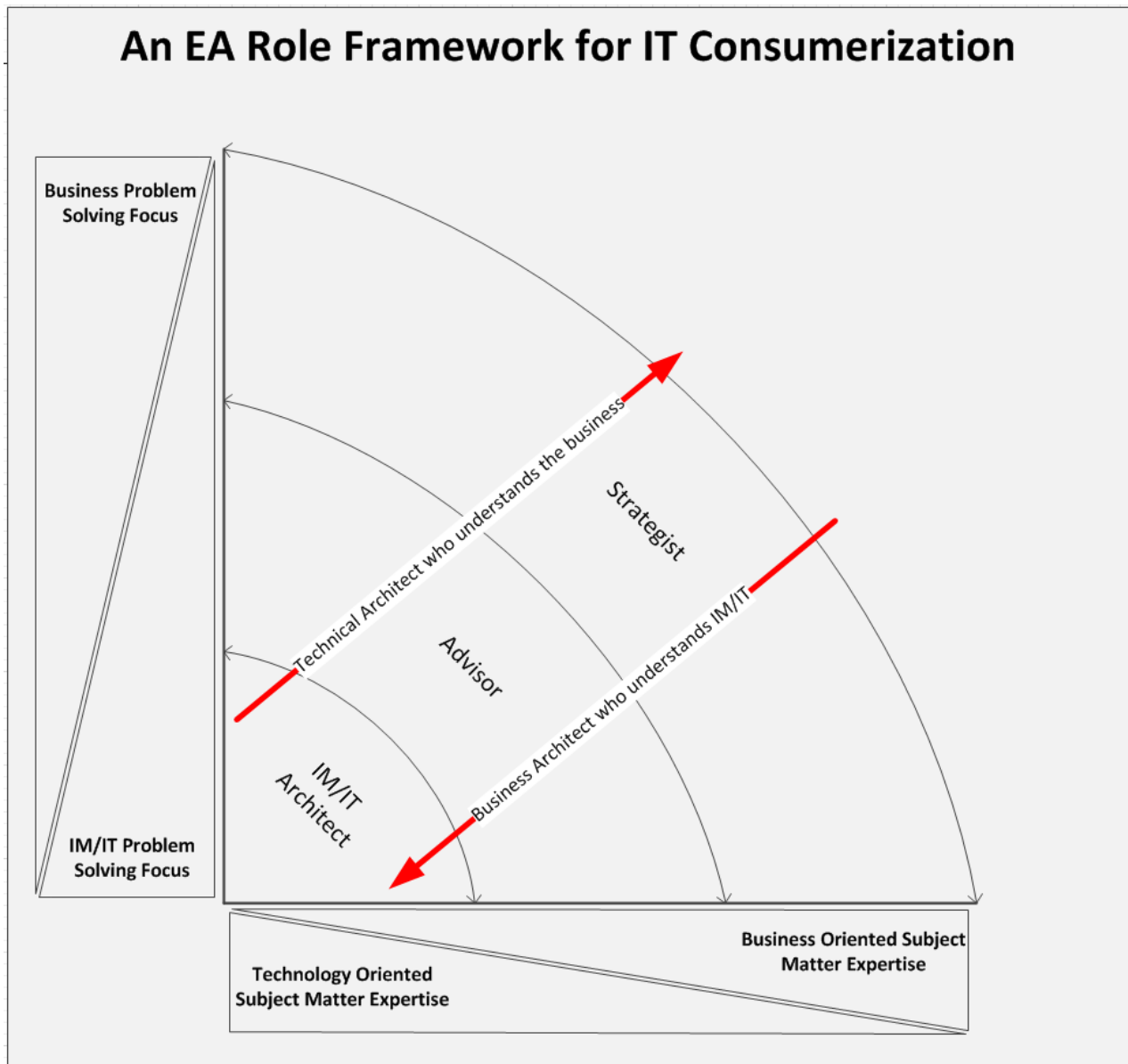


Figure 13 - An EA Role Framework for IT Consumerization (Appendix 7.2)

Section 4.3 will discuss the 3 roles identified within this framework and how technical architects who understand the business and business architects who understand IM/IT ultimately contribute to EA success in the context of IT Consumerization. In addition, below is a summary table of the various focus areas that each EA role has within the IT Consumerization domain, which are further described in Section 4.3.

IT Consumerization Focus Areas	
↑ Technology Oriented ↓	IM/IT Architect <ul style="list-style-type: none"> • Technology functionality and integration • System lifecycle management and technology selection • Business technology and infrastructure modeling and road-mapping • Information management including data security, sensitivity, and federal regulations
↓ Business Oriented ↑	Advisor <ul style="list-style-type: none"> • Business and IT relationship management and communications • Identifying stakeholders and influencing strategic leadership • Facilitating decision making, consensus building, and resolving escalations • Championing adoption of corporate decisions, policies, and standards
	Strategist <ul style="list-style-type: none"> • Business planning, strategy development, and strategic problem solving • Framing the enterprise context and direction setting for change initiatives • Maximizing business value of IT investments • Applying and promoting industry practices and methodologies • Monitoring external business environment and market changes to evaluate relevance of disruptors and trends in terms of impacts, risks, and opportunities

Figure 14 - An EA Role Framework for IT Consumerization (Focus Areas)

4.3.1 IM/IT Architect

A key role that Enterprise Architecture can play in IT Consumerization is the Information Management / Information Technology (IM/IT) architect. While there are many dimensions to IM/IT architecture concerns and challenges within organizations, some of the key ones observed in our research data included security, technology functionality, integration complexity, and maintenance and support costs.

“Security, absolutely number one [IT Consumerization challenge]. Then user misunderstanding of what the devices or apps, or software does. And then lastly, I think complexity of integration, if you have too many disparate systems, the support costs are enormously high.”

– PO3 Senior Enterprise Architect

Other key challenges observed in our data relevant to the IM/IT architect role observed in our data included identifying data sensitivity, data value, as well as legal regulations and requirements pertaining to data.

“You got to decide what truly are your crown jewels in your organization ... [as well as] understanding the ramifications, the legal ramifications of everything is very important.”

– PO2 Enterprise Architect

Technology road maps and reference models were also observed as key aspects of this role in the context of IT Consumerization.

“I’m an Enterprise Architect and my accountabilities are reference models, roadmaps...”

– PO1 Enterprise Architect

While technology roadmaps at a system level are plans detailing system capability based on known future business requirements, technology roadmaps can also be applied at the enterprise level. These enterprise level technology roadmaps focus on business portfolio solution planning at the business unit level, as opposed to a single system or function specific level. For example, instead of developing plans for a single Human Resources (HR) system in terms of which modules would be enabled, enterprise level technology roadmaps focused on whether or not the collection of systems that HR, as an accountable line of business, were the right toolset to achieve known future business objectives. As part of that enterprise level planning, relevant information may include which systems were no longer needed, and which ones needed to be introduced. In essence, the focus of technology road mapping relevant in IT Consumerization to an Enterprise Architecture practice was not a single system specific plan, but rather domain specific plan focusing on a collection of systems. Our research data was also suggestive that the scope of systems in an enterprise level technology roadmap were generally enterprise grade systems managing critical business workflows and authoritative data, as opposed to smaller, productivity applications that were not corporate systems of record.

“We have a digital workplace program which manages, which looks at what the employees need to do their jobs. And increasingly a job isn’t a place, a job is, it’s a job wherever you are

given the appropriate tool, right? So, but, as you know, EA is always part of that discussion, because you need to interact with corporate systems necessarily to do your job at some point.”

– PO2 Enterprise Architect

Reference models were described as frameworks, diagrams, or blueprints of key subject areas that were intended to explain how pieces of the larger picture fit together. While reference model development was not only specific to the IM/IT architect role but also the strategist role, it was evident that this role certainly produces reference models, technology roadmaps being a prime example. Another example of a reference model that the case study organization described as relevant to IT Consumerization was a Hybrid IT framework.

“[The Hybrid IT Framework] specifies the mix between positioning applications internal to an organization versus putting the application in the cloud. And the reason why it’s a hybrid is that of course, not everything is in the cloud, and not everything is on prem. So there’s a framework that you have to follow in terms of deciding where something should go, and then of course, once you go through that framework, then there’s integration concerns, because everything you put outside still has to integrate, presumably, into some of your internal systems. It’s very rare that something’s completely isolated these days. So there are integration concerns, and then there’s of course security. So we have actually set up a framework that understands all of these types of things, or at least a framework that we can position things, so I wouldn’t say that it makes the decision for you, it actually provides the framework for the appropriate conversations to take place to decide where things go.”

– PO2 Enterprise Architect

While reference models could be specific to a capability, subject area, or even a concept, enterprise architects, in the IM/IT architect role at the case study organization, also developed reference models that spanned multiple domains.

“Yeah, I think ultimately EA, Enterprise Architecture, should define, I’m going to call it the overall ‘model’ that everyone should be able to connect what they do, to the big picture.”

– PO1 Enterprise Architect

Technology selection governance was a key part of this role as well, specifically in the context of user-driven IT Consumerization initiatives, as discussed in Section 2.1.1. Often times, the IM/IT architect role was involved with helping the business in selecting a technology solution. An interesting observation was that this IM/IT architect role did not select the product for the

business, but rather limited the product selection based on other enterprise and IM/IT considerations that were relevant.

“Well I think we try to listen to what the business wants early enough that we can influence them to buy a product that is enterprise ready. So we, soon as somebody is interested in something, we’ll do a market scan to see what products are available. And we’ll let them know early, that some products really should not be pursued, and then we work with them, they don’t have to, we don’t choose products for the business, we limit the product selection through guidance”

– PO3 Senior Enterprise Architect

In Figure 13, the role of the IM/IT architect, within the context of IT Consumerization, is predominantly technology oriented in terms of subject matter expertise and problem solving focus. This does not mean that IM/IT architects as a role have no business subject matter expertise or any focus towards solving business problems, but rather that an IM/IT architect does not need to have deep business subject matter expertise or focus towards pure business problems, to be capable of properly carrying out the tasks and responsibilities of this role.

“The business really decides what it is we’re trying to accomplish, what do we need to do, what value do we need to achieve, or what capability are they looking to enable, and then [IM/IT architects] would then turn around and decide how do we technically need to do this, in terms of what kind of platforms and how far to take each platform.”

– PO1 Enterprise Architect

It is evident the IM/IT architect role of Enterprise Architecture is focused on technology problems, and surfaces them to the business. Technology subject matter expertise is foundational to understanding associated technology needs and risks.

“We have to help understand and make sure that the technologies are being represented, that the technology needs and risks are being brought forward for those upper level [business] discussions, and I think that’s part of our role as well.”

– PO1 Enterprise Architect

4.3.2 Advisor

Another key role that Enterprise Architecture can play in IT Consumerization is the advisor. While organizations generally have many different advisory functions and roles, some of the key ones that EA played which were observed in our research data included business and IT consensus building and facilitating the right conversations with the right decision makers and influencers.

“I wouldn’t say that [a reference model or recommendation] makes the decision for you, it actually provides the framework for the appropriate conversations to take place to decide where things go.”

– PO2 Enterprise Architect

Often times the concerns and needs that arise in the IT Consumerization context have not been previously addressed by industry or the organization, as expected of a complex problem as defined in the Cynefine Framework. Enterprise Architecture plays a role as an advisor by providing advice and recommendations to decision makers. This manifests by either recommending outputs of the IM/IT architect role, or identifying and consulting the right stakeholders, anywhere from governance, management, to operational roles, ultimately trying to providing advisory to decision makers for approvals that may be complex. At the case study organization, it was clear that EA did not make all IT related decisions, and as such, often played an advisory role in some scenarios. For example, in the earlier stages of the case study organization’s EA practice, the advice that the EA group provided was often rejected at an operational level.

“[At one point], EA [was] a non-entity that provided opinions that were often rejected at the delivery level”

– PO4 Senior Solution Architect

This data provided insight towards potentially why the EA group later focused towards assisting and convincing those in approval roles, when strategically functioning in an advisory capacity, as opposed to operations roles.

“Organizational culture can influence exactly what you can do as an architect. For instance, cloud computing has developed as a standard component of, I’ll call it Enterprise Architecture

practices, but certain organizations are more accepting and more open to the new approaches, so you have to achieve a balance that is suitable for your organization. We have to get approval from the various constituencies. A part of it is the policies for all these organizations haven't really been defined yet. Nobody has actually said these are the rules though shall follow."

– PO2 Enterprise Architect

The data clearly showed that EA did not make all IT related decisions and was not considered management leadership, and as such, often played an advisory role. However, it was observed that the EA practice at the case study organization interacted with the majority of corporate business leadership to understand the needs.

"I think EA can play a fundamental [role outside of IT], because by our nature, we interact broadly across the organization in order to understand the needs."

– PO2 Enterprise Architect

EA did not report to these IT leaders that they were advising and partnering with, and the consensus building and facilitation of decision making was often considered cryptic and complicated within the IT Consumerization context.

"You're trying to set a direction as to where the corporation should go. And in that regard its difficult because identifying where leaders should go, when you are not a leader, can be coming from a position of lack of authority or trust, and it is often very complicated and leaders obviously, intelligent in many areas, might not be in the area of IT, so it's very cryptic and complicated, and in some regards I think that [leaders] just want to forget about it."

– PO3 Senior Enterprise Architect

While this observation suggested that EA may sometimes be perceived as lacking of authority and trust, there was also data suggesting that EA was a trusted party to help resolve escalations. While EA may not have had direct ability to resolve the escalation, they certainly knew who needed to be involved, and what needed to be done. The fact that the scope of escalations included non-architectural issues, suggests that EA indeed had a reputation of getting things done and, or resolved.

"People would come here, to the EA positions here, and any time there was lack of clarity or a lack of understanding, they were brought in, whether it was architecture or not. We were seen

more as the advisory group type of capacity. Nobody really understood what it was, but everyone knew that we kind of needed it.”

– PO1 Enterprise Architect

In addition to facilitating consensus building and assisting with issue and problem escalations, the Enterprise Architecture practice also found themselves helping champion the adoption of recent decisions, policies, and standards.

“The absence of certain standards here at [case study organization], the imposition of standards where there’s previously been no standards, so trying to get adoption and things like that [is one of the biggest challenges and pain points I face as an architecture practitioner].”

– PO4 Senior Solution Architect

Beyond facilitation and consensus building role, Enterprise Architecture also played a key role in helping maintain overall positive relationships between business and IT. Note that we do not refer to business and IT at a person to person level per se, but rather the overall working relationships of corporate functions. While EA plays and IM/IT architect role, sometimes the decisions made in that capacity do not resonate well with the business. In the context of IT Consumerization, EA played a key relationship management role, ensuring that business relationship between IT and the business were perceived as enabling and not as an obstacle.

“People don’t like to be told they can’t have something when they get it in their head that it is better, so it’s not for IT to limit the businesses ability, quite the opposite, we are here to enable the business, so we have to ensure that we are perceived as such.”

– PO3 Senior Enterprise Architect

In Figure 13, the role of the advisor, within the context of IT Consumerization, has a good mix of business and technology in terms of subject matter expertise and problem solving focus. While this does not mean that the advisory role does not have deep business or technology subject matter expertise or deep focus towards solving business or technology problems, but rather that the advisor role does not require deep business or technology skills or problem solving focus to be capable of properly carrying out the tasks and responsibilities of this role. A good balance and mix of skillset and problem solving focus in both business and technology is far more valuable to this role than deep skills and problem solving focus in only one of the two.

4.3.3 Strategist

A third role that Enterprise Architecture can play in IT Consumerization is the strategist.

“Enterprise architect is the most strategic [role in IT].”

– PO3 Senior Enterprise Architect

The strategist role was identified as a business savvy individual focused on solving business problems using IM/IT. A major assumption here is that IT as a business unit can also be treated as a line of business similar to a finance or marketing function within an organization. Similar to a strategic function within a business unit seeking to maximize business investments, enterprise architects play a strategic role supporting business planning and strategy development.

“[Formal planning] actually positions everything in a rolling sort of, okay there is where we are, this is where the rest of the world’s, so of course that EA has to play a key role in that... we better be doing a fundamental role in strategy.”

– PO2 Enterprise Architect

In the context of IT Consumerization, the EA strategist role also seeks to maximize value out of technology investments, viewing the IT function as another business function.

“We want to get the most value out of our technology investments, so I wouldn’t call it optimization, but we want to actually ensure that we’re getting the value out of the technology investments that we’ve already made, while making sure we can keep up with industry trends, and industry best practices in terms of agility, in terms of speed of delivery.”

– PO2 Enterprise Architect

The focus on value and industry, agility, all suggest that IT in itself plans, governs, and prepares for the future similar to any other line of business function. While IT is generally considered an enabler of other business functions, there are still many strategic roles that are required, specific to IT, in the context of IT Consumerization. Our data showed that EA was indeed involved with helping the business solve strategic problems.

“I think the real purpose and value and EA is to reach out there and understand the business problems and business opportunities that may be out there for the organization and say, I now understand the business problem statement, now let’s apply the technology, in a sense the technology is just one aspect of what we’re supposed to do, we’re just, our scope should be able

to solve business problems that sound rather high in the sky, but genuinely that's what we should be able to do. And we only use technology as a kit bag that we bring along after we understand the true business, or the true problem that's important to the business."

– PO2 Enterprise Architect

In order to effectively carry out this role, applying and promoting industry best practices and methodologies when problem solving was identified as a key approach of the strategist role.

"I think again it's a process, we're not there yet, but we're at least starting the conversations with the appropriate people to have a more open mindset. So, but that has to start with EA saying this is what the industry practices are, to the extent that, our job is to reflect the best of industry and real-world best practices within [the case study organization]."

– PO2 Enterprise Architect

When looking to understand why industry best practice alignment was such a key concern for EA strategists, the data suggested that industry best practices are typically considered to be the most effective tools for problem solving, as well as ensuring alignment with industry. For example, the way an organization defines processes, terminology, artifacts, even capabilities, are critical when communicating with external parties and aligning to industry best practices, or else what an organization refers to as change management, may be considered part of knowledge management in industry.

"Industry standard, we are trying to adopt the most widely recognized, effective tools for the different prefaces within the industry. The reason, if you're going to ask that, is because we want to be as easily consumable as possible."

– PO1 Enterprise Architect

Awareness of and ability to contextualize the external environment as well as industry and market changes were also a key focus relevant to the strategist role. For example looking at external disruptors and trends, such as those related IT Consumerization, and evaluating their relevance in terms of impacts, risks, and opportunities to the organization.

"We evaluate [external disrupter and trend] likelihood in the market, we evaluate them and their likelihood in our market, and we evaluate them in the usefulness of [our organizations]."

– PO3 Senior Enterprise Architect

There was also evidence that an industry research focus and awareness was a crucial part of the strategist role.

“I would say, informally, [we use external expertise to support IT Consumerization efforts] through our research and direction setting in Enterprise Architecture”

– PO3 Senior Enterprise Architect

While subject matter expertise is relevant, business problem solving skills oriented towards business problems are key enablers to successful strategy development. The end goal of the strategist was to ensure long term sustainability of the business by enabling educated and well-informed strategic planning. An analogy of the EA strategist role in this context is providing the guardrails on a road without driving the car or telling the business which lane to use.

“Well, it’s understanding the ecosystems that you have internally, and the ecosystems that you partner with externally, and understanding how they’re working together, and if something changed or needs to be changed, that you can do so without impacting. It should guarantee that you’re future proofed, in terms of you’re aware of everything, or you should be aware enough of future trends that you don’t go “oh, that was a huge surprise”. And the second thing is, we’re an insurance policy in some sense, we are the guard rails that say well this is the prudent way to proceed so that you don’t [crash], EA makes sure [the case study organization] moves forward without falling off a cliff.”

– PO2 Enterprise Architect

While those observations were more oriented towards framing the business context by which the corporation had to play within, the strategist also played a role in telling the car where to go.

“You’re trying to set a direction as to where the corporation should go”

– PO3 Senior Enterprise Architect

In order to successfully provide direction, a very future oriented perspective was observed as a being a key characteristic. Synthesizing external factors as well as internal factors, and correlating them with business objectives were fundamental to the strategist role.

“From an EA perspective, we’re direction setters. So, we’re operating 5 years out anyhow... EA’s role is to help advise and set direction, and then maybe help prioritize and help understand the connections of what the outcomes should be and how we should help to implement those.”

– PO1 Enterprise Architect

An interesting observation was how EA measured success with respect to the strategist role. While some of the expected metrics of success for IT strategists would be return-on-investment (ROI) of technology, business partner or customer satisfaction, and speed of delivery, our research suggested a different set of metrics were actually applicable to strategic Enterprise Architecture practices.

“[Speed of delivery, business partner satisfaction, and ROI] are all measurements of delivery, those are not measurements of effectiveness of Enterprise Architecture. So how do you measure effectiveness of EA? I guess its enterprise outcomes, success of the business, what are our profit margins, how many customers have we gained or retained over the years. Those are all business metrics that I guess that would apply.”

– PO5 Senior Solution Architect

While this correlation may be difficult to establish, our data also revealed a different perspective of measuring success of strategic Enterprise Architecture focused on how effective the strategic planning tasks were executed.

“It sounds kind of funny, but if nobody knows EA was involved, and nobody can point to something and say this EA involvement, or this EA piece here was the piece that drove us forward, we’re successful, we’re enablers. We’re not supposed to be up front, we’re supposed to be behind the scenes. So if, to me, if we are in the front row driving something, it’s probably because we weren’t as successful as we should have been in anticipating what was necessary in order to bridge that particular gap that we’re doing. So that means we’re reacting. So if we’re planning, nobody should actually know EA was involved.”

– PO1 Enterprise Architect

As Figure 13 shows, a strategist still needs some IT problem solving focus as well as skills. Our research confirmed that a key role the strategist plays is interpreting the business strategy into the technology strategy while providing guidance on prioritization and ensuring timely execution.

“[EA’s role in our organization is] to interpret the business strategy in terms of IT needs, and ensure the IT systems infrastructure, what not, is developing at, at least the speed of the business, if not faster.”

– PO3 Senior Enterprise Architect

4.3.4 Potential Maturity Paths of EA

The framework in Figure 13 purposely does not have an x-axis or y-axis that is directional. While many people in industry may see deep IT technical knowledge and skills paired with a deep technical problem solving focus as key to an Enterprise Architecture role, our empirical findings showed that there is a lot of value in having business professionals who understand IT as part of an Enterprise Architecture practice as well. In fact, this may be one of the gaps in the current industry, as IT may often be perceived as not having enough business credibility. This notion is reinforced with the emergence of business schools who offer programs with specialization in various facets of information systems such as e-commerce, business analytics, and data management. This is well aligned with our findings that a strategist EA role is relevant, and is likely to emerge more commonly throughout industry.

While many Enterprise Architecture practices staff senior IT roles that have a solid business experience working within the organization, it is our assumption that business professionals with IM/IT expertise are not as common. However, a good example within the financial industry is the emergence of financial technology companies, also known as “Fin-tech”. These companies have created a deep need for business strategists and professionals to be competent in IT, and it is very likely that EA practices can contribute to this need, offering the right industry perspective to help solve these problems. What this suggests, is that there is potentially two maturity paths of an enterprise architect’s role, and that all 3 roles are relevant in establishing and staffing a successful Enterprise Architecture practice.

As the framework in Figure 13 suggests, there are strategists, who become more competent in IM/IT architecture, as well as IM/IT architecture practitioners who become more competent in strategy. Another dimension to this is the ability for either of those roles and their ability to solve technology oriented problems and business problems, respectively.

A key thing to note is while the two red arrows are depicted as a direction, the progression is not necessarily linear. For example, a strategist may become more competent in IM/IT architecture, without developing as an advisor. Similarly, an IM/IT architecture practitioner who becomes more competent in strategy may not develop as an advisor. While the advisory role requires a good mix of business and IT skills and problem solving focus, it is not necessarily the intermediate step between the strategist and the IM/IT architect.

Our research identified that the case study organization's Enterprise Architecture practice, actually started as an IM/IT architecture function, and eventually transitioned towards an advisory capacity, and ultimately, a strategist.

"Well when I first got here 10 years ago, it barely existed... A lot of that was sort of driven by our technology landscape, at that point in time, so a lot of it was mainframe... Then we needed to scale outside of the mainframe, and we started to get into Windows based environments as well...So we've gone from addressing it through specific implementations of technology to more of a pattern of engagement and how to leverage things. So that has been a bumpy ride, you know, EA went from a non-entity that provided opinions that were often rejected at the delivery level, to a group that provided oversight and a certain amount of enforcement over time. Basically, you know, I watched them climb the value chain to the point where now they're providing input into strategic planning, which is fantastic."

– PO4 Senior Solution Architect

The data was rich in examples of the case study organization's EA practice starting with a technical focus, and their eventual shift towards a business focus.

"We had all these applications that were being managed and serviced by different groups of people. So EA started out of [a] desire to get a handle on the existing landscape, but then of course, then, well once you have a handle on the existing landscape, the logical extension is, well let's take a look at the appropriate technologies and things to add to it to get to where we're going to go. And of course having, in our case, [the Director of Enterprise Architecture], who is also one of the members of [a Business Architecture professional association] and gave presentations at the early stages of that, that just combined the technology and business side of things even more, so that's how things have evolved."

– PO2 Enterprise Architect

There was also evidence of the shift from an internal enterprise focus, to an increasingly external focus to support EA's transition to a more strategic role.

“We used to be largely internally focused, but then as we evolved, we really did set a motion to look outside and see how we could actually, not fundamentally document what we were doing, but what would be more future state focused, and figuring out what the gaps were.”

– PO2 Senior Enterprise Architect

4.4 Summary of Empirical Findings

As presented in the empirical findings, IT Consumerization is a complex decision making context, and a complex problem as defined within the Cynefin framework. It is evident within our data that there is unpredictability, many unknown unknowns, as well as no single right answer when addressing IT Consumerization needs. Our research findings validated that Enterprise Architecture practices almost always fail when trying to impose order within the IT Consumerization phenomenon, but by continuously probing, sensing, and responding, they are able to adapt to the needs of IT Consumerization. While changing stances on decisions may sometimes be seen as poor decision making, based on our research, this actually was a necessity in ensuring longevity and sustainability of the overall organization.

We also presented an EA Role Framework for IT Consumerization (Figure 13) based on our empirical findings, which identifies 3 key roles that EA played when supporting IT Consumerization. These 3 roles benefit from different blends and balances of business and IT skills sets and problem solving focuses. There were also two maturity paths of architecture roles identified as well, that were presented as non-linear directions of skills development. While evidence from our case study organizations suggested that most maturity paths within the 3 EA roles start from the IM/IT architecture space and progress towards the strategist role, there was data suggestive that strategists with little IT focus and skills could still play a valuable EA role within IT Consumerization.

5 Discussion

As the empirical findings have been presented, the conclusion will begin with a section on theory matching. After concluding our empirical findings in relation to previous research and our research questions, the limitations regarding this study are discussed along with suggestions for further research.

5.1 Theory Matching

This section will correlate our empirical findings with previous research in the context of earlier research discussed in the literature view. The theory matching will be organized with respect to the two research questions of this research project.

5.1.1 What Function Does EA Play In The Context of IT Consumerization?

As presented in the empirical findings, IT Consumerization is a phenomenon which has all of the characteristics of a complex problem and complex decision making context as per the Cynefin Framework. While these dimensions and characteristics are pertinent to the Cynefin Framework lens of analysis, within our data there are many links to other previous research identified in the literature review as well, when contextualized to IT Consumerization.

For example, one of the key empirical findings in Section 4.2 was the case study organization's stances on device ownership and approach to IT strategy were well aligned with the IT Consumerization strategies as presented by Harris et al. (2012) in Figure 4, Section 2.2. While we did not find the middle ground strategies to necessarily be reflective of the transition that was described in our case study organization (from restrictive to more enablement oriented), it was evident that the restrictive stance mapped well to the authoritarian strategy, and the enablement stance mapped well to the enablement stance. This was a validation of the high level dichotomy of IT Consumerization strategy that was presented by Harris et al. (2012), in Figure 4, Section 2.2.

One of the key reasons that the IT Consumerization phenomenon is complex is the fact that it is unpredictable. As discussed in Section 4.2.1, there were many user driven requests for technologies which ultimately sometimes became introduced into the organization, and others rejected. At the same time, there were initiatives that had to do with corporate systems that

were corporate level initiatives coming from the top down. These two concepts validated the dual flow of how technologies are introduced into organizations that Leclercq-Vandelannoitte (2015) describes in Figure 1, Section 2.1.1 of this research study.

Our research also observed ownership and purpose as a key issue and challenge within IT Consumerization. The case study organization had actually changed their policy regarding device ownership and purpose, validating that these two dimensions were indeed key differentiators. This was a validation of Figure 5, Section 2.1.2 as presented by Niehaves et al. (2012).

When trying to understand how EA's supported the needs of IT Consumerization, it is evident that there are different perspectives and roles that emerge in the data. While none of the roles are directly called out specifically in a single framework, it is evident that the difference in roles actually speaks to why some of the frameworks are so different. For example, we identified a strategist, advisor, and IM/IT architect role representing how EA contributes to IT Consumerization. It is evident that, for example, Gartner Enterprise Architecture as a framework seems to put more emphasis on the advisory aspect of Enterprise Architecture. This seems well aligned, as Gartner's Enterprise Architecture framework is very practice oriented as discussed in Section 2.4.4. General EA framework effectiveness in supporting the needs of enterprise architects in addressing IT Consumerization will be discussed as part of the next section.

5.1.3 How Well Do Current EA Practices and Frameworks Support IT Consumerization?

As described in Section 3 of this research study, TOGAF is the main framework that was selected based on its widespread adoption and acceptance as the industry standard EA framework, as well as the researcher's pre-existing knowledge of the framework. TOGAF also was the most well relevant framework in terms of concepts, with respect to the EA role Framework for IT Consumerization that this study proposes. The following section will focus predominantly on TOGAF, while referencing the other architecture frameworks identified within Section 2.4 such as the FEAF, Zachman's Framework for EA, and Gartner Enterprise Architecture.

One of the key gaps we identified was the general dearth of literature examining EA's role in IT Consumerization. While there are quite a few frameworks for Enterprise Architecture and related practices, as discussed in Section 2.4, there does not seem to be much literature focused on the various roles and their maturity progression within the context of IT Consumerization. In fact, this seems to be a gap in the frameworks discussed in Section 2.4.

The three roles identified within our data were the strategist, advisor, and IM/IT architect. TOGAF does not seem to call out the role of the strategist, other than the fact that enterprise architects should be involved in the vision and business architecture phases. It does not prescriptively describe or provide guidance on the strategic role of an EA, other than to align to the business strategy. While we examined instances of EA actually setting direction in the context of business planning, where EA successfully communicated key IT concerns and abilities to the business allowing them to shape where the business was going. TOGAF seems to describe a process where the business makes decisions and plans at the strategic level, and that EA and other IT related roles are support functions. In comparison, our evidence suggested that enterprise architects, either those with deep IT expertise and business knowledge as well as those with deep business expertise with IT knowledge helping shape the corporation's strategy.

Similarly, TOGAF does not provide ample guidance, if any, on how EA can play this role. While facilitating consensus building and decision making is called out in some of the example artifacts provided in the TOGAF framework such as the various RACI, skills, and stakeholder matrixes, there is little describing the advisory role in terms of what type of skills and problem solving focus enterprise architects should have.

IM/IT architecture is well addressed in the TOGAF framework, and most of the emphasis of the TOGAF framework seems oriented around ensuring IM/IT architecture is aligned to the business. Our research suggests that Enterprise Architecture also plays a role in shaping the business, as opposed to being the second in line to strategy, playing a role in only supporting and executing. It seems that strategy and advisory functions are only referred to in the context of IT when observing the TOGAF framework, whereas our research suggests that EA plays a role of strategy and advisory within the business, as well as IT.

Zachman's Framework for Enterprise Architecture, described in Section 2.4.2, does not have any guidance or descriptions of roles that EA plays. Rather, it provides various views and concerns that are generic enough in nature to understand all roles within an organization. While it is a great framework that surely has its merits, it is not specific enough, or contextualized enough to the stakeholders or concerns specific to IT Consumerization to provide guidance. Gartner Enterprise Architecture, as described in Section 2.4.4, is rather practice oriented, and does not provide much guidance or descriptions around more tactical and strategic aspects of Enterprise Architecture. This is exemplified in 2.4.3 with the Enterprise Architect's Dilemma (Figure 9), where many of the challenges for EA practitioners that are mentioned include organizational barriers and seemingly unbalanced expectations. IM/IT architecture also lacks representation within Gartner Enterprise Architecture. The Federal Enterprise Architecture Framework is a very artifact and documentation heavy framework. This is discussed in Section 2.4.1, where the FEAF maturity assessment is based heavily based on documenting all of the architecture and having all of the architecture processes, which subsequently enable the measuring benefits of using the architecture. While the FEAF is holistic in nature, it is very industry-specific, particularly towards the US government. While there are concepts within it that are transferrable, the documentation heavy approach seems to lack the advisory and strategic aspects. It is our opinion that EA does not necessarily need to play a role in asking the business to document all change systematically, rather there is a heavy advisory and strategic function that may be purely be based off discussion. While the FEA Framework seems heavily focused on re-usability and limiting rework, which are valid and important principles, it seems to lack a strategic component as well. This is likely due to the fact that government departments have mandates, and as such do not need much input to develop corporate strategy. Based on our car analogy in Section 4.3.3, we observed EA having a role in defining the guardrails of the road (framing the context), but not driving the vehicle. We also observed helping point the car towards a destination (setting the direction), but not specifying which lane to use. Assuming that the car is the business, the FEAF seems to be lacking descriptions of Enterprise Architecture playing the role of framing the business context and setting the business direction. It is also suggestive that EA plays a compliance role in enforcing

policy, similar to ensuring that the car stays on the right side of the lane. It also suggests that EA is entangled in systems architecture and delivery, or metaphorically speaking, contributing to the driving of the car. Neither of the latter two did we observe the EA practice at the case study organization as being heavily involved in.

A key gap in the EA frameworks that exist today are that the ones that have processes and roles defined seem to lack guidance on how to implement these practices. The two frameworks that do have processes and roles are TOGAF and FEAF. For example, TOGAF seems to assume that the roles it defines within the framework already exist and that Enterprise Architectures can simply use TOGAF as they see fit. TOGAF suggesting that the framework can be applied and tailored as required has its merits. But as an industry best practice, there seems to be a gap in terms of guidance around how to implement a holistic EA practice, whether new or existing within an organization. Particularly, if there is an established EA function focused on IM/IT architecture, what are the recommendations with respect to progress the EA function towards a strategist role? How do you assess if a strategic role is even required, in the example of government, this role may not be as relevant as for example IM/IT architecture. TOGAF seems to make this a standard assumption that all pieces are required, but an organization can choose what they need based on priority. As an industry best practice, in order to be effective, it is our opinion that these frameworks need to provide recommendations towards prioritization.

Assuming that no EA processes exist, no roles have been defined, and no artifacts have been standardized, EA frameworks should be providing guidance towards these issues. When looking at what a roadmap of a TOGAF implementation would look like, it is presumed that it is based on the organization. Yet, based on our findings, this is one of the main challenges in IT Consumerization and EA within industry literature. The lack of use-case specific industry guidance, as discussed in Section 4.2.2, is a critical gap in IT Consumerization research.

While these may not be suitable to an “all-in-one” framework such as many industry best practices, in order to be a fully effective framework in the context of EA and IT Consumerization, there might be merit in having extensions tailored to specific industries or other variables that are deemed relevant. For example, as an EA practice involved with IT consumerization, there

seems to be a lack of guidance towards determining how significantly technology contributes to business strategy, and whether or not this is something IT should always advocate for, or are there legitimately scenarios where IT plays a pure support and delivery function which does not entail having IT in the forefront of the business creating value. It is evident that EA frameworks still have lots of unaddressed dimensions and considerations that suggest they are not effective in addressing the current needs of IT Consumerization.

Most of the practitioner and academic literature discussed in Section 2.1, which details the market, individual, and organizational perspectives of IT Consumerization, seemed suggestive that there was a “right answer”. Contrarily, our empirical findings suggested that IT Consumerization is complex, and may have potentially more than one, or no right answer, as discussed in Section 4.2.3. There did not seem to be much correlation with respect to the unpredictability, unknown unknowns, or acknowledgement that imposing order without continuously probing, sensing, and responding to changing environments. For example, none of the practitioner literature discussed in this thesis identified the potential requirement to change the policies that were implemented. Rather, they were suggestive of identifying an approach, and fully implementing it. Frameworks in this space that recognized that policies would eventually change may have enabled organizations to be more agile in designing policies while expecting for change. In addition, our research showed that the variables identified within the majority of these industry frameworks seemed to highlight “talking points” as opposed to use-case specific guidance as discussed in Section 4.2.2. Also, our research findings suggested that IT Consumerization decision making variables and management approach may be different for different industries, yet all of the frameworks that were identified in this research study seemed to be industry agnostic, and applicable to all industries. As such, we did not think the frameworks identified in Section 2 of this research study were effective in addressing the current needs of IT Consumerization.

5.2 Key Takeaways and Recommendations

The following section will discuss our research findings and provide suggestions on how to operationalize the concepts discussed in our findings. The two main concepts are IT as a Complex decision making context, and the EA Role Framework which identifies 3 roles and some of the focus areas that are relevant within IT Consumerization.

5.2.1 IT as a Complex Decision Making Context

Based on this study, IT Consumerization was situated within the Cynefine Framework as a Complex decision making context. As discussed in Section 4.2 of this study, the Complex decision making context is characterized by unpredictability, unknown unknowns, and no single right answer. In this decision making context, organizations and leaders will almost always fail when trying to impose order. In order to make successful decisions within the IT Consumerization context, it is important that organizations and their respective leaders utilize a probe, sense, and respond approach. That entails a continuous monitoring of implemented decisions, in order to sense or to be aware when change is required. A continuous probe, sense, and respond approach requires an organization to be both agile and aware, which are fundamental to success within the IT Consumerization context.

In order to successfully respond to IT Consumerization, organizations and leaders must realize that there is no right answer. Decisions that are implemented will have to change, as the landscape continues to evolve. IT Consumerization is characterized with unpredictability, and unknown unknowns, meaning that the context is ever changing with new considerations. Organizations that are not prepared to proactively respond and adapt to these changing conditions will not be successful in addressing IT Consumerization needs.

5.2.2 EA Role Perspectives as a Guiding Framework

The EA Role Framework presented in Section 4.3 of this study is meant to be a guiding framework to help quickly assess at a high level where an organization's EA capability can play. It can also be used as a reference guide to illustrate a holistic EA role within an organization in the context of IT Consumerization. It can provide a visual context of where EA plays within IT Consumerization. Below are a few examples of how the three role perspectives and concepts:

IM/IT Architect, Advisor, and Strategist can be operationalized in the context of IT Consumerization.

An EA team within an organization may look at the key focus areas of the EA Role Framework and realize that they are not involved in many of the Strategist functions, but rather that they are heavily focused in the IM/IT Architect and Advisor functions. This EA Role Framework could then provide an understanding of what kind of focus areas the Strategist role would deal with, and the types of problem solving focus and skillset that were required. This is of course under the assumption that the strategist role is a gap, or that it is a potential opportunity for an EA function to position themselves closer to the business within their organization. Similarly, an EA team may also look at the EA Role Framework, and realize that they may be lacking in certain focus areas. The EA Role Framework would provide an understanding that there are multiple roles that EA can play within the context of IT Consumerization, and any focus areas or roles that do not resonate with the team may be actually be capability gaps.

The EA Role Framework also provides a reference model so EA function or an Enterprise Architect can explain the role that they play, in the context of IT Consumerization. For example, assume an Enterprise Architect or EA team are more business oriented, and less technical. Using this framework, this could be graphically explained, along with a few example focus areas for discussion. The framework is holistic in that addressed both spectrums of business and technical problem solving focus and skillsets. As such, it is a great visual to help describe the EA and IT Consumerization context.

This framework can also be used as a reference for an EA team or architect to understand what some of the gaps in their overall EA capability may be, when tackling IT Consumerization issues. For example, a team or architect may realize that while they are involved with Strategist and IM/IT Architect roles, they may be lacking in the Advisory role. The EA Role Framework would identify this as requiring both business and IT skillsets in order to address both business and IT related problems. In another scenario, an EA team may identify the Strategist role as a gap within their capabilities, and be faced with a resourcing decision to source skillsets from a either a line of business or a function such as IT. The EA Role Framework presented in this study

provides guidance that more emphasis on business skills and business problems would be entailed and more useful for a Strategist role.

One of the key takeaways of this study is that while the emergent EA Role Framework presented in this study may seem generic and general in the sense that the framework seems to apply to more than IT Consumerization, based on our findings, EA itself seems to view IT Consumerization as a just another disruptive IT change. Enterprise Architecture holistically applies to a wide range of IT disruptors, and IT Consumerization is just another one of them. As discussed in the literature review, IT Consumerization itself also encompasses all aspects of IT from user experience expectations to user functionality. As IT is also increasingly leveraged in most, if not all businesses that are impacted by IT Consumerization, EA as a tool positions itself well in managing and architecting change. The EA Role Framework that emerged is fairly general, and was similar to many of the concepts as suggested in current EA frameworks. However, as discussed in Section 5.1.3, there are additional areas to be discussed and explored.

5.3 Limitations of the Study

One of the main limitations of this study is that the data set does not include roles within the case study organization that did not have the job title of “architect”. While this is desirable when trying to answer the research questions which required an “inside-out” view of EA, an “outside-in” view of EA within the organization would have contributed to additional perspectives by providing this research study more relevant data with regards to our empirical findings. Solely through interviewing architects, this research observed the various roles of an enterprise architect within an organization affected by IT Consumerization. Interviewing those who interact with architects, while not having a job title of architect, would likely provide valuable insight providing a better understanding of what roles EA can play that architects may not necessarily self-identify with. Examples of other relevant perspectives that could provide insight include Project Managers, Business Managers, IT Managers, Business Analysts, Consultants, among other various roles.

Another limitation of this study is that this study was only conducted at one case study organization. Contrarily, Mariotto, Pinto Zanni, & De Moraes (2014). Al argue that the single-

case study as a research method would allow a better dialogue between researchers and benefit management research as a whole (Mariotto et al., 2014). In order to have better generalizability and transferability of our empirical findings and theoretical propositions, additional case studies within the same industry would have further strengthened the empirical findings section and therefore, the overall results of the study.

The proposed EA Role Framework was based off our interviews, and as such, could benefit from additional data sets such as governance and procedural documentation. In addition, this research used a deductive approach, using sensitizing concepts from TOGAF, in an exploratory case study. Our research started with deriving an initial set of codes from TOGAF, then concept mapping those codes to the EA and IT Consumerization data. As a result, this directed content analysis and deductive approach observed very specific themes. As such, the research findings presented in this study may not represent all of the semantic and latent themes that were present in our data.

5.4 Suggestions for Further Research

As stated in the limitations of the study, completing a study about the role of Enterprise Architecture within the context of IT Consumerization taking an outside-in perspective is an area for further research. This study has focused on the perspectives of solely architects within the case organization. Consequently, no data from staff that interact with architects such as managers, business leaders, or IT leaders were reflected within the data, which would further validate or contribute to the understanding of how EA can support the needs of IT Consumerization.

Another limitation of this study that would greatly benefit from additional research would be to conduct additional case studies with the same research questions in other organizations within the financial industry. Even broader, additional research of the same research question within other industry verticals would further enhance an understanding of what some of the industry-specific variables within the context of EA and IT Consumerization are.

The EA Role Framework presented in this study was also derived solely based off interviews and the initial set of codes and themes that were sensitized concepts from TOGAF. If the data set

was inclusive of additional IT Consumerization data such as an organization's process documentation and governance policies, this would have further strengthened and validated our research findings.

As mentioned in our theory matching section, there are also opportunities to further research Enterprise Architecture and IT Consumerization frameworks. In order to be an effective framework in the context of EA and IT Consumerization, there might be merit in having extensions tailored to specific industries or other variables that are deemed relevant. For example, as an EA practice involved with IT consumerization, there seems to be a lack of guidance towards determining how significantly technology contributes to business strategy, and whether or not this is something IT should always advocate for, or are there legitimately scenarios where IT plays a pure support and delivery function which does not entail having IT in the forefront of the business creating value. Also, our research findings suggested that IT consumerization decision making variables and management approach are different for different industries, yet all of the frameworks that were identified in this research study seemed to be industry agnostic, and applicable to all industries. As such, additional research focused on industry specific variables offering more guidance to organizations trying to establishing the correct IT Consumerization strategies and approaches would greatly benefit the EA and IT communities within organizations.

We feel that the proposed EA Role Framework for IT Consumerization should hold true outside of the IT Consumerization context as well. Additional research applying this framework in the context of all business management domains, including IT would be well served.

All of these research recommendations would serve as an extension to current academic literature, enhance current understanding of how EA can support the needs of IT Consumerization, and provide a validation of EA and IT Consumerization framework effectiveness.

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7 Appendix

7.1 Interview Questions

Enterprise Architecture

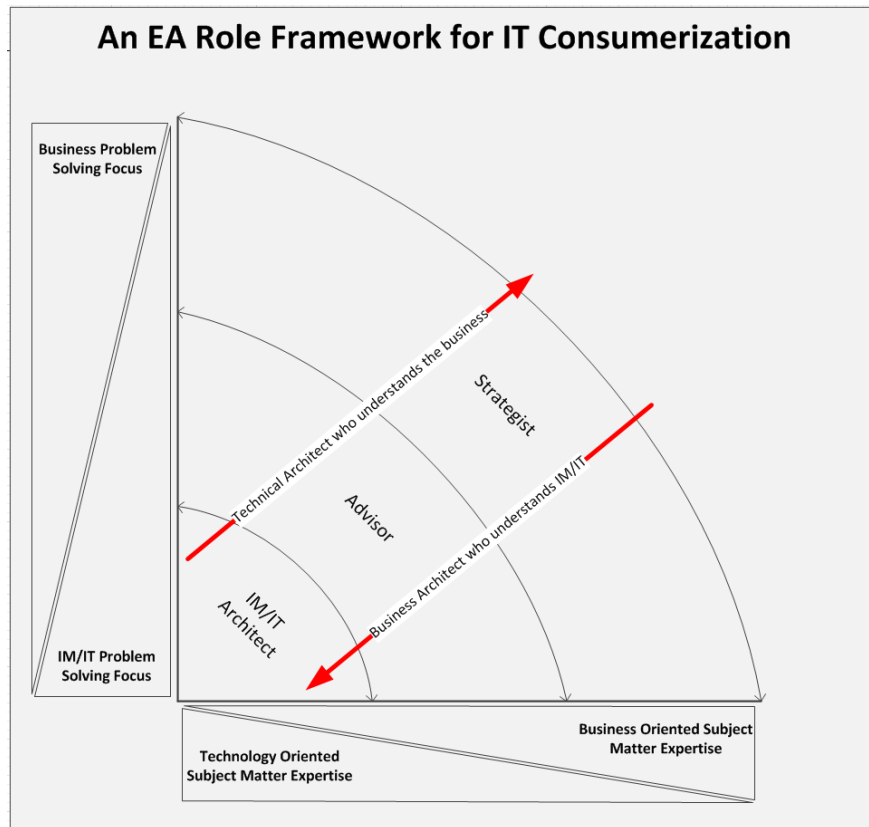
- What types of “architects” are there in your organization? (For example, Business Architect, Enterprise Architect, Solution or Technical Architect, Infrastructure Architect, etc.)
 - What are the key differences in their roles?
- Please describe your job title and accountabilities / responsibilities
- What are some of the challenges and pain points you face as an architecture practitioner?
- What is EA’s role in your organization?
 - (if not answered) What is EA’s role in the development of an IT Strategy? (Do you think EA has a role in the development of an IT strategy?)
 - (if not answered) Do you see EA having roles outside of IT and why?
- How has architecture in the enterprise matured in your organization over the past 3-5 years? 10 years?
- What type of architecture processes does your organization have?
- Are there any industry EA frameworks or methodologies that your organization is using?
 - (if not answered) Why are you using these ones as opposed to others?
- What are some of the key things that IM/IT architects in your organization do?
 - Are there any key skills or enablers required for success?
- How does EA help in responding to external disrupters and trends?
- How does your organization measure EA success?
 - (if not answered) Can you share a few examples?

IT Consumerization

- What would you say are the key IT Consumerization challenges your organization faces today?
- What would you say are the key factors affecting your organization’s ability to respond to the needs of IT consumerization?
- Does your organization have a stance or strategy on IT consumerization?
- What were some of the early enterprise drivers that pushed IT to formalize a response to IT consumerization?
 - (if not answered) Was it risk? Was it business users’ requests? Projects submitted by business leaders? Proactive research on IT’s behalf?)
- How does your organization assess the impacts of IT consumerization?
- Has IT’s stance / strategy with regard to supporting employee use of personal devices and applications changed in recent (past 3) years? If so, what are the drivers of this change?
 - What were some of the early enterprise drivers that pushed IT to formalize a response to IT consumerization? (Was it risk? Was it business users’ requests? Projects submitted by business leaders? Proactive research on IT’s behalf?)

- How does your organization enforce the standards and policies set out by IT?
- Do you think current industry best practices and academic literature clearly identify all of the aspects of concern or variables relevant for decision making with respect to IT consumerization?
 - Why or why not?
 - Do you think there is more than one right approach to addressing and responding to IT Consumerization?
- Have you looked at other consumerization examples from industry?
 - Benchmarking, best practices, lessons learned, and templates?
- How has EA contributed or supported the needs of IT Consumerization?
- Who is involved in the decision making process for IT Consumerization initiatives with respect to issues such as deciding the level of enablement and what device provisioning model is chosen?
 - Various types of architects? / EA & Subject Matter Experts? / IT wide? / Business?
- Has your organization had to intervene in any IT consumerization scenario, such as a business user circumventing IT using an unsanctioned tool, and addressed that immediately with some sort of action, in absence of a formal decision or policy?
 - Are there scenarios where the policies aren't defined, and you guys have done some responsive action?
- Do you think the variables relevant in the context of IT Consumerization are the same for all organizations? Or are they different?
 - Why or why not?
- Has your organization leveraged any external expertise to support IT consumerization efforts? (Think tanks, consultants?)
- What would you consider to be success in the context of IT consumerization?
 - Speed of delivery? Stakeholder satisfaction? Measurable ROI?
- How aware would you say your organization is of non-corporate sanctioned devices and apps? (Shadow IT)
 - Are there any methods or mechanisms your organization uses for identifying non-corporate sanctioned devices and apps?
- Based on your experience with IT consumerization initiatives in your organization, what are some of the key lesson's learned?

7.2 An EA Role Framework for IT Consumerization



IT Consumerization Focus Areas	
IM/IT Architect	<ul style="list-style-type: none"> Technology functionality and integration System lifecycle management and technology selection Business technology and infrastructure modeling and road-mapping Information management including data security, sensitivity, and federal regulations
Advisor	<ul style="list-style-type: none"> Business and IT relationship management and communications Identifying stakeholders and influencing strategic leadership Facilitating decision making, consensus building, and resolving escalations Championing adoption of corporate decisions, policies, and standards
Strategist	<ul style="list-style-type: none"> Business planning, strategy development, and strategic problem solving Framing the enterprise context and direction setting for change initiatives Maximizing business value of IT investments Applying and promoting industry practices and methodologies Monitoring external business environment and market changes to evaluate relevance of disruptors and trends in terms of impacts, risks, and opportunities

Technology Oriented
 ↑
 ↓
 Business Oriented

7.3 Ethics Approval

File Number: H04-17-11



Date (mm/dd/yyyy): 06/06/2017

Université d'Ottawa **University of Ottawa**
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Certificate of Ethics Approval Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

<u>First Name</u>	<u>Last Name</u>	<u>Affiliation</u>	<u>Role</u>
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Eric	Zhou	Engineering / E. Business Technologies	Student Researcher

File Number: H04-17-11

Type of Project: Master's Thesis

Title: *Advancing Enterprise Architecture Frameworks to Support IT Consumerization*

<u>Approval Date (mm/dd/yyyy)</u>	<u>Expiry Date (mm/dd/yyyy)</u>
06/06/2017	06/05/2018

Special Conditions / Comments:
N/A