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**NAVAL
POSTGRADUATE
SCHOOL**

MONTEREY, CALIFORNIA

THESIS

**ORGANIZATIONAL SELF-AWARENESS IS THE KEY
TO KNOWLEDGE SUPERIORITY**

by

Ricardo Rivera

December 2015

Thesis Advisor:
Second Reader:

Mark E. Nissen
Walter Owen

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**ORGANIZATIONAL SELF-AWARENESS IS THE KEY TO KNOWLEDGE
SUPERIORITY**

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ABSTRACT

This thesis proposes an integrated approach to develop and evaluate knowledge management systems and methodologies that deliver sustainable competitive advantages through knowledge superiority. Integration revolves around internal, structural factors that the organization can manipulate to achieve its strategic goals. The fundamental concept behind the research is that an organization's self-awareness allows leaders to select the best approaches to achieve knowledge superiority, leading to sustainable competitive advantages and market leadership. The research behind this thesis identifies four attributes of self-awareness that are critical contributors to knowledge superiority: success decomposition, targeted dissemination of knowledge, organizational design, and individual decision making.

The three arguments of organizational needs that this thesis seeks to address are (1) firms do not understand precisely why they succeed, (2) market leaders feel they must compromise either the power or uniqueness of their knowledge and competitive advantage, and (3) the design and goals of existing knowledge management systems do not fit the organization's design. The thesis examines the hierarchy of needs of the organization's stakeholders and proposes a knowledge management system that integrates the self-awareness attributes that contribute to knowledge superiority. It develops a theoretical architecture for the system, which prioritizes the needs and selection criteria for that system.

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LIST OF ACRONYMS AND ABBREVIATIONS

INSURV	Board of Inspection and Survey
KM	knowledge management
KS	knowledge superiority
KVA	knowledge value assessment
MRS	Maintenance Requirements System
NAVSEA	Naval Sea Systems Command
OPNAV	Office of the Chief of Naval Operations
OSA	organizational self-awareness
SEA 04	NAVSEA, Logistics, Maintenance, and Industrial Operations Directorate
SEA 05	NAVSEA, Systems Engineering Directorate
SEA 21	NAVSEA, Surface Warfare Directorate
SURFMEPP	Surface Maintenance, Engineering, and Planning Program
TFP	Technical Foundation Paper

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EXECUTIVE SUMMARY

It is better to know nothing, than to keep in mind fixed ideas based on theories whose confirmation we constantly seek.

—Claude Bernard, *An Introduction to the Study of Experimental Medicine*, 1865

Knowledge management (KM) theory argues that as a source of sustainable competitive advantage, knowledge is the critical element needed for any organization to innovate and succeed (Porter and Millar 1985). Its timely and correct flow allows organizations to leverage tacit and explicit knowledge to gain market share in their field and to gain influence and even more knowledge (Nissen 2006). That increase translates into a greater competitive advantage, such that when an organization achieves market dominance, it leverages both its current knowledge and its increased ability to learn more, quicker than smaller, less knowledgeable competitors (Tuomi 1999; Alavi and Leidner 2001). The gap becomes insurmountable. The market leader becomes entrenched; it is secure from any upstart rising through imitation.

Reality, however, tells a completely different story. Market leaders, in the private or public arena, do not retain their superior position indefinitely and many times only for a short time. The competitive lead based on knowledge at some point dwindles and a smaller, less knowledgeable competitor overtakes the incumbent. In many cases, the fall from the top of the market is so drastic that the former leader, if it survives, does so as a much-diminished player in the market it once dominated, much like it happened with Research in Motion's Blackberry (McNish and Silcoff 2015; Dummett 2015).

This thesis seeks to answer the question of why knowledge does not lead to sustainable competitive advantage. According to business and knowledge management (KM) literature, the premise is correct in terms of competitive advantage, but something is missing so that market dominance is sustainable. The term for this lack of sustainability is “creative destruction,” coined in the 1940s, to describe how innovation disrupts market hierarchies and is essentially unstoppable (Schumpeter 2008).

This inability to sustain competitive advantage led the author of the thesis to examine organizational theory to gain understanding of potential factors that may hinder KM efforts. Expanding the focus of the thesis yielded important findings that determined the course of the research in the thesis captured by Mintzberg in 1981.

- Knowledge management goals and methodologies correspond to what organizational theory calls means of coordination.
- The five means of coordination that Mintzberg identifies are a one-for-one fit with a specific organizational structure.
- Two of those structures coordinate by standardizing results, either via expert divisional leadership, or with individual SMEs in an adhocracy. An adhocracy, as defined by Mintzberg, “is a tremendously fluid structure, in which power is constantly shifting and coordination and control are by mutual adjustment through the informal communication and interaction of competent experts” (Mintzberg 1981, 111).

Much of the research into sustaining competitive advantage focuses on duplicating it, mostly by exact copying and implementing the processes that yielded successful working templates. Exact duplication, however, only fits with one type of organizational structure, which is a machine bureaucracy such as a fast food restaurant or a manufacturing plant. These organizations enjoy a substantial understanding of why they are successful, and most of their relevant tacit knowledge is well codified (Szulanski and Jensen 2008). Many organizations strive for this KM methodology, regardless of its fit to the organization’s structure. Duplication requires the codification of tacit knowledge, which implies a high level of expertise that the organization is looking to convey to its stakeholders (Alavi and Leidner 2001).

When the organization’s structure does not match the appropriate means of coordination, it neutralizes the benefits of the KM systems and the competitive advantage gained from them. Compounding the problem is the misplaced confidence of organizational leaders that the codification of tacit knowledge leads to greater competitive advantages.

Combining KM and organizational theory, the thesis then proposes an updated KM system that focuses on the two kinds of structures that require standardization of results for a proper fit. This allows the organization to evaluate KM system performance

based on measurable duplication of success based on the bottom line, and not just on the process that auditors and inspectors seek. Standardization of results is incompatible with standardization of processes, so the key individuals involved with the organization's successes require additional training in command and control to make the most appropriate decisions possible.

The thesis then focuses on the architecture and selection criteria for attributes and functions of a proposed KM system that addresses the needs. It combines the four critical attributes into a singular design that drives innovation and protects the organization from decisions that lacked organizational self-awareness. This system has the additional benefit of becoming the source of the organization's competitive advantage, giving it greater control while masking the value of the system that drives innovation from competitors. As long as imitators remain focused on products and processes, instead of on the KM system itself as the source of innovation, the organization can continue to leverage and increase its knowledge power without risking knowledge uniqueness.

This thesis represents a contribution to the study of KM for different types of organizational structures. Further study would test some of the assertions in this research, especially the quantifiable cost of misfit structures and KM methodologies, or the marginal impact on the organization's performance based on the decision-making skill level of individuals working in divisionalized bureaucracies or adhocracies. An interesting area of further study specific for the public sector would be to analyze the impact of how it audits and evaluates the performance of government agencies.

The government often creates new agencies as problem-solving organizations that require innovative cultures and a high concentration of subject matter experts (SMEs), which is the definition of an adhocracy (Mintzberg 1981). Yet a few years after their creation, the expectation is that they codify the SMEs' knowledge to reduce manpower costs and secure knowledge gains for the government. The question would be: how would one measure the cost to the government of creating a misfit between an adhocracy, which should be coordinated by mutual SME adjustment, and the imposed means of coordination most fitting for a machine bureaucracy, requiring standardization of processes. The supplemental question is: what is the expectation and the reality of what

the government gains quantifiably, if it even does at all, by forcing this standardization throughout all government agencies?

EXECUTIVE SUMMARY REFERENCE LIST

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To my parents, who taught me to never settle for convenient answers, thank you. The best of what I am is because of you.

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And finally, my lovely wife, Melissa: you have paid the highest price of all, and have done so without complaint or reservation. Your encouragement and confidence made the biggest difference to me. I can never tell you enough, but you are the treasure that gives value to my days. If there is any value in the last two years of sacrifice, it is because you are here still. I love you so much. I hope the work here makes you proud.

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I. INTRODUCTION

When Apple introduced the iPhone in 2007, many of the wireless market leaders looked at it in disbelief. Research In Motion's (RIM) Blackberry was the top selling cellphone at the time, and RIM's CEO at the time could not understand what Apple thought it could accomplish by developing this telephone that was so far outside what was the accepted norm of what a cellphone should be (McNish and Silcoff 2015b).

It was not that the phone was superior technologically to RIM's current Blackberry offering, for it was not. It had a weaker battery, a data-hungry browser, was incompatible with the newest cellular networks, was not secure, and was overall a hodgepodge of features and capabilities that did little to make it a better phone per se. Not only that, but the wireless carriers had rebuffed prior attempts by RIM and others to add browsers and other data-intensive features on their devices. The main consumers for wireless devices were not really looking for many of the iPhone features at all. As RIM executives saw it, this iPhone was a solution in search of a problem; "it should have failed, but it did not" (McNish and Silcoff 2015a, 135).

Instead of failing, the iPhone became the core business and largest profit-generator for the largest company ever. Apple has sold over 700 million as of March 2015 (Costello 2015), while Blackberry and most other major players in 2007 are struggling and downsizing (Dummett 2015), and Apple now defines the features a cellphone must have to be considered high quality.

Government agencies are not immune. Around the time of the iPhone introduction, the Surface Navy maintenance community went through a thorough review of its state of affairs, especially as its ships started missing operational requirements and/or failing the Board of Inspection and Survey (INSURV) review due to material condition deficiencies. The 2010 Balisle Report laid out a scathing rebuke of the maintenance community's lack of planning ability and resourcing, recommending, among other things, the creation and empowerment of a centralized maintenance planning agency tasked with creating, pricing, resourcing, and defending the maintenance requirements for a ship to achieve its Expected Service Life in good material condition

(Balisle 2010). The responsibility for managing this process fell to Naval Sea Systems Command (NAVSEA), and specifically to the Maintenance Requirements System (MRS) Alliance under the Logistics, Maintenance, and Industrial Operations Directorate (SEA 04), which also manages the Submarine and Aircraft Carrier maintenance programs.

When the report became public, SEA 04 and the MRS Alliance were wholly unprepared to answer questions regarding the nature of the maintenance items that needed to be executed for surface ships, with even less of an accounting of the maintenance requirements that had not been done, regardless of the reason. Almost all of surface ship depot level maintenance is not time-directed but is condition-based; the maintenance plans depend on forecasting material and operating conditions for each system on the ship along with the maintenance that would be needed to restore the system to its proper condition. These forecasts allow the analysts to assess risk of underperformance due to insufficient resources, making the funding and planning of the depot availabilities more defensible and executable.

Instead, the agency report pointed to the complex mathematical models that predicted the budget requirements year after year without the ability to analyze the reasoning behind those requirements. It was not for lack of resources, as the Balisle Report and other follow-on analyses resulted in increased congressional support and funding to repair the Surface Navy based on their findings (Office of Chief of Naval Operations 2010; Commander, Naval Regional Maintenance Centers 2015). The MRS Alliance did not see its purpose as one of engineering analysis as much as one of metrics and analytics. They understood the declining condition of the fleet's material condition and the budget shortfalls that Navy leaders simply accepted as "a fact of life" until they did not (Balisle 2010). The MRS Alliance was unprepared to take action, never realizing that their value proposition to the Navy was the ability to identify shortfalls so that if, and when, the Navy prioritized the material condition of the fleet, it would be prepared to present specific recommendations of how to invest the additional resources.

The Navy decided that it needed a companion agency to MRS to do the missing engineering analysis for maintenance, and the Surface Ship Life Cycle Management activity was born, growing into the Surface Maintenance Engineering and Planning

Program (SURFMEPP) by the end of 2010. This new agency immediately gained influence in every area of maintenance planning, and within two years, it had fully displaced MRS as the trusted agency for all aspects of planning and funding, especially on fiscal requirements. The MRS Alliance, which saw SURFMEPP as just one of many other parallel but separate agencies, never saw its decline coming. Naval Sea Systems Command transferred it from SEA 04 to SEA 21 in 2008, and by 2011, it was absorbed as a minor player within the newly-established SURFMEPP, relegated to maintaining historical fiscal records with little input to the funding or planning processes (Hugel and McManamon 2008). Few people outside of SEA 04 realize MRS exists anymore, as it went from a critical player to irrelevancy in less than two years. Strategic, organization-level decisions of what to focus on led to an agency staffed with strong and dedicated experts being overtaken by a two-year-old organization, which in that short amount of time was able to demonstrate value and expertise that overshadowed MRS and relegated it from its market-leading position.

At the individual level, decisions made in organizations designed to deliver standardized results are often subject to standardized processes that undermine the strength of the organizational structure. As the new incumbent market leader, SURFMEPP is what organizational theory describes as a combination of an adhocracy and a divisionalized bureaucracy (Mintzberg 1981). Designed as an innovation center, it is responsible for, among other things, forecasting and defending technical and financial requirements to achieve expected service life. Its credibility in the resourcing field of defense spending is without peer, and the admirals and senior defense civilians depend on its analysis and impartiality to provide actionable knowledge based on sophisticated and innovative analysis. This has allowed the surface Navy maintenance community to more than double its maintenance budgets from fiscal year 2010 (FY10) to the current FY15 and beyond (Office of Chief of Naval Operations 2010; Ehret 2014).

To achieve that level of credibility, SURFMEPP aggressively acquired a vast network of the top subject matter experts (SMEs) available and immediately set out to meet the need of defining the requirements and defending their resourcing to Congress (Malone and Gallagher 2015). The goal for the agency, from its inception, was to coordinate for standardization of results, hence its organizational structure. A few years

after its inception, SURFMEPP began to standardize its most commonly performed processes as a means of coordinating mundane tasks. While this is a common tendency for nascent organizations, the consequences of trying to codify every process, including sophisticated analysis, can be destructive to an organizational structure that does not support this standardization of processes.

A recent example serves well to illustrate this point. In June of 2013, SURFMEPP completed its final review of the forecasted maintenance and financial requirements to support all depot-level work for surface ships in FY14. One of these events was a three million dollar, non-docking shipyard period, or “CNO depot availability,” for the USS PATRIOT (MCM-7). The basis of the size and scope of the maintenance event is a product called Ship Sheet. It uses the baseline of maintenance that SURFMEPP developed in the Technical Foundation Paper (TFP) for that class of ships and tailors it to the condition and specific requirements for the ship at the time of the maintenance event.

This tailoring process, which is at the heart of SURFMEPP’s success, is a combination of subjective analysis and codified sub-processes that the agency developed to ensure technical rigor. One critical sub-process involves a senior SME screening a large amount of maintenance data to pull the “important” data for evaluation by another SME to determine if it will influence the final estimate for the event. The process as a whole has not just survived multiple inspections from senior technical and financial auditors but has lauded repeatedly for its rigor and defendability by both auditors and senior stakeholders all the way to Congress (House Armed Services Committee 2013).

For this event, all SMEs executed their part of the process flawlessly. The multiple reviews of the tailoring and estimating processes all approved of the estimate and the process that built it. The Fleet and Type Commanders funded the shipyard event at 100% of the requirement, with additional resources in reserve in case there was need for up to 25% more funding, all developed as part of the Ship Sheet process. Then the final bill arrived, which was almost 200% above the original estimate (Surface Maintenance Engineering Planning Program 2015). On average, the rest of the fleet across all classes and ports closes out within 15% of the estimates (Commander, Naval

Regional Maintenance Centers 2015), so the agency's Deputy called for an immediate investigation into what went wrong in this case.

The results of the investigation revealed a critical weakness in the Ship Sheet process. Rather than permitting and training the SME to make a judgment call that was well within his area of expertise, the agency felt that codifying that step made the overall process more defensible. The process did not allow the SME to make a decision that would have recognized the situation, and either increase the estimate or alert the Type Commander to reduce the scope of the maintenance event. The auditors agreed, but the results did not. Fortunately, for the agency, its own leadership found the issue and took steps to correct it, but the root of that weakness is the more troubling.

That root was the drive to codify a process with the purpose of measuring effectiveness based on compliance with it. Anecdotally, this is a common weakness among organizations as they mature from simple structures or small adhocracies toward more bureaucratic designs, especially in the public sector (Mintzberg 1981). It is a common complaint from the public that government agencies are "inefficient," though that complaint probably means to convey dissatisfaction with a machine-like compliance with a process regardless of the results it generates. Inspector General assessments, or INSURV inspections, generally focus on compliance with internal and external processes as a measure of effectiveness. If the organization is not, or should not be, a machine bureaucracy, then process compliance is not an appropriate means of coordination (Mintzberg 1981).

As a government agency, SURFMEPP was bound to fall into this trap. Even though it is still in its organizational infancy, very much an adhocracy, but it is shifting to a means of coordination more suitable for machine bureaucracies. The consequences of that premature shift are clear from the USS PATRIOT example above. By relying on process compliance, the agency deprived itself from the benefits of being an adhocracy, where SMEs leverage their expertise to chart the best path toward a desired end. The shift to compliance created a sense of safety that if the SME followed the process, the correct results would follow automatically. SURFMEPP instituted decision-making training for SMEs and feedback-analysis mechanisms to prevent this from happening again, forcing it

to reevaluate whether it should slow the drive toward standardization of all processes, or stop it altogether.

These three examples illustrate different but related failures that knowledge management (KM) systems and organizational theory seek to prevent. The first illustrates a technology and product leader that did not understand how and why its product was successful, and how to duplicate that level of success. Based on the *Wall Street Journal's* interview of Blackberry's executive leaders in the summer of 2015, eight years after their fall from the top, they still do not understand (McNish and Silcoff 2015b). The second shows a public agency at the top of its market and level of influence designed to achieve standardization of results, but driven to standardize processes without checking if they had codified enough of their tacit knowledge to trust that their processes would lead them to the best results. That lack of feedback led its stakeholders to seek an upstart to achieve those results, and in two years took them from the highest-levels of influence to near irrelevance, and they never saw it coming. The third looks at that upstart, three years into its market-leading status, facing similar pressures to codify processes before they are able to deliver the desired results consistently. In this case, it identified that the problem was not just a misfit between structure and means of control, but also a lack of training or mentoring at the SME level to make command-style decisions (Shattuck and Miller 2006), rather than rely on a process map as the ultimate technical authority.

A. OVERVIEW

The knowledge that upstarts use to gain a foothold in an established market is as readily available to the market leaders, if not more so. The incumbents' expertise in the field should translate to an incredible advantage compared to new players that are just now becoming acquainted with the market, and the few that are succeeding in staying a step ahead are doing so through a high rate of productivity and differentiation through innovation (Schmidt and Porteus 2000), as seen with Apple, Samsung, and other technology giants that update their software and hardware offerings on annual cycles to stay ahead of their competitors own competitive innovations. However, as this research shows, there are certain attributes of an organization's KM system that can work against it when improperly applied, and that certain organizational structures require

implementation of command and control (C2) attributes to ensure that individuals are able to coordinate internally toward desired results.

The organization of this research is as follows: the subsections in this chapter elaborate on the problem on which this thesis will focus, postulate a proposed solution, and briefly explain how this solution would meet the need. The second chapter discusses the fundamental concepts and theories that form the basis of this research, including knowledge management, organizational theory and design, and how organizational self-awareness is the key of knowledge superiority. The third chapter elaborates on the analysis of Creative Destruction in spite of the KM and C2 systems and theories designed to mitigate it, explaining how four attributes of organizational self-awareness are critical to mitigate the risk of Creative Destruction. The fourth chapter lays out the architectural conceptualization of a KM system, which addresses the necessary functions from the third chapter, and describes the analysis of alternatives and selection criteria for the proposed KM system. The final chapter summarizes the key findings and limitations of this research, and lists areas for further study, including design and implementation of such a system, refinement of the research with feedback from said implementation, and potential expansion of the scope of the research into the relationship between organizational self-awareness and knowledge superiority.

B. PROBLEM STATEMENT

This thesis looks at the inconsistency between competitive advantage through knowledge and the fall of market leaders to upstarts in both private markets and public fields. It evaluates the main premise of knowledge management is that knowledge is a source of competitive advantage (Porter and Millar 1985). More knowledge translates to more competitive advantage, which would then mean that market leaders, assumed to have the most knowledge and the resources to get even more, should be safe atop of the market. In both public and private markets, however, leaders constantly fall to smaller and/or newer organizations that have a lower level of knowledge than the leader(s) do.

A problem, by definition, is to know that something needs to be done but cannot be done now, and not knowing how to achieve what needs to be done (Langford 2012). Creative Destruction, described by the term's creator as industrial mutation "that

incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one” which “is the essential fact about capitalism” (Schumpeter 2008, 83), is a problem for market leaders in every field. That the term greatly predates the Information Age indicates this problem affects several fields regardless of their nature or sophistication.

The knowledge management field addresses competitive advantage through knowledge power and knowledge uniqueness (Nissen 2014). Knowledge power increases through acquisition and dissemination of that knowledge throughout the organization to duplicate success, emulate best practices, and increase competitive advantage (Szulanski and Winter 2002; Hatch and Dyer 2004). It also increases its ability to flow, since as the desired recipients’ absorption of new knowledge depends on the knowledge they already possess (Tuomi 1999; Alavi and Leidner 2001). In other words, the term “transfer of knowledge” can be a misnomer, since it is not exactly knowledge that flows, but signals generated by and based on the teacher’s knowledge that are interpreted based on the learner’s knowledge (Nissen 2006; Shattuck and Miller 2006). This flow process emphasizes the advantage through knowledge superiority. It maximizes the power of an organization’s knowledge while protecting it from Creative Destruction through imitation, and it leverages the depths of the knowledge advantage of incumbency. This helps create knowledge flows that prioritize the knowledge that is key to the organization’s value proposition to the market.

Knowledge uniqueness increases, or is protected, via controlled or limited access, appropriation, and key employee retention (Saviotti 1998; Partnership for Public Service 2011; Madsen, Mosakowski and Zaheer 2002; McAusland and Kuhn 2011). It is the basis of critical differentiation for a market leader to retain or expand its competitive advantage (Porter 1996).

Both knowledge power and uniqueness are critical to maintain competitive advantage, but their relationship is paradoxically inverse. The steps that are necessary to increase one, in most cases, cause the other to diminish; thus, it is common for organizations to find themselves sacrificing power for uniqueness or vice versa, which ultimately leads to losing market share. Most of the literature dealing with this paradox

recommend either to give up on uniqueness and focus on excellence of duplication (Szulanski and Jensen 2008; Winter 2000), or to maximize uniqueness via innovation or combination of product and corporate processes at the expense of duplication of success (Schoemaker and Gunther 2006; Saviotti 1998; Hargadon and Sutton 2000).

The following four statements summarize the problem this thesis addresses:

- Market leaders build what should be a near-insurmountable competitive advantage in their market due to their greater knowledge assets, yet they constantly fall to less-knowledgeable organizations.
- It is very difficult to increase the power of an organization's knowledge without compromising its uniqueness or vice versa, which means that there usually is an inherent weakness in KM systems that leads to the continuous cycle of Creative Destruction.
- Organizational structures require a specific means of coordination to succeed. These means relate directly to KM methodology, but are rarely analyzed this way, creating a separate weakness in the system via misfit with the organization's structure.
- There are organizational structures that require standardization of results as a means of coordination for a proper fit, such as adhocracies and divisionalized bureaucracies. This creates an additional challenge for the KM system to ensure SMEs and other individuals responsible for achieving said results to develop and evaluate their decision-making ability as a key element of their competency.

C. PROPOSAL

This study will challenge the reader to rethink the path to KS in five critical areas of organizational self-awareness:

- Knowledge completeness. Has the organization analyzed its successes and failures from a KM perspective to understand all the relevant internal and external factors that worked together for the initiative's outcome? Is its success by deliberate design or by a happy coincidence? Does it understand the risk of gaps between what key workers' know and what they need to know to make good decisions?
- Knowledge baselines. Does the organization know how much and which knowledge their key employees have at the individual or group level? Has the gap between complete knowledge and each person's/group's knowledge been analyzed? Can it be?

- Knowledge prioritization. Is there a systematic approach to achieve complete knowledge depending on each individual's/group's baseline of knowledge? Is it flexible to adapt to different knowledge bases? Is there a priority level assigned to different parts of the knowledge that individuals and/or groups need to have?
- Organizational purpose. Does the design of the organization serve its strategic goals? Does its KM system and methodology fit and support the organizational goals and design? Does the organization prepare and empower individuals to achieve desired results regardless of where they are in the organization? Is there a system to determine when this is desirable?
- Individual decision-making processes. Do key knowledge workers have supporting systems to filter from the universe of signals and data to a manageable set of information to make informed decisions? Does the organization have mechanisms in place to train and evaluate these key decision makers? Do they know how their decisions affect the ability of the organization to deliver consistency of results?

This thesis proposes a combination of knowledge management, organizational design, team cognition, and decision-making concepts to design a system that can increase knowledge power without sacrificing its uniqueness. This system would analyze the organization's successful initiatives and use their functional decompositions to duplicate successes in situations where exact duplication is not a fitting means of coordination. This allows the organization to evaluate its design based on its strategic goals, and to identify the best KM methodology for that structure.

The research here is a starting point. One goal of this path of research is to design KM systems that identify, catalog, test, and prioritize knowledge so that it does not just flow to the appropriate people and systems in the organization but that it is the appropriate and relevant knowledge that needs to flow. Another goal is to help organizations, particularly large ones, see that the path to competitive advantage does not necessarily rely on standardization of as many processes as possible, but rather of the fewest to allow the high-priced SMEs on its staff to use their expertise to deliver desired results. This is particularly relevant for public sector organizations and their auditors, as they tend to focus on process compliance as the measure of effectiveness with only a passing regard for the quality and consistency of results.

The analysis will look at the current state of organizational KM and C2 systems and organizational theory, analyze their functions, and identify the needs that they address as well as those that remain, even after their implementation. It will evaluate the impact and viability of adjusting or overhauling organizations' KM systems and methodologies, and propose tools and applications to help leaders and managers determine how to assess their effectiveness, particularly how they support the organizational strategic goals and competitive advantages

Each of the proposed areas of improvement require the organization to look inwardly. There are principles and theories that focus on areas outside the organization, which could be as impactful to its competitive advantage, but this thesis is concerned with the organization's self-awareness. The reason is that nothing is as demoralizing at all levels in a successful organization than self-inflicted wounds. Even the best organizations can lose sight of who and what they are, ending up in a situation much like Blackberry, whose leaders to this day cannot believe that Apple, and now Samsung and Google, overtook them with clunky, inefficient, and flashy cell phones with weak security features. They cannot understand how, while the public cannot understand their confusion (McNish and Silcoff 2015b). The goal of this thesis is to contribute to the explanation.

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II. KNOWLEDGE MANAGEMENT SYSTEMS FOR INDIVIDUALS AND ORGANIZATIONS

This chapter provides an overview of knowledge management, knowledge superiority, and a definition of Organizational Self-Awareness. It elaborates on current organizational KM systems, their purpose, and the need they address in their design and implementation, with a review of the value proposition that such systems offer organizations that incorporate them.

The purpose of this chapter is to provide the reader a summary of the KM discipline, major aspects and attributes of knowledge and systems of knowledge, and a framework to analyze the effectiveness of KM systems. It provides the rationale to choose the proper measures to evaluate KM systems' strengths and weaknesses with respect to their most overarching goal of knowledge superiority, which is to leverage organizational knowledge into sustainable, competitive advantages that protect leading organizations from Creative Destruction.

A. GENERAL OVERVIEW

Organizational self-awareness is the firm's perception of what it knows and what it needs to know, both institutionally and as a sum of individuals' knowledge. The purpose of the focus on it is to demonstrate that decisions by leaders and lower-level decision makers can affect the organization's current and potential success regardless of external factors that are outside their control. Some obvious answers may require more scrutiny, and it is important for leaders to understand that their time would be well-spent making internal organizational decisions with careful consideration of the impact they can have on strategic and tactical goals.

In the framework of Team Cognition, theorists treat organizations as teams instead of groups, as the heterogeneous nature of organizations is one of the key challenges that the design of the proposed KM system addresses (Cooke, Gorman, and Winner 2007). The degree to which the organization is able to overcome this challenge will be a major factor in determining the impact of OSA on knowledge superiority and competitive advantages.

As the complexity of organizations increases, the organization's total knowledge level separates from the sum of the knowledge of the individuals in the organization (Cooke, Gorman, and Winner 2007). In some cases, the total exceeds the sum, while in many others, it is substantially less. The goal is always to increase the level, and hence the power, of an organization's knowledge. Evaluating whether an OSA factor causes the total knowledge to exceed the sum of individuals' knowledge, as opposed to merely increasing that total, is beyond the scope of this thesis.

The awareness portion of OSA would consist of these five parts:

- understanding what the individuals and the organization must know to be knowledgeable
- knowing what each individual knows as it relates to the organization's goals, and his or her impact on them
- realizing how to build from the organization's knowledge assets to the required knowledge level
- understanding how the organization's structure must dictate its KM methodology for a proper and effective fit
- determining how far to delegate and disseminate the responsibility of making critical decisions, which depends on that KM methodology

Achieving OSA requires that the firm decompose its vision, mission, and each of its initiatives. This decomposition reveals the knowledge chunks that contributed to the successes, along with the chunks that were missing from its failures, and helps establish a continuous knowledge assessment mechanism that tests both the level of knowledge of the individuals in the firm and the relevance of the knowledge chunks identified in the organization's own assessment. This would be akin to an information-processing subsystem (Blanchard and Fabrycky 2011) in systems engineering design but with a focus on the knowledge chunks and their dissemination via the information and data bits.

Therefore, organizational self-awareness would be the result of implementing KM and C2 systems and organizational theories that leverage the analysis of successful initiatives to duplicate success and mitigate the risk of Creative Destruction. This involves a deeper study of innovations to assess not just their strengths but their

weaknesses as well, and anticipate how a competitor may successfully counter them, which is an important attribute for a KM system that intends to meet this need.

There are several disciplines and theories with extensive research regarding both knowledge management and command and control. This general overview section discusses three major concepts that are the pillars behind this thesis, and their relation to the ultimate goal of knowledge superiority. This thesis proposes adjustments and enhancements to the design of the KM discipline itself, leveraging knowledge flow and C2 principles to create a system that increases knowledge power while protecting knowledge uniqueness. These concepts are critical to the premise of the thesis.

1. Knowledge Management

Knowledge management relates to the acquisition, accumulation, assessment, dissemination, and institutionalization of knowledge assets in an organization. Because knowledge is akin to competitive advantage (DeLong, Lees and Gabarro 2008; Dierickx and Cool 1989; Hatch and Dyer 2004; Nissen 2006; Porter and Millar 1985; Madsen, Mosakowski and Zaheer 2002), the value proposition of the KM field is to provide organizations competitive advantages that are sustainable, protecting the organization's market share and helping it expand it. The subsections below explain the functions of KM and their contribution to meeting the need.

a. Knowledge Power

The main purpose of KM is to maintain competitive advantage (Porter and Millar 1985). Whether by duplication of successful endeavors (Szulanski and Winter 2002), accumulation of knowledge assets (Dierickx and Cool 1989), or by profitable innovation (Andrew and Sirkin 2004), to know more is generally synonymous with gaining value. Therefore, knowledge management initiatives are measured not just by their efficiency of knowledge attainment and transferring, but also in terms of how that knowledge increases an individual's or an organization's value.

b. Knowledge Uniqueness

Competitive advantage in this context is when an organization can do something of value in its market better than its competitors (Porter and Millar 1985). Knowledge management initiatives have mostly focused on technological or process knowledge to deliver product that is better or cheaper to produce than what is currently available (Schmidt and Porteus 2000). Both externally and internally, KM leads and/or manages technological changes, which, if they are better than the competition's, can gain it a competitive advantage (Porter 1985). Differentiation from the competition as a competitive advantage is the external measure of KM success. Internally, the measure of KM success takes the form of process improvement, codification of tacit knowledge, dissemination throughout the organization, refinement of the newly acquired knowledge, and ultimately its penetration on all relevant parts of the organization (Nissen 2006). The leveraging of this flow of knowledge, expected to lead to more effective innovation and technological improvement of product and/or process that creates competitive advantage, is the internal measure of KM success.

c. Knowledge Flow

Assessments are a key element of KM application. They allow an organization to both quantify and qualify its knowledge assets and its gaps in knowledge, which help the organization's leaders make decisions about where knowledge needs to flow. The results show the need to create and apply new knowledge, and to find the most effective flow path to achieve the desired explicitness, reach, and maturity to achieve the organization's strategic goals (Nissen 2014).

d. Knowledge Classifications

Knowledge is largely classified as either experiential and tacit or as codified and explicit (Nissen 2014), at the individual or organizational level. Explicit knowledge is the easiest to disseminate and standardize, which makes it better for knowledge flow purposes but also risks the competitive advantage that the knowledge provides since it can flow both internally and toward competitors (Saviotti 1998). Management must evaluate the risk-reward ratio of losing the competitive advantage compared with the

efficiency and effectiveness gains within the organization due to the knowledge flowing well. Additional benefits of codifying knowledge come from the codification process itself, as management makes important decisions about compliance, repeatability, and standardization (Winter 2000).

Tacit knowledge, conversely, is difficult to disseminate, and even more so to standardize. Subject matter experts (SMEs) hold this knowledge in their own heads, and articulating it is very difficult to accomplish fully since so many parts of that knowledge are second nature to the SME, sometimes without her realizing that what she does naturally is instrumental to the total body of that knowledge (Leonard and Sensiper 1998). It is founded on experience. At the same time, it is the most valuable kind of knowledge for the firm, and it is the best source of its competitive advantage. It is the hardest to duplicate, the source of all explicit knowledge, and it greatly increases the ability to absorb more and better knowledge to expand the advantage (Looney and Nissen 2007).

2. Command and Control and Organizational Theory

Command and Control, as its name implies, focuses on singular decision-making processes at the top of an organization. The following subsections elaborate on the C2 principles this thesis leverages for analysis and recommendations: decision making and organizational design.

a. Decision Making

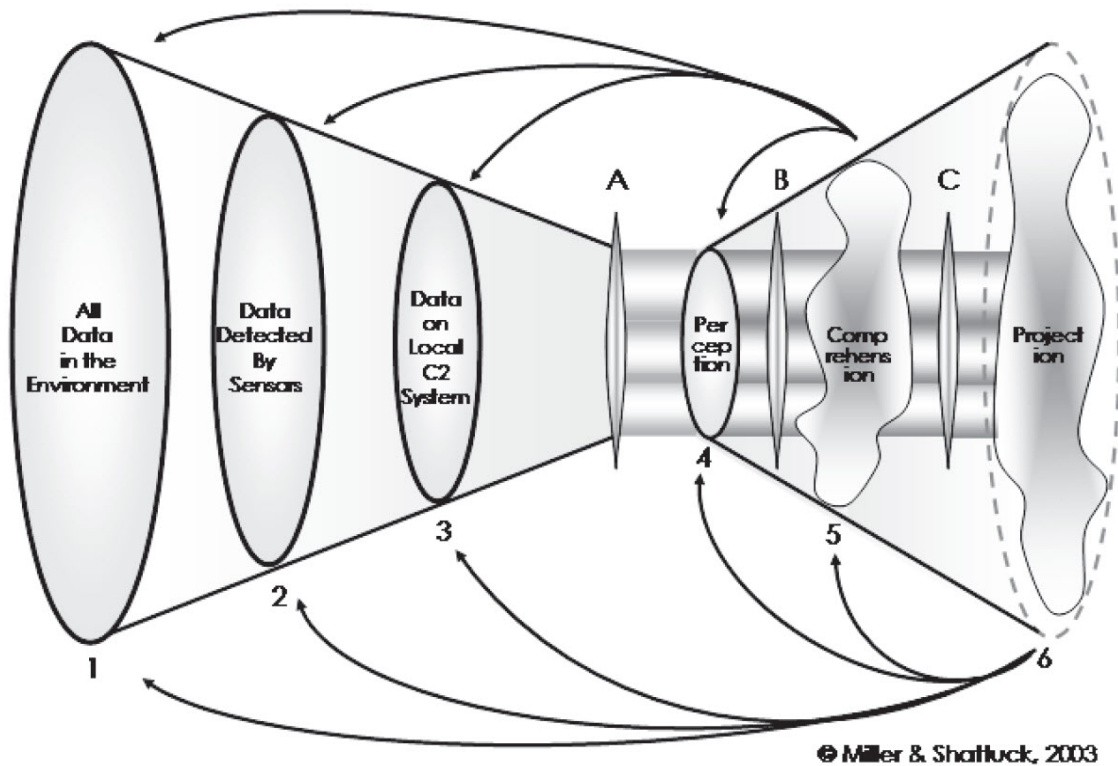
Success in an organization is ultimately the result of good decision making. Qualifying the goodness of a decision, however, generally happens in hindsight. Even the best-trained leaders can make mistakes, and much the more if the leader's perception of a certain situation does not come into sync with reality (Coakley 1992, 95–122). That leader's perception is in turn a function of her experiences and personal tendencies, combined with the data and information that she can and does access when making a decision. She then proceeds through the Naturalistic Decision Making (NDM) process to arrive at the best decision.

The steps of NDM are essentially going from all the information available, to what can be detected, to what is displayed to the commander, to what the commander sees, understands, and ultimately projects as the likely outcome of the choices at his or her disposal. Once one of the projections fits the commander's vision of a desirable outcome, it determines the doctrine and actions for the forces under his or her command (Shattuck and Miller 2006).

Situated cognition, as a part of NDM, refers to the "interplay of multiple individuals and their environment" which plays a determinant role in an individual's decision-making process. It helps explain how the decision maker must not only be prepared and trained to make the best decisions, but must take steps toward ensuring that she is fully aware of all the factors in the environment that are impactful to the decision.

Of course, knowing what one needs to know without learning everything else is a near impossibility, more so in situations where others are responsible for filtering the environment for the leader to absorb only the "important" information. Shattuck and Miller (2006) use the complex scenario of military operations, particularly a deadly collision at sea with a Japanese fishing vessel, to illustrate how operators and information technology were unable to prevent a trained and competent leader from making a terrible mistake. Their illustration of this process is in Figure 2-1, with the filtering mechanisms being sensors and their operators, neither of which are trained to make the command decisions, but are tasked with deciding for the commander what he needs to know. This inconsistency of having less-trained individuals and IT systems make information-discrimination decisions is a critical weakness of modern C2 systems, and usually is at the core of many recent military disasters, such as the *USS GREENVILLE (SSN 772)* (Shattuck and Miller 2006) or *USS VINCENNES (CG 49)* incidents (Roberts and Dotterway 1995).

Figure 2-1. Naturalistic Decision Making—Dynamic Model of Situated Cognition with Feedback Loops Representing Decisions That Have Been Made and Their Impact.



This Situated Cognition illustration indicates how the decision maker’s information flow goes from all the data that exists down to the data that sensors can detect and the data that the system discriminates as important, based on programming. The lenses (A, B, C) represent the impact that the decision maker’s mind (experiences, perception, physiological and psychological conditions) has on the data and what he gains from it. The final lens is a representation of how the decision maker forecasts the result of the options being considered, and selects the one that best fits the desired result. From Shattuck, Lawrence G, and Nita Lewis Miller. 2006. “Extending Naturalistic Decision Making to Complex Organizations: A Dynamic Model of Situated Cognition.” *Organization Studies* 27 (7): 1–21.

Outside of military or other high-tech operations, public and private organizations go through the same decision making and information-discrimination processes. Instead of sensors, they may have market research data, “metrics,” or business-unit performance standards designed to filter through large amounts of data and information and facilitate decision making at the most senior leadership levels. The principles remain the same, as do the contradictory weaknesses of having less-trained individuals making critical decisions for the well-trained executive leader, potentially guiding or bounding the decisions the leader makes.

While these limitations are inevitable in any organization, there is much room for improving an organization's chances for success based on decision making. Some involve better filtering mechanisms for the right information and data to reach leadership, or better training the leaders to anticipate a particular quantity or quality of information and drive the performance of filtering operations to meet the standard. Situated cognition, as an extension of NDM, illustrates the need for these measures to achieve better performance. Another way that C2 theories promote better organizational performance is through the design of the organization itself, particularly as it relates to the strategic goals of the organization.

b. Organizational Design

Another critical attribute to consider is the design of the organization, especially as it relates to the strategic goals and purposes of the organization. Numerous well-documented organizational failure “stem from the assumption that organizations are all alike: mere collections of component parts to which elements of structure can be added and deleted at will, a sort of organizational bazaar” (Mintzberg 1981, 103). Conversely, Mintzberg continues, “effective organizations achieve a coherence among their component parts, that they do not change one element without considering the consequences to” the other parts of the organization (Mintzberg 1981, 103).

A key element of Mintzberg's work (1981) is the cataloguing of the various organizational structures based on the desired means of coordination. The KM methodology as determined by its goals corresponds to a specific means of coordination, which itself requires a specific organizational structure to be successful. If one takes Szulanski's (2002, 2008) franchise model approach of exact duplication of successful working templates, the appropriate means of coordination is the standardization of work, which fits a machine bureaucracy. If instead one heeds Black and Morrison's (2010) warning not to devote oneself to The Way, but instead seek to coordinate through standardization of results or mutual SME adjustment, the appropriate structure is either a divisionalized bureaucracy or an adhocracy. Foregoing KM altogether works in very simple structures, while highly complex and sophisticated organizations, which Mintzberg names adhocracies, coordinate via mutual adjustment, driving innovation and

depending on the expertise of the specialist to go beyond their specific field into understanding how the rest of the organization works and how to communicate effectively to collaborate at an effective pace.

The challenge for leaders seeking knowledge superiority is to decide how they would like to coordinate the work of their organizations, examine their current structures, and determine which KM strategy fits their organization best. Conversely, they may evaluate their current structure and analyze trade-offs between adapting to a different structure or a different form of knowledge management to ensure a proper fit.

3. Knowledge Superiority

In its brochure for the Knowledge Superiority Certificate program, the Naval Postgraduate School defines knowledge superiority as the leveraging of “sustainable, knowledge-based, competitive advantages” that come from the “integration of people, processes, organizations and technology” that drive knowledge to flow to where the organization needs it to be (Naval Postgraduate School 2015). Knowledge Flow Theory describes knowledge flow as it goes from tacit to explicit and back, from an individual-level to organization-wide, and how it matures from its creation to its application, with the added dimension of time for each knowledge flow process (Nissen 2006). Nissen (2006) leverages the theory to illustrate and analyze the direction, speed, and effectiveness of this knowledge flow as a key measure of an organization’s competitive advantage through knowledge superiority.

The concept serves the purpose of this thesis well. Knowledge may be the key for competitive advantage, but superiority, by definition, speaks to its sustainability. The efforts described in the upcoming chapters all drive toward the singular goal of knowledge superiority.

B. ORGANIZATIONAL KNOWLEDGE MANAGEMENT SYSTEMS

The current-state organizational KM systems focus on organization-level tools and initiatives to disseminate and protect knowledge looking while treating the organization as a singular entity, or a system of smaller knowledge systems and players, with the emphasis on the organization.

This section elaborates on the design and value proposition of organizational KM systems in their current state, addressing their functional decomposition, needs analysis, and knowledge flows to deliver its value proposition to the organizations that implement it.

1. Purpose of Current Organizational KM System

The purpose of organizational KM is two-fold: maximize both knowledge power and knowledge uniqueness. The power of knowledge allows organizations to duplicate their best practices and successes both internally and externally (Nonaka 1994; Szulanski and Winter 2002; Nissen 2014), while the uniqueness of that knowledge protects the organization from knowledge-based competition through imitation (Saviotti 1998).

Because knowledge, particularly tacit knowledge, is the more powerful contributor to an organization's competitive advantage, driving innovation and differentiation, managing, protecting, and disseminating that knowledge is imperative for market-leading organizations to keep or even to expand their lead (Dierickx and Cool 1989). Tacit knowledge is more powerful, but it is sticky and requires deliberate effort for it to flow to where needed (von Hippel 1994).

At the same time, organizational KM must also protect the uniqueness of that knowledge to protect the organization from competition from imitation. As tacit knowledge becomes more explicit and disseminated, it is more difficult to keep it from competitors that could use it to overtake the organization (Porter 1985).

Nissen (2014) elaborates on the functions and application of KM systems and programs. He establishes attributes of knowledge itself, knowledge flow, knowledge transfer, and the increasing power and decreasing uniqueness of knowledge as it diffuses throughout the organization. It transitions from tacit to explicit, and then back to tacit at the organizational, refined level, where it maximizes its power again, but with reduced uniqueness.

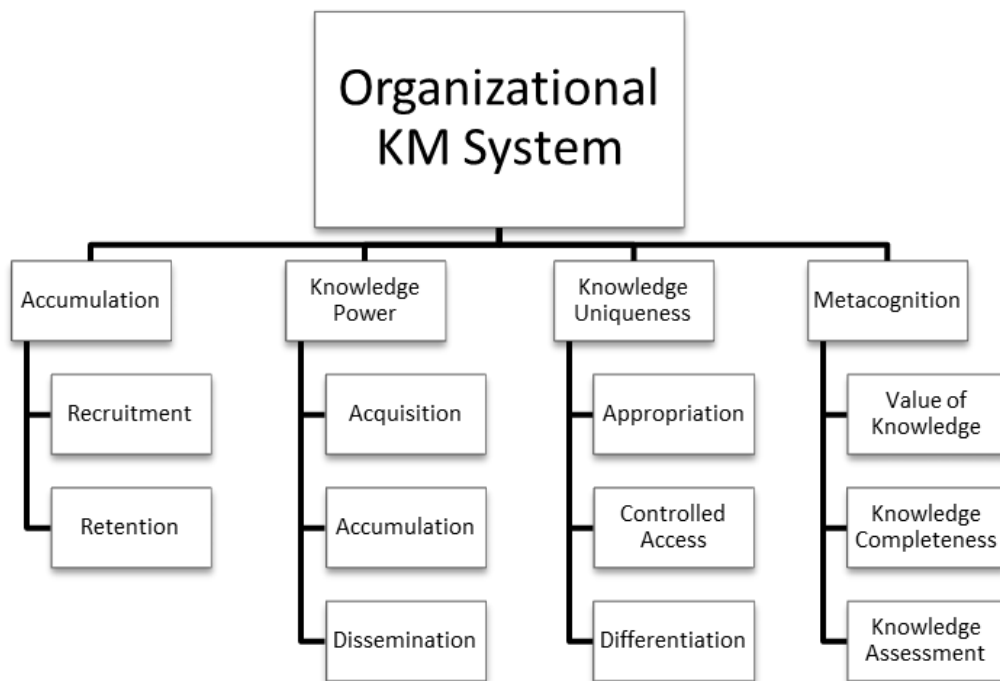
2. Functional Decomposition

The need that organizational KM was designed to fulfill was to leverage knowledge as the source of sustainable, competitive advantage (Porter and Millar 1985). It does so by extracting and disseminating the organization's clumps of tacit knowledge

based on a targeted level of knowledge that the leaders of the organization decide is necessary to maximize that competitive advantage. Knowledge Flow Analysis evaluates the dimensions of knowledge and the paths to maximize its dissemination throughout the organization to minimize the vulnerabilities that threaten organizations' ability to sustain their competitive advantage (Nissen 2010).

Figure 2-2 illustrates the different attributes or organizational KM systems as they exist today. These attributes are applicable to both the current state of KM systems and the proposed design that this thesis elaborates in following chapters, particularly metacognition and knowledge uniqueness.

Figure 2-2. Functional Decomposition of Current-State Organizational KM Systems.



3. Current-State Functional Analysis

Table 1 takes the organizational needs that the KM system is designed to address, and indicates the functions of the system that address them directly, with a short requirements statement that explains what the system must do and why.

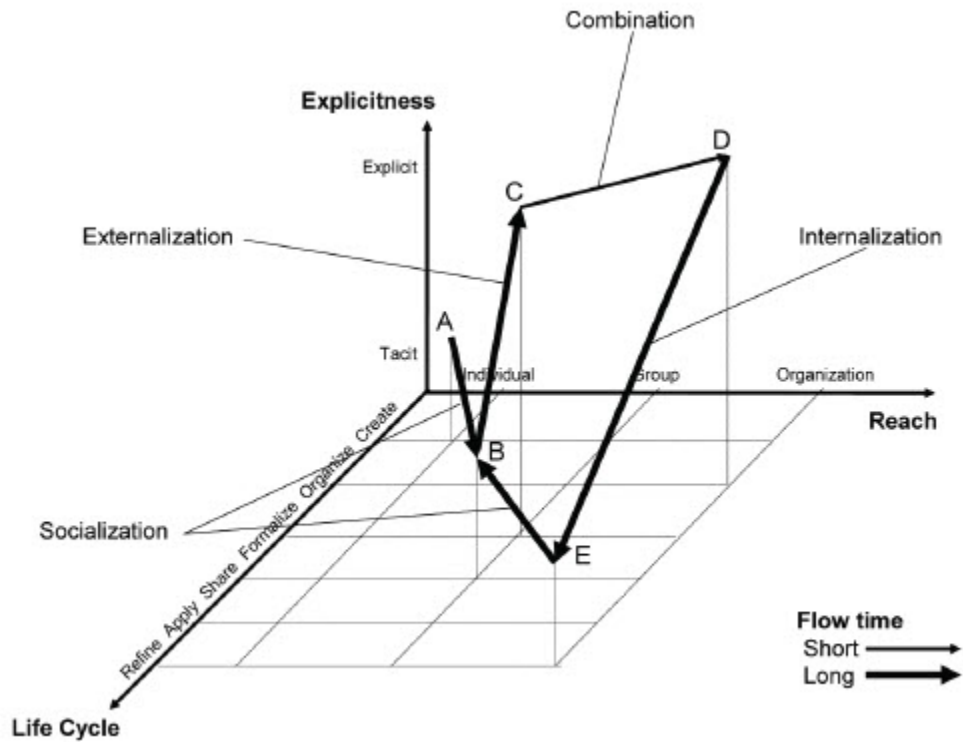
Table 1. Current State KM Functional Analysis.

Need	Function(s)	System Requirements (The system must...)
Subject Matter Expertise	Asset Stock Accumulation	Incorporate processes to increase the accumulation of its knowledge, particularly tacit knowledge, via recruiting or training/mentoring. This accumulation represents the ceiling of individual knowledge, and hence competitive advantage for an organization.
Duplication of Successes	Knowledge Power, Flow	Evaluate successes, and transmit the knowledge behind them throughout the organization. Once the organization knows what it did to be successful, it must codify it and transfer it to other parts of its organization to multiply its success and increase its competitive advantage.
Protection from Competition due to Imitation	Knowledge Uniqueness	Protect key advantageous knowledge from competition by controlling access to it. As tacit knowledge becomes more codified and diffused throughout the organization, it is easier for competitors to copy and leverage that knowledge, threatening the organization's competitive advantage
Organizational Metacognition—to know what is known	Knowledge Assessment	Identify knowledge gaps at the individual and team/group levels, quantify the value for the current and desired knowledge in the organization, and develop the proper transmission tools to close the identified gaps in order of value for the organization.

4. Knowledge Flows

As illustrated in Figure 2-3, Nissen (2006) employs a multidimensional visualization to illustrate how knowledge matures and disseminates throughout an organization, transforming from tacit to explicit, and back to tacit. He adds a time dimension to show how long knowledge takes to travel/flow from one three-dimensional form to the next.

Figure 2-3. Multidimensional Knowledge-Flow Visualization.



Knowledge begins (A) as a clump of tacit knowledge newly created/acquired by the SME. The SME, using tacit training tools such as mentoring and hands-on training (Swap W. L. 2001), socializes (organizes, formalizes and shares) still-tacit knowledge to a group level (B), slowly. The group slowly externalizes (codifies and formalizes) as much of that tacit knowledge into explicit knowledge as possible (C), and quickly combines it at the organizational level (D). The organization then slowly internalizes the explicit knowledge into tacit, refined, organizational knowledge (E), where it slowly socializes it again with much more power. From Nissen, Mark E. 2006. *Harnessing Knowledge Dynamics: Principled Organizational Knowing and Learning*. Hershey, PA: IRM Press.

There are other paths for knowledge flow, particularly to overcome organization-specific barriers to flow, or to accommodate for different types of knowledge refinement and dissemination, that may necessitate alternate paths.

5. Value Proposition

In practical terms, the KM programs in many organizations today consist of acquiring SMEs that are full of relevant tacit knowledge, complementing that core of experience with junior and mid-level personnel, and creating flow paths for that knowledge to go from where it is to where it is needed (Hatch and Dyer 2004; Nissen and Levitt 2004). The programs then use a combination of training sessions, mentoring,

knowledge sharing networks, and process analysis to understand and codify that tacit knowledge to disseminate throughout the organization (Swap, et al. 2001; Nissen 2006).

Organizational KM leads to more collaboration and efficient utilization of knowledge asset stocks, better prioritization of training needs, and less duplicative efforts within organizations. However, Creative Destruction remains as much a threat to market leading organizations as ever. The balance between knowledge power and knowledge uniqueness remains elusive, with market leadership shifting between organizations, or taken by an upstart that leverages the codified knowledge that the leaders have in abundance.

In the following chapters, this thesis will propose adjustments in organizational KM to address this inconsistency, and provide firms with an additional and robust path to knowledge superiority.

III. ORGANIZATIONAL SELF-AWARENESS RELATION TO KNOWLEDGE SUPERIORITY

The previous two chapters introduced the problems facing knowledge-based market leaders and players and how KM and C2 disciplines have addressed the problem. Chapter I discussed how Creative Destruction seems to fly in the face of the competitive advantage that knowledge provides for an organization, especially since market leaders and main players have access to more and better knowledge than the upstarts that keep overtaking them. Chapter II elaborates on how the knowledge management disciplines have addressed the issues of increasing both knowledge power and knowledge uniqueness, with the goal of maximizing competitive advantage while minimizing the risk of competition through imitation, including how knowledge assessments and flow theory work to take knowledge from tacit and individual-based to explicit, disseminated, and finally tacit and organizational-based.

This chapter analyzes the current state of organizational KM systems, and explains how there is an important piece that has gotten little attention in theory and in practice. That element involves a combination of two initiatives within an organization: (1) decomposing the organization's knowledge, particularly about its successes, to understand exactly why and how the success occurred, and (2) developing a precise knowledge base for each position in the organization that allows it to disseminate the appropriate amount of knowledge to each individual, while not disseminating so much that one compromises uniqueness.

A. NEEDS ANALYSIS

As discussed in the previous chapters, market leaders are constantly under pressure to increase their lead through additional competitive advantages. This lead comes from accumulating expert knowledge through recruiting and internal research, assessing the knowledge levels of each person in the organization compared with a standard of knowledge for the organization, finding the clumps of relevant, powerful, tacit knowledge and disseminating it through the organization. The ultimate benefit is the replication and even improvement of the successes that the organization has achieved.

Disseminating the knowledge requires making it portable. The advantage that comes from being able to transmit it across the organization also presents a susceptibility to imitation. However, protecting the knowledge and access to it hinders the ability to duplicate success, so these two forces work against each other.

The Creative Destruction comes from either another organization achieving the steps above in a more effective way, or leveraging the leaders' portable knowledge toward a better or more cost effective product to take market share away. The same process that the market leaders use to overtake their competitors is used against them, and the Creative Destruction process continues. For a KM system to meet the needs of knowledge accumulation, dissemination, and uniqueness while not compromising uniqueness, certain adjustments in the approach to organizational KM are in order.

B. DUPLICATION CHALLENGES

Szulanski and Winter (2002), Black and Morrison (2010), and others illustrate the benefits and elusiveness of duplicating success. The challenges that they find in their research all come down to a single point of failure: the codification of the tacit knowledge behind the success was incomplete. Duplication efforts often underestimate the amount and type of knowledge chunks that were critical toward building the successful innovations the firms had built, or overestimating their understanding of what worked and why. Moreover, because duplication becomes the goal, the organization institutionalizes inherent weaknesses in its initiatives and permeates their effect throughout as part of the knowledge flow process.

In their 2010 study of Japanese firms exporting *The Way*, Black and Morrison elaborate on this last point when they evaluate how these firms believed that the entirety of their management and operations system was successful as a whole. Their faith in *The Way* as a whole led them to forego decomposing their successes to find precisely why and how each functional component of their initiative(s) succeeded or failed, which would have shown them the structural weaknesses of their system (Black and Morrison 2010). They summarized these weaknesses into four, applicable to companies looking to expand beyond their market or niche:

- Devotion to The Way: A strong belief in the strength of the system as a whole
- Isolated Domestic Market: Their faith is protected due to lack of competitive challenges in their local market, reinforcing their belief in the system
- Docile (or more broadly, homogeneous) Domestic Labor Force: The less diversity in the workforce, the easier for management to develop a single management system that works throughout the organization, further reinforcing faith in the system
- Homogeneous Senior Leaders: Similar to the previous point, when the executive team as a whole tends toward the same decisions and conclusions, most decisions seem brilliant, and the strength of the system becomes self-reinforcing

Szulanski and Winter (2002) are blunter in their assessment from the introductory statement: “In-house ‘experts’ don’t truly know why [the best practice] worked in the first place.” Using Starbucks and McDonald’s as contrasting examples, they illustrate the difficulty of understanding on what a company’s competitive advantage is based.

When Starbucks executives first looked to establish the company’s identity, they tried perfect copies of what its leadership viewed as critical elements of successful Italian cafés that they sought to emulate and failed. McDonald’s tried the opposite approach when they started seeking to expand globally, adapting its model and practices in a way its executives perceived would be well received by the countries into which they were expanding. In this case, this approach was also a disaster.

Each of these companies then decided to try an approach to their desired expansion that was essentially what the other had tried and failed. Starbucks’ management decided that they should adapt their model to the culture to which they were marketing, in this case Americans, implementing successful principles they had seen in those other cafes at a functional level. When they did, they found success at a grand scale, and that success was ready for exact duplication. They were not ready to copy exactly when they first tried, but they certainly are now. Conversely, McDonald’s already had an excellent working template that should have been duplicated exactly, but did not realize it, and tried to adjust it unnecessarily. When they decided to copy exactly, they succeeded. However, their adaptation to cultural differences in new markets caused

McDonald's to fail internationally. The pure American model would have been, and ultimately was successful globally (Szulanski and Winter 2002).

In the end, each of them essentially tried the other's failed approach and succeeded. This is yet another illustration that the KM methodology needs to adapt to the appropriate organizational structure. There is no one "best" methodology, though exact copying seems to be one that makes innate sense to many business leaders and managers.

This contrasting example also serves to illustrate an additional point, one that Szulanski continues to elaborate in follow-on research: innovation and duplication cannot be achieved at the same time (Szulanski and Jensen 2008). Organizations need to choose, even if it is at the business unit/agency, which one they are going to pursue. In this example, Starbucks was in the innovation stage, while McDonald's was mostly at the duplication stage; it took these failures to get them to understand this.

Szulanski's focus is on duplication, and the two papers cited above encourage the reader to adopt a "Copy Exactly!" method as a way to ensure success and troubleshoot duplication failures with a current, living template of a working process. This has the effect of duplicating the success, done correctly, but does little to address the analysis of the success at its own functional, decomposed level. It works when the working template is robust and well-understood, as long as this KM methodology fits the structure of the organization.

C. DECOMPOSITION OF SUCCESS

While many organizations are actively working to help knowledge flow to where it is needed, the path to knowledge superiority assumes that the knowledge to be transmitted is well-defined and essentially complete. There is little in the KM literature that discusses the evaluation of this premise.

This thesis proposes a process that precedes the need for duplication, focusing on understanding success at the functional level. Decomposing success would be a part of the innovation process itself, so that when one is successful, it is the result of a deliberate process. This decomposition involves not only understanding how success was built, but

also understanding which part of the knowledge behind the success is necessary at the individual level for all the people who make decisions in the organization.

The reason for this focus on decomposing success is the fundamental premise behind this thesis: that the competitive advantage of an organization, particularly one that has gained market share through innovation, must shift from the innovation itself to the process of innovation. This allows the organization to codify as much of the knowledge as necessary as it relates to the innovation, while protecting itself from imitation taking its biggest competitive advantage. Additionally, by decomposing successful operations and initiatives, the organization is able to better assess, acquire, and allocate knowledge throughout the organization based on what the organization has determined is needed to achieve success.

The process of determining what is needed to succeed is the elusive goal behind duplication efforts, such as those mentioned already in the preceding chapters. Many of the theories to increase knowledge power through flow and dissemination conclude that either complete duplication or functional adaptation of successful working templates are the means to achieve this (Szulanski and Winter 2002; Szulanski and Jensen 2008; Black and Morrison 2010). Both duplication and adaptation, however, take for granted that decomposing successful initiatives to determine how each of their individual functional components contribute to the success of the whole. Based on the research in support of this thesis, it is very difficult to understand why something works once it is already working, and more so to be sure that all the components of success are understood. If any part of the whole is missing, the entire initiative would fail, even if the missing part is an adaptation to transfer the success to another market or country (Black and Morrison 2010), which makes the “Copy Exactly!” strategy a most sensible way to duplicate success (Szulanski and Winter 2002).

Therefore, one of the key elements of this thesis is to decompose success as it is built. Successful innovation is rare but very valuable (Andrew and Sirkin 2004), and it takes a concerted investment by organizations to do this, especially since many of the decompositions will be on initiatives that will lead to nothing in terms of return. That is not to say that there is no value in failures or learning from them, as there are strong

arguments to the return on investment of mistakes, going so far as to say that there is so much value that companies should be willing to make deliberate mistakes (Schoemaker and Gunther 2006).

The improvement in this allocation of knowledge, in which the flow is limited to precisely what individuals need to know based on their position in the organization, prevents individuals from being able to transfer important knowledge to competitors. It empowers those same individuals to make decisions that align with the organization's strategic goals and key elements of success it is looking to replicate, and prevents employees from getting overwhelmed with unnecessary knowledge. By tailoring the employees' training to what each of them needs to know, and illustrating to employees their knowledge gaps and the specific training to address those gaps, organizations get the additional benefit of motivation from the employees to learn the material that they need and nothing else.

D. TAILORING OF ORGANIZATIONAL DESIGN AND KM CONCEPTS

The preceding chapters and sections elaborate on the need to disseminate knowledge and to keep it protected from imitation. Current KM and C2 theories address this need, but most of the solutions deal with the organization as a singular entity, with a capable leader and information systems designed to feed said leader with the information to make the best decisions possible (Coakley 1992). The organization trains its leaders to make the best decisions based on the organization's strategic goals, to which those leaders are usually an important contributor. The organization trains its workforce as a whole to a certain baseline of knowledge throughout, with specialized training for positions with unique and known skill requirements. The codified knowledge that is the basis for competitive advantage is protected, with access limited to prevent losses.

Tailoring those same tools and techniques for individual worker and position in the organization addresses the concerns of the KM paradox mentioned earlier in three ways:

- It increases the power of the organization's knowledge while divorcing it from the product or system it is developing. The firm uses the improved understanding of the factors and functions behind its successes to allocate knowledge requirements at the individual/position level in a discretionary

way to avoid allowing individuals to have enough explicit knowledge to harm the firm by their departure.

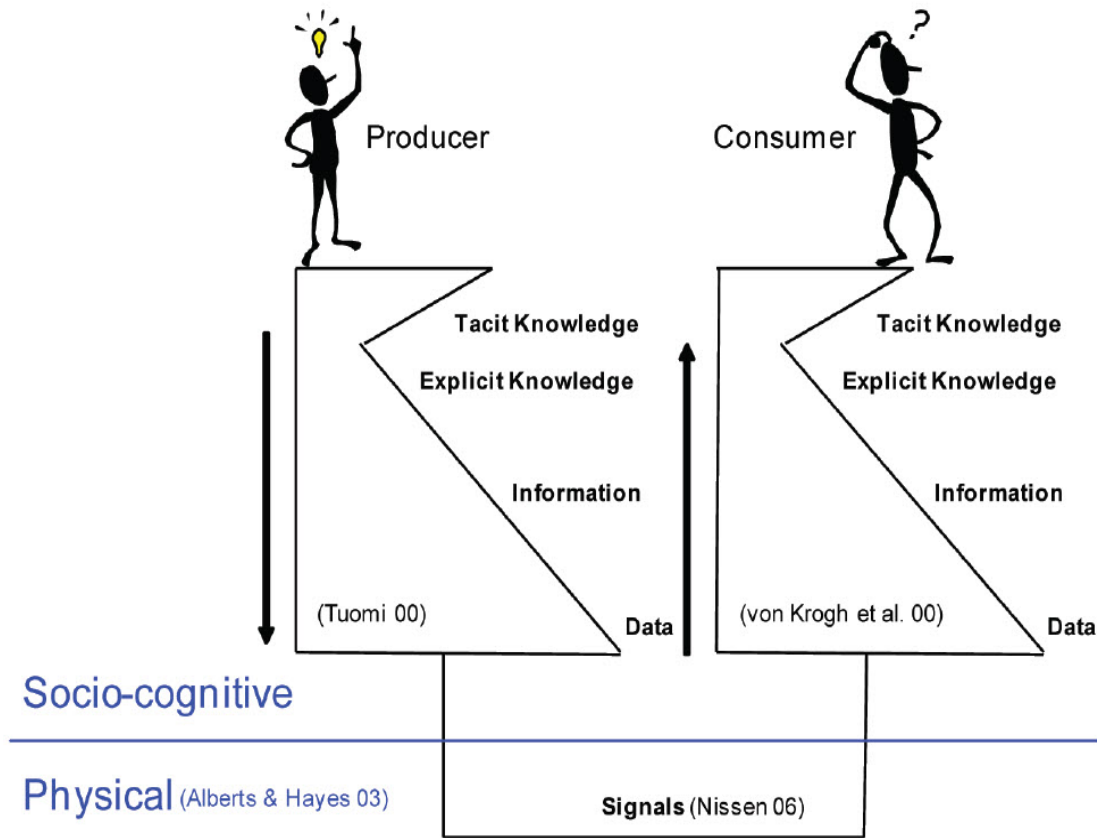
- It allows the organization to appropriate its knowledge by combining its product development and workforce development processes. Saviotti (1998) alludes to this idea but does not pursue it further, either in that work or his follow-on research. The process by which the firm innovates is deliberate in its construction, allowing the organization to duplicate its successes properly without having to rely on a “Copy Exactly!” methodology, which requires innovation to stop completely, creating vulnerability for the organization.
- It better motivates individual workers to absorb the knowledge that the organization wishes to flow. This is an important aspect of knowledge flow theory, which implies but does not directly address motivation from the learner’s perspective. This is an additional feature of the proposed system that the thesis addresses only superficially, but it is an important benefit where the goal is to ensure the knowledge is received and not just transmitted.

E. INDIVIDUAL DECISION MAKING

The principles of Naturalistic Decision Making (NDM) are designed for the ultimate decision maker to have the information necessary to make the appropriate decision, and no more. The process that NDM facilitates is designed to eliminate the leader’s learning of extraneous information that could cloud his judgment at a critical junction, as illustrated in Figure 2–1. While this is a good decision for the organization, given the responsibility that the leader has and the impact of his or her decisions on the organization’s success as a whole, important decisions are made constantly throughout the organization. These decisions may not be as visible or obviously impactful, but wrong decisions by lower-level knowledge workers and supervisors have long-term effects that can lead organizations down the wrong path.

To better visualize how the NDM process impacts decision making at the individual level, we review adaptation and combination of the knowledge transfer and absorption principles (Nissen 2010, 1622), illustrated in Figure 4–1. The second half of the NDM process depends mainly on what the decision maker can forecast for the various options available to choose from, and making the final decision based on the perceived best option. That forecast depends on the knowledge that the decision maker has, which at the individual level is not as deliberate as it is at the executive level.

Figure 4-1. Knowledge Flows—Model Representing the Flow of Knowledge Once It Is Created by the Transmitter’s Own Tacit Knowledge.



The combination of knowledge flows from the transmitter’s tacit knowledge to the learner’s based on what that learner knows. For individual decision making, the critical element is to ensure that anyone in the organization that makes decisions which can impact the organization has the requisite level of knowledge to forecast the most accurate outcomes possible, and choose from those. Without proper and standardized tacit knowledge throughout the organization, individuals make critical yet uninformed decisions, which are rarely correct. From Nissen, Mark E. 2010. “Visualizing Knowledge Networks and Flows to Enhance Organizational Metacognition in VOs.” *Connectivity and Knowledge Management in Virtual Organizations: Networking and Developing Interactive Communications*. IGI Global: 74–88.

The decision to increase operators’ knowledge level, or improve the systems’ ability to accurately filter irrelevant information to arrive at the best decision based on all the data and information available is a difficult one. Training the operators requires transferring specialized tacit knowledge beyond the knowledge chunks necessary to perform other functions in the organization, increasing the risk of important knowledge asset losses through attrition (McAusland and Kuhn 2011; Cohn, Khurana and Reeves

2005). Not training them and getting them more involved risks losing high-potential people through apathy or attrition as well (Martin and Schmidt 2010).

Similarly, the codification required to create IT systems capable of robust information-discrimination risks the uniqueness of the organization's knowledge (Saviotti 1998), and can create an overreliance on those systems to the detriment of the leaders' judgment in critical situations (Roberts and Dotterway 1995; Shattuck and Miller 2006).

F. ORGANIZATIONAL DESIGN

As discussed in Chapter II, the structure of the organization plays a major part in determining whether a certain form of organizational KM system will be successful. The following sections provide a summary of Mintzberg's organizational structures and their appropriate means of coordination, and hence the applicable goal of their KM system (Mintzberg 1981).

1. Simple Structure

A single authority and center of knowledge, with no KM need since that individual directly supervises all actions, and delegates market-specific decisions to no one.

2. Machine Bureaucracy

A technostructure with both vertical and horizontal specialization, which requires little to no training since the organization is structured around its explicit knowledge, which standardizes its processes. This is an ideal organizational structure for exact duplication KM, which Szulanski's research from 2002 to the present (Szulanski and Winter 2002; Szulanski and Jensen 2008).

3. Professional Bureaucracy

Defined as an operating core, like a doctor's or lawyer's practice, requiring much training and horizontal specialization. The expectation of baseline levels of professional competence requires a standardization of skills as a means of coordination. This KM methodology is common in both public and private markets, both as the main or a complimentary training system, such as human resources topics or other general training sessions, depending on the sophistication of the organization.

4. Divisionalized Bureaucracy

Not as specialized as the previous structure, the organization's purpose is to standardize results or outputs, delegating process-related decisions to lower-level individuals. They are not as trained as the previous structure, but must have an in-depth understanding of both the organization's desired goals and how their function individually fits in the organization to achieve the expected results. This means of coordination requires that the organization's KM system "can stimulate and support interunit collaboration to leverage their dispersed resources" (Hansen and Nohria 2004, 22).

5. Adhocracy

An organization of experts, this structure's design builds on the individuals' expertise and specialization for complex collaborative initiatives. The nuance of this structure is that it is similar to a simple structure in terms of formalization, with the support staff being the critical element in the success of the organization. The main difference is that the core of the organization is not an individual but a deep bench of specialists, and the means of coordination is mutual adjustment. It requires a large amount of specialized training, similar to the divisionalized bureaucracy, but leveraging a higher level of expertise at the individual level.

G. ORGANIZATIONAL SELF-AWARENESS

While many organizations are actively working to help knowledge flow to where it is needed, the path to knowledge superiority assumes that the knowledge to be transmitted is well-defined and essentially complete. There is little in the KM literature that discusses the evaluation of this premise. The decomposition of successful endeavors from a knowledge point of view as a central part of the proposed KM system addresses this need directly and allows the organization some flexibility on its desired organizational structure to succeed.

Furthermore, understanding why an initiative is successful at the functional level allows the organization to better allocate its resources. This helps organizations to adapt its structure or means of control based on desired results instead of on being reactive to

others' initiative or on the market itself. This increase in self-awareness is instrumental to the organization's knowledge superiority.

The conceptualization of this thesis' proposed KM system can work with many different structures, but the need is greater for adhocracy and divisionalized structures. There are several examples of standardization of work, such as exact copying initiatives, and standardization of skills is the most common type of organizational KM initiatives. Simple structures must decide to grow past this initial form before needing anything other than basic KM.

Important decisions that leaders and managers are making to help knowledge flow are not evaluated on the merits of the knowledge, but instead are made with the underlying assumption that as long as the knowledge flows, then KS will be achieved. Therefore, the proposed organizational KM system would invest considerable resources on training key individual knowledge workers to make decisions at the level that the leader is expected to perform. The same principles behind NDM and Situated Cognition apply to employees, not just as they discriminate information for the organization's leaders, but they also are responsible for making important decisions themselves.

For all these reasons, this thesis proposes an organizational KM system that focuses on individual tailoring of knowledge transfer initiatives and decision making, and correlates that tailoring to the structure of the organization to maximize the chances of success. The competitive advantage of such an integrated system would be difficult to imitate by competitors, increasing both the power and uniqueness of the firm's knowledge, and with it its competitive advantage and knowledge superiority.

The analysis in this chapter shows that organizations must consider their own nature and goals when determining how to implement KM in a way that will create a good fit with the organizations' structure. It also illustrates that even though the KM paradox is inherent to the KM process itself, that does not necessarily mean that the challenge it presents is insurmountable, or does it make Creative Destruction absolutely inevitable. What it shows is that organizations should consider shifting their source of competitive advantage from their product lines to the innovation and KM system itself.

The following chapter elaborates the design considerations and selection criteria for organizations seeking to implement the principles of this thesis.

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IV. PROPOSED KM SYSTEM DESCRIPTION

The preceding chapters described the current state of private and public organization competition, and the role that knowledge superiority plays in determining which organizations achieve market leadership and how long that leadership remains. They focused on the contrast between KM initiatives and their inability to prevent Creative Destruction from disrupting every market and discipline, and how or if it can be resolved. Chapter III evaluated how organizations should design or adapt their KM systems to fill that gap.

This chapter describes the purpose of the proposed organizational KM system, updates the needs hierarchy and functional decomposition from Chapter II based on the analysis from Chapter III, and forecasts how implementation of this system would impact the sustainability of an organization's competitive advantage. It develops the architecture and system boundaries to meet these needs, analyzes trade-offs and alternatives to the proposed system, and establishes performance benchmarks to analyze its effectiveness.

A. SYSTEM PURPOSE AND SCOPE

The main purpose of this proposed KM system is to allow organizations to increase the power of their knowledge without diminishing the uniqueness of that knowledge, designed to fit the organization's structure. As stated in previous chapters, these two knowledge attributes appear to be inversely proportional. For power to increase, knowledge must transfer and flow from being new, tacit and at the individual level to the whole organization as refined and tacit (Nissen 2006). As part of the transformation of knowledge, the process codifies and disseminates it, which reduces the appropriation and uniqueness of that knowledge and makes the organizational susceptible and vulnerable to competing initiatives based on the similar knowledge (Saviotti 1998; von Hippel 1994; Tuomi 1999). The organization would appear to have two options: maximize knowledge power while decreasing its uniqueness or preserving its uniqueness by limiting its power.

Additionally, the specific process that the organization chooses to increase the power of its knowledge defines that organization's means of coordination, which can

cause fundamental problems for the organization if it does not fit its structure (Mintzberg 1981). The organization must decide, which attribute it is willing to adapt for a proper fit: its structure or its means of coordination. Because organizational dynamics are outside the scope of this thesis, the proposed design assumes one of two structures from Mintzberg's definitions for this KM system; namely, a divisionalized form or an adhocracy. There is much literature and many working models for machine and professional bureaucracies, while simple structures do not require a KM system, by definition.

A third option, as proposed in this thesis, is to transfer some of the organizational tacit knowledge, and hence its source of competitive advantage, to the organization itself, and its KM system. Instead of focusing solely on the industry-specific knowledge assets of the firm, the advantage would be in the architecture of the KM system itself. Competition focuses more on product and production process attributes. This shifts the competitive advantage inwardly so has the added benefit of masking the most valuable knowledge assets from potential imitators. The result is that it maintains the uniqueness of this knowledge while increasing its power through internalization.

To maintain focus on what the system and its description here will address, the scope of this analysis on the following goals and objectives is limited as follows:

- Maximizing knowledge power. This requires the right knowledge to flow to the right people, and includes ensuring the receiving individuals have enough knowledge themselves to effectively process the flow of signals from the source and turn them to useful tacit knowledge (Nissen 2006). This requires determining the total knowledge that each individual needs to have based on his position to achieve a commonality of results for all members of the organization.
- Maintaining knowledge uniqueness. The way the system addresses this is by shifting the source of competitive advantage. Instead of focusing on the innovative process or product, the organization emphasizes the KM process itself that generates the innovations, which allows it to better duplicate its successes. This makes it more difficult for outside competitors, and even for internal members who could take important knowledge with them to a competitor to interfere with success.
- Ensuring a fit between organizational structure and KM system objectives. The organization must redefine its structure and internal functionality both

to support the appropriate means of coordination and its corresponding KM system design.

- Focus on critical decision-making processes. Since this thesis is concerned primarily with organizational structures that seek standardization of results, a dedicated focus on individuals' training in decision making becomes a critical element to evaluate in designing the system
- Analysis of knowledge transfer means and purposes, as they relate to their compatibility with the organization's structure and strategic goals.

This proposed framework differs from the current form of organizational KM the first and last points. It expands from current KM and flow theory, which identify knowledge clumps and implement systems to disseminate it to where it is needed, and encourages the organization to fully understand the nature and principles of their successes and failures at a component-of-knowledge, or "chunk" level. It then proposes a focus on tailored KM at the individual level, based on the results of the knowledge assessments, which would be focused on decomposing individuals' body of knowledge and filling the gaps only as they are needed. An IT system that would support this framework, for example, would have "modules" or "chunks" of knowledge in five-or-less-minute training sessions. The system would select the appropriate modules, or chunks of knowledge based on the individual's knowledge gaps, and collate them into a coherent training session.

The motivation element would be the result of the individuals' understanding of both the gaps in their knowledge, and how those gaps are relevant to the required knowledge for the organization. This element is an area of further study that this author will pursue in the near term, but not as part of this thesis.

B. MODEL ARCHITECTURE

Beginning with how the organizational knowledge is evaluated, decomposed, and compartmentalized based on several key attributes the system would generate knowledge flow paths specifically designed for the learner. By breaking down the components of the organization's knowledge, tacit and explicit, it would examine the relative importance of each of them based on their contribution to the organization's success, and tailor a training plan that the learner is motivated to execute. Doing so would provide a

systematic process to achieve competitive advantage through knowledge superiority, leveraging assets already within the organization (Porter and Millar 1985), while appropriating the key knowledge to mitigate the risk of competition through imitation.

This section elaborates on the architecture of the proposed KM system, specifically designed to address the major needs that are discussed in the preceding chapters. It states the needs and prioritizes them, defines the attributes of the system to address the needs, discusses the life cycle of the problem and of the needs, and lists the assumptions and constraints used as part of the design. It then establishes the boundaries of the system, analyzes the value of the system to the stakeholders and users, and provides a specific value proposition of the KM system.

1. Statement and Hierarchy of Needs

Maslow's Hierarchy of Needs is a list of five factors that impact an individual's motivation to undertake current or future initiatives. The hierarchy indicates the prioritization of these needs, which as the Maslow's theory proposes, must be addressed in the given order so that individuals will be motivated to continue. The order of these needs is physiological, safety, love/belonging, esteem, and self-actualization (Maslow 1943; Simons, Irwin and Drinnien 1987).

The major stakeholders in the implementation of a new KM methodology and system are the organization's owners and leaders, the mid-level managers charged with both implementing the change and interpreting its purpose, and the non-supervisory personnel that have little input on the decision. These stakeholders are all affected in similar ways by implementing the proposed changes in this thesis, with the differences being more a matter of degree of impact and perception of threat to their needs. The impacts are summarized here.

a. Organizational Leaders

The impacts to their needs are based on the performance of the organization and their own personal and professional reputations. There is an increase of physiological stress, which carries a risk to their financial safety and love/belonging from both family and coworkers, but given that they are the ones implementing the initiative, the risk to the

initiative itself is minimal once the decision is made by them to proceed. The stronger impacts are in their esteem and self-actualization needs, as they are more personally invested in the decision to implement new initiatives.

b. Mid-Level Managers

At this level the impact to mid-level managers' needs is more fundamental, though not as much as with non-supervisory personnel. As the implementers, mid-level managers are charged with pressing for other stakeholders' goals, though their input for the initiative or its implementation process may be minimal. The increase in their physiological stress may be as high as, or higher than, the owners', and the potential rewards are not nearly as substantial. Success of the initiative does not necessarily mean success for these stakeholders at the individual level, making their buy-in critical to their support of the initiative.

The rest of their needs and perceived risk to them depends on the personal investment of the mid-level manager in the success of the organization. The challenge for the organization is to encourage that investment by incorporating these stakeholders into the decision-making process that will determine if and how to implement the proposed KM system.

c. Non-Supervisory Personnel

These stakeholders would likely feel the impact at a more fundamental level in their hierarchy of needs. With little or no input into the decision-making process, they could oppose change if there is a perception of risk without an understanding of the reasons behind them or without a personal or professional stake in the organization's success. It is a bigger challenge for the organization to get buy-in from these stakeholders, and the challenge to do so falls mostly to mid-level managers.

These risks to the initiative's implementation can be mitigated by competent managers if they are able to help these stakeholders change their perception of risk to their physiological and safety needs, such as loss of employment or income and the physical stresses caused by even worrying about these risks. They would also need to

find appropriate incentives for these employees that align with the organization's success in implementing the proposed KM system.

2. Measures of Performance

Performance measures are defined as “quantitative values (estimated, predicted, and/or measured) that describe system performance” (Blanchard and Fabrycky 2011).

With that in mind, the relevant measures of performance and utilization are:

- **Recruiting and Retention Effectiveness:** Measured as the turnover rate of employees and the average time that knowledge-based positions are open. The impact of the proposed system is that it removes incentives from competitors to innovate through imitation by hiring the organization's employees. This would be a long-term impact measure, as the implication of this proposal is that the competitive advantage currently lies in market knowledge, with an incentive among competitors to hire talent away.
- **Knowledge Assessment scores:** Measured in terms of organizational knowledge value assessments, which includes defining value for each knowledge attribute and the expected knowledge level of each individual in the organization (Nissen 2014).
- **Operating Expenses:** Energy, material wealth, matter, and information (EMMI) expenditure, the primary measure of which would be financial costs (salaries, training and reorganization programs, IT system costs). This is followed by time and resource costs due to the inefficiencies early in the life of the new system, and time to implement the system and the adjustments to the organization, including reviewing and planning the structure of the organization itself.
- **Awareness:** Interest among the business units within the organization to coordinate efforts and more effectively share knowledge. This awareness increase would be measured by the increases in cross-division knowledge increases, particularly as it applies to the link between other divisions' production and the organization's strategic goals.

3. Life Cycle of the Problem and the Need

The problem's conceptualization began when knowledge was unequivocally determined to be the source of sustained competitive advantage, even in the face of Creative Destruction. The problem of Creative Destruction far predates this, but this problem deals with the inconsistency that market leaders achieve their dominant positions by achieving knowledge superiority (Porter and Millar 1985), but then lose their lead to

companies with less knowledge. As organizations have implemented KM systems to achieve and sustain competitive advantage through knowledge, more research in how to increase the power and uniqueness of that knowledge has led to more sophisticated systems and initiatives, and better understanding of the nature of knowledge, yet Creative Destruction continues unabated.

Additionally, research in organizational design shows that its structure fits a specific means of coordination (Mintzberg 1981). By evaluating Mintzberg's means of coordination from a KM point of view, one sees that there is a direct relationship between them as follows:

- Standardization of work or process directly relates to exact duplication of explicit knowledge (Szulanski and Jensen 2008)
- Standardization of skills relates to standardization of training level, applicable to highly-trained organizations with little need for cross-training or other sophisticated methods of KM after indoctrination
- Standardization of results relates to a more nuanced form of KM, where the duplication of knowledge requires a functional decomposition of successes to adapt the template to different circumstances, rather than exact duplication (Black and Morrison 2010)
- Mutual adjustment is a more sophisticated form of results' standardization, where there is less of an emphasis in skill-building and more on cross-sectional knowledge sharing to address highly-complex knowledge-based needs of the organization (Mintzberg 1981; Hargadon and Fanelli 2002)

The problem of KM systems is that they are not resolving the problem of unrealized competitive advantage, at least not in a sustainable way. The KM systems have yielded positive results, and in some cases very positive, such as franchising efforts by McDonalds, Starbucks, and many others, or successfully transferring manufacturing operations using working templates and exact copying (Szulanski and Winter 2002; Szulanski and Jensen 2008). However, many of the successes cited in the KM literature are with organizations that benefit from standardization of processes or skills as a means of coordination as opposed to those that seek to innovate or face complex situations that are beyond the ability to predict and prepare for using codified instructions.

The problem has been materializing even as KM systems are institutionalized throughout industry or government agencies. These problems, where the current KM

initiatives are not wholly successful, occur mostly with innovative and dynamic public agencies and corporations (Black and Morrison 2010; Hargadon and Fanelli 2002). These organizations are most closely related with either divisionalized bureaucracies or adhocracies, where standardization of processes or skills are not a proper fit (Mintzberg 1981). This is not to say that there are no benefits from forcing these organizations into KM systems that seek to exactly duplicate processes, but one loses the main benefit of the KM system, which is the competitive advantage (Hargadon and Sutton 2000; Porter and Millar 1985).

In both cases, the use and disposition stages of the life cycle are the initial presentation of the proposed KM system and its implementation. The disposition of the problem occurs when the system is institutionalized, and market-leading organizations realize the increase in appropriation of their most valuable knowledge, as measured by not just sustaining competitive advantage but increasing it and market share.

4. Assumptions, Constraints, and Definitions

The system concept is based on the following assumptions and constraints:

- Knowledge, as an attribute, “is a source of sustainable competitive advantage” (Ambrosini and Bowman 2001). While this analysis looks at differentiating types and relevance of knowledge chunks, the underlying assumption remains.
- The costs of the system’s development and implementation will be covered by the organizations R&D budget, since the system itself is designed to be the main source of competitive advantage.
- This system design is focused on organizational structures that coordinate via standardization of results. While it can be adapted to look at structures that benefit more from standardized processes or skills, that adaptation is not covered in the thesis.
- Situated Cognition theory (Shattuck and Miller 2006) dictates how individuals make decisions.
- Organizations are interested in duplication of success for the sake of expanding revenue and profits, as opposed to altruistic motives. The latter do not necessarily change the design of the system, but they would affect the measure of performance and the time window the system has to demonstrate its value.

- The organization's innovation measurable are based on quantifiable differentiations, such as production/operations costs, increased revenues due to appeal of innovation, or both. Schmidt and Porteus (2000) define this as a given product's or process' Degree of Innovation.
- The organizational structure depends on factors outside of the convenience of a given KM system. Hence, the decision on which type of KM methodology to pursue is subordinate to the structure that fits the organization best.
- In an adhocracy, and to a lesser extent in a divisionalized bureaucracy, individuals who make decisions which could affect the organization in terms of its position in the market are designated key individuals, even if they are in lower or support levels in the organization.
- The KM system can only support one type of KM methodology. The nuances of adopting parts of various methodologies and merging them is beyond the scope of this thesis.
- The organization can afford to recruit and/or retain key talent as necessary to implement this system. The recruiting pool can support necessary hires.

5. System Boundaries

The proposed KM system has several boundaries that limit the scope of its design and its performance. Since it is a conceptual system, it has no physical boundaries except those of the organization and its workforce itself. Its functional and behavioral boundaries are in the two subsections below:

a. Functional

The functional boundaries of the KM system are:

- **Personnel management:** The system delivers the functions that each position must fulfill and the knowledge necessary to accomplish those functions, but it does not dictate if that knowledge is acquired based on training plus a baseline of knowledge, or recruited SMEs. Research shows that there is a limit on the value of hiring nothing but SMEs with knowledge from other players in the market (Hatch and Dyer 2004).
- **Knowledge completeness:** The system requires that the organization take steps to functionally breakdown the successes it seeks to duplicate, but it does not determine if the knowledge is complete without the organizations input.

- Success' functional decomposition: Similarly, this function falls outside of the system, though it receives input directly from the organization's efforts supporting it.
- Organizational design: This determination could be designed into the system, but one of the key assumptions is that the organization's structure is based on the overarching goals, and the KM system and methodology subordinate themselves to it. Also, the design of the system assumes a structure that fits with standardization of results as the means of coordination.
- Decision making at the individual level: The system generates tailored training for individuals, but the function of determining which decisions need to be made where, and where those decisions lead, rests solely with the management team.

b. Behavioral

The behavioral boundaries of the proposed KM system are:

- Specialization of skills: The system lends itself to assist cross-divisional and cross-functional training, but it cannot drive it. Only management can do that.
- Decision making: Not all individuals, even specialists, are willing to make decisions without it being imposed on them. Again, this is a boundary where management alone can take action and press the key individuals to do so.
- Organizational structure: If the organization is not aligned to operate effectively based on its goals, the necessary reorganization will face challenges that management alone can overcome. Since the structure is the prime factor in determining KM methodology, it is an input to the system, not an output.
- Appropriation of knowledge: Even though the system is designed to shift the competitive advantage inwardly to the organization, it is not necessarily immune to imitation. The organization itself is responsible for appropriating the knowledge behind both the system and the products or services that make it competitive.
- Learner motivation: Much like the specialization of skills mentioned above, the system can only aid in motivating learners by closing the gap between what the learner thinks she knows and what she actually knows. The incentives to close that gap are the responsibility of the organization (Nohria, Groysberg, and Lee 2008), and the system can assist in the evaluation and rewarding of motivated employees.

6. Stakeholder and User Analysis

Stakeholders are individuals and entities that have a direct or indirect interest in, and/or are directly or indirectly impacted by the design, development, funding, implementation, operation, maintenance, and/or disposal of the proposed KM system. An abridged list includes:

- Owners/shareholders: Ownership of the system, design, implementation, and disposition and life cycle costs, responsible for the suitability and effectiveness of the system, and trade-off selections
- Senior Executives: Fiscal resources, support from the organization, recruiting of top talent, technology selection, preeminence in the market, reputation risk based on success of project.
- Middle managers: Training, implementation, managing workforce opinions, and establishing performance measures for effectiveness evaluation and feedback.
- Knowledge managers: Development of the knowledge assessments and decomposing the organization's desired initiatives into knowledge chunks that will form the basis of the workforce development plan.
- Subject matter experts: Owners of the key tacit knowledge in the organization, responsible for dissemination and quality-control of the knowledge chunks. Also serve as mentors for key knowledge workers and the knowledge managers, and contribute to the development of the individuals' tailored stock of knowledge, which consists of "(a) role-related normative expectations; (b) dispositions, which have been formed in the course of past socializations; and (c) local knowledge of particular circumstances of time and place" (Tsoukas 1996, 11).

For the purposes of this KM system, users are customers are considered the same group. Further studies could address the impact on non-user customers of having a stronger organization to do business with, and the value of being considered innovative and strong, but that is outside the scope here. Instead, the user/customer is the recipient of the system's outputs or the operator of the system. An abridged list includes:

- Knowledge workers: Receive the output of the KM system, particularly the tailored, position-specific training based on knowledge assessment results.
- Managers: Receive assessment results and performance improvement feedback based on implementation and execution of the KM system.

7. Value Proposition

The value proposition of the system has four major attributes to contribute, but the largest contribution of the proposed KM system is the integration of all four attributes. Individually, they have contributed to the success of many organizations, but in general organizations still have not achieved the sustainable competitive advantage that KM promises. This integration, and the thesis in general, is a contribution toward the achievement of the goal of competitive advantages that are based on knowledge and are sustainable.

The first contribution is the system's inherent ability to transfer the organization's main competitive advantage from products and production systems to the innovation practices its ability to duplicate them in varying conditions. This relies, of course, on the organization's awareness of how their successes are constructed, and how the basic elements contribute to the success. The organization has more control of the key institutional knowledge, and would more effectively protect it by understanding how much and which kind of knowledge individuals need to perform their duties well. The construction of the system allows knowledge chunks to flow freely only in an environment that is designed to manage and use those chunks correctly. Without the system, the chunks are much less valuable, and hence the knowledge is more appropriated, which allows the organization to maximize the power if its knowledge more freely.

A second key contribution is to make the organization aware of the impact its structure has on its potential to succeed with a given KM methodology. Rather than allowing the organization to force a standardization of processes or skills as the main means of coordination, the system adapts to, and in fact it is designed to support, structures that fit with a standardization of results and adhocracies. It tailors the KM methodology to the organization's structure, which is based on the desired direction and strategic goals of the organization.

The third contribution is that it would define which knowledge is actually necessary for the organization to not only succeed, but to duplicate its success. It does so with a deliberate innovation process which, while allowing freedom to the innovators to

operate as necessary, documents the principles behind each selection among alternatives so that when one becomes successful, that success can be deconstructed by the KM system, giving the organization more power out of the knowledge behind the innovation.

Finally, the fourth contribution is to highlight the need for decision-making training much like executive leaders or military commanders, particularly in support of divisionalized bureaucracies and adhocracies, where lower-ranking individuals need to make critical decisions to achieve standardized results. These structures are not a good fit with standardized processes (Mintzberg 1981), but many organizations do not actively train low-level knowledge workers in C2 decision making at a level akin to executive leaders. It does not seem to matter that their decisions carry similar weight and consequences in organizations where they have to decide, on their own, how to achieve common results regardless of their starting point.

Ultimately, the value of this proposition is the integration of these factors into a singular system. The contribution of this proposal is that it addresses multiple areas that have hindered the success of current KM systems by focusing on both the organizational structure, itself based on its mission and desired objectives, and on individual's performance and level of knowledge. This focus not only improves performance at the individual and team levels, but also protects the organization from knowledge losses and inefficient knowledge transfers.

C. ANALYSIS OF ALTERNATIVES AND SELECTION

This section covers the conceptualization of this KM system, from initial ideas and concepts through technological consideration, prioritizing the needs that the system should address, and evaluating alternatives. It then explains why the proposed KM system was chosen, the opportunity cost of that decision, and an overview of the expected performance of the system.

1. Initial Ideas and Concepts

Based on the various needs highlighted so far in this thesis, there are several options for an organization to optimize the design and use of its KM systems. From looking at the organization's own structure, the stated goal of its KM system in terms of

the knowledge attributes it chooses to improve, and the appropriation level of certain chunks of knowledge. At the same time, it must consider the needs and functions the system must address, and what changes, if any, does the organization need before, during, or after implementing the system.

When first conceived, one of the proposed KM system attributes was a focus on the organization's metacognition. It would evaluate the completeness of its knowledge as criteria for dissemination, with constant feedback mechanisms to challenge the assumed completeness and get that much closer to it. Many times, organizations think they know why something works when they actually do not, and in the process of dissemination the errors are exposed either via execution failure or external stakeholder feedback (Szulanski and Winter 2002; Black and Morrison 2010). Since KM initiatives require much collaboration and trust, especially when that collaboration is with external and even competing stakeholders (Nissen 2010), errors such as this bring the organization's competency into question, and therefore they should be mitigated as much as possible.

Another attribute was the determination and manipulation of the learner's motivation. The idea behind this attribute is that for all the initiatives of knowledge flow-path determination, it was very difficult to find much KM research that addresses how to motivate the employees and other learners to absorb the knowledge. A constant obstacle for knowledge-sharing networks (KSNs) and KM in general, and particularly in government agencies, is the belligerent resistance of SMEs to participate or accept, much less absorb, knowledge from outside their own areas of influence. The concept would be to develop a mathematical model that relates the difference between the learners' perceived level of knowledge (LOK) and their perception of what their LOK needs to be with their motivation to learn. The variables in this model could be manipulated by multiple organizational initiatives to either increase the learners' perception of what their LOK needs to be, decrease their perception of what their LOK is, or a combination of the two, thereby increasing their motivation to learn.

A third conceptualization was the definition of the term Organizational Self-Awareness itself. Initially, it was conceived as little more than organizational metacognition, with a market-leaning focus. The concept of this definition was that the

organization would know what it did to be successful, and how to invest its resources on the areas that were creating the most value for the organization. Since then, the definition has grown to address the organization's structure itself and its relationship with the design of the KM system. Many times, management decides on the structure of the organization without evaluating whether that structure's compatible means of coordination, instead choosing out of convenience or in an attempt to emulate other successful organizations that are similar (Mintzberg 1981; Szulanski and Winter 2002; Miles 2011).

The last of the major initial concepts was decision making at the individual level. Focusing on the two more sophisticated organizational structures, divisionalized bureaucracies and adhocracies, the responsibility for the organization's KM and overall success depends more on the decision making capabilities of individuals below the executive or senior management levels. Because the goal is to achieve a standard level of results, decisions made at various levels in the organization can all have an impact on those results, especially because there is no standard process or method. Those individuals and SMEs are responsible for how their choices affect the ultimate results. Therefore, the principles of NDM and Situated Cognition that are generally focused on the top of the organization would be applied to all the individuals below (Shattuck and Miller 2006). From the filtering processes of the IT systems and the information-filtering humans, the system that individuals use to make decisions require a deliberate analysis and design based on what the organization needs and expects from each of its key decision makers.

2. Priorities

Above all else, the priority is to gain and protect public influence or market share. Because the four major attributes of the system, which are summarized below, are all intertwined and require each other to succeed, this prioritization exercise will focus on the functions of the system and the needs they address. The prioritization criteria are based on the functions' impact on the success of the system. Listed in order of priority:

- Fit for the organization's structure: The research behind this thesis indicates that the most common and impactful factor for a KM system's chances of success is to match the KM methodology or means of

coordination with the organization's structure. When referring to duplication of success, much of the KM literature refers to exact duplication of working templates, or standardization of processes. Based on Mintzberg's work (1981), this creates a misfit for situations where standardization of results or mutual adjustment is the appropriate means to duplicate success. A misfit is likely to lead to failure regardless of the merits of the KM system.

- Increasing knowledge power while maintaining its uniqueness: Referred to in this thesis as a knowledge paradox, the increase in knowledge power generally results in loss of uniqueness, or vice versa, facilitating the conditions that lead to Creative Destruction. By shifting the competitive advantage from its market offerings to the proposed KM system, which the organization has more control of, it can more freely leverage the power of its market knowledge while maintaining the uniqueness of the KM system knowledge that gives it sustainable competitive advantage.
- Success decomposition: A key element to support the previous function is to understand the organization's successes at the functional level, to ensure that when duplicating its successes, the organization does not unnecessarily try to duplicate areas that are not useful, or even detrimental to the duplication efforts. Additionally, understanding successes at the functional level allows the organization to better manage the knowledge necessary for each individual to succeed without risking duplication due to codifying and/or disseminating too much knowledge.
- Individual decision-making preparation: This last function is specifically necessary for organizational structures that use standardized results or mutual adjustment as their means of coordination, which are the focus of the proposed KM system in this thesis. Because lower-level individuals are trusted to make the decisions that arrive at expected results, the decision making training needed at this level is equivalent to that of senior executives and commanders. The reason this is last in priority is that the previous three functions are required for this one to be necessary.

Therefore, major changes to consider from the functional decomposition in Chapter II are:

- Shifting the competitive advantage from the product to the innovation process itself, thereby allowing the organization to increase its knowledge's power without crippling its uniqueness,
- Developing tailored knowledge requirements and training for individuals to achieve them, by position,
- Integrating the design of the organization's structure to ensure a fit with the KM system's desired outcomes, and

- A KM focus on decision making by key individuals in the organization.

3. Viable Alternatives

One alternative is for the companies to focus exclusively on mentoring as a means to transfer tacit knowledge without necessarily codifying it. The ultimate goal of knowledge transfer is to go from tacit knowledge of the teacher to tacit knowledge of the receiver (Nissen 2006), and mentoring allows knowledge transfer with reduced codification (Swap, Leonard, Shields, and Abrams 2001), therefore maintaining the uniqueness and appropriation of the knowledge (von Hippel 1994). Additionally, mentoring has other inherent benefits to increase learning and improve other areas of performance (DeLong, Lees and Gabarro 2008; Cohn, Khurana and Reeves 2005).

A second alternative is for organizations to innovate fast enough to keep ahead of imitation risks. While this alternative may be the most effective at achieving the goals set out earlier in this chapter, innovation is very difficult to achieve consistently (Andrew and Sirkin 2004; Porter 1985; Kandybin 2009). Additionally, many innovations occur even though the SMEs responsible for their development are not quite aware of why they were successful, making it difficult to duplicate outside a structure that supports standardization of work as a means of control (Mintzberg 1981).

The third potential alternative is for organizations to focus on changing the structure of the organization to fit a convenient KM methodology. This alternative may need to be executed regardless of the implementation of the proposed KM system anyway, since the structure affects a fit with the organization's KM system and its strategic goals. Many times the organization is not deliberate in deciding its structure (Mintzberg 1981), but for this level of change the reason should not be to fit with a preferred KM system. Knowledge management exists to serve the organization, not the other way around, so it should fit its structure, which in turn should fit executive leaders' view of what the goals of the organization will be.

Finally, a fourth alternative would be to force the preferred KM methodology into an organization regardless of its structure. This alternative is not practical for the organization structures that this proposed KM system is designed to address; namely, organizations that rely on standardization of results leveraging institutional or acquired

knowledge. Many organizations already force work standardization as a means of coordination regardless of their structure with negative results, which is the point of Mintzberg's (1981) "Fashion or Fit" article.

4. Selection Criteria

The recommended system's design and objectives are based on the decisions which selected among the various alternatives at an attribute by attribute level. While there are other means to achieve the goals of a system such as the one proposed, the reasons why this particular system was the final selection are that:

- Consistency of results: Mentoring is very difficult to execute and to evaluate its effectiveness. While tacit knowledge as more power (Nissen 2006; Thomas, Watts Sussman and Henderson 2001) and is more appropriable (Saviotti 1998), it is also difficult to measure its impact directly on the organization. Further, mentoring depends on the mentor's effectiveness, which exacerbates the risk of results which do not meet the need for consistency of results. Innovation has similar issues in terms of difficulty to execute consistency. Changing the organization's structure or forcing a means of coordination do not achieve much success, much less consistent one.
- Practicality: There is ample research on trying to duplicate innovation (Szulanski and Winter 2002; Black and Morrison 2010), and mentoring has been implemented many times across various industries with mostly positive results but they have yet to meet the needs elaborated on in this thesis, summarized as preventing Creative Destruction through improved OSA. The organization structure alternatives are unlikely to succeed, as widespread research shows that those two options usually lead to more and deeper problems than the one this thesis seeks to address.
- Applicability to the need: As mentioned before, none of the four listed alternatives fit the need directly and predictably. Mentoring depends on each individual with few means for standardization. Innovation focus does not necessary address the appropriateness and uniqueness protection need, but instead seeks to push the risk far enough into the future that another innovation would generate the market domination it seeks. Forcing the structure to shift in support of a desired KM system design is not only contrary to the point of building appropriate KM systems, but it ignores the organization's specific goals that the KM systems serve to ensure.

V. CONCLUSIONS AND ITEMS FOR FURTHER STUDY

The study of knowledge superiority is ultimately the study of sustainable competitive advantages, particularly in the Information Age (Naval Postgraduate School 2015). The advantage comes from the quality, type, and flow paths of the knowledge that supports action, which organizations leverage toward innovation and management (Nissen 2006). This competitive advantage grows with the organizational knowledge's power, and as knowledge flows more from new, individual-level knowledge toward the whole organization as a refined asset, that advantage should grow with it. As a result, this widening of the gap between the knowledge leader and the rest of the market should be an insurmountable advantage that results in a monopoly, but this is not the case at all.

A major challenge for KM systems to fully succeed is that tacit knowledge is difficult to codify well. Additionally, codifying knowledge implies a level of understanding of tacit knowledge that is not always complete, leading to surprising failures when trying to replicate successes following codified processes (Szulanski and Winter 2002), such as the failure of Japanese companies to duplicate their local success with their foreign subsidiaries (Black and Morrison 2010). When analyzing these types of failures, common traits emerge, such as organizational structures that do not fit with the KM methodology (Mintzberg 1981), missing essential pieces of the knowledge/process that were assumed-but-not-codified (Szulanski and Jensen 2008), or minimizing the importance of lessons learned that proved crucial for repeatable success (Miles 2011).

A powerful observation from the research on *The Way* is “that the very factors that enabled Japan’s early success led to its later failure” (Black and Morrison 2010, 99). Those factors, such as “strong corporate policies, practices, thinking, and behaviors” that reinforced their business models, were the key elements to duplicate and achieve success (Black and Morrison 2010, 100). These executives never considered that their methods only worked domestically because they fit well with the Japanese culture itself, and that the key to their success was not the way they managed their domestic plants and personnel, but how their management system fit the culture where they were operating. The organizations understood how to succeed in a specific environment, but they did not

understand the functions in their initiatives that led to success, and hence were unable to adapt them to different environments.

Analyzing the organizational structure and means of coordination of these Japanese companies indicates a deeper issue. They assumed that they were machine bureaucracies, which would justify standardization of processes at the management level. That fit their distrust of other cultures' management competence and techniques, but not the reality of their situation. Manufacturing as an industry operates well as machine bureaucracies, but the management teams do not. The means of coordination they needed to succeed in management was a standardization of results, which required them to trust the expert local managers to achieve the expected results, perhaps aided by successful working templates. Instead of training their foreign management teams on the fundamentals of their success and individual decision making so they could generate the desired results, they placed all their trust standardized processes and culturally-nuanced management techniques that did not incorporate all the necessary knowledge to be successful. They never understood the composition of their success, the misfit of their organization's structure for their management teams, and hence were unable to duplicate success.

The fall of RIM's Blackberry tells a similar story. Executives did not understand that upstart competitors, especially Apple, had imitated the key elements of Blackberry's competitive advantage, such as creating a brand that conveyed technical competence and elegance which allowed Blackberry to dictate what made a good cell phone, and were leveraging them to create and expand their own. Apple in particular achieved this in other lines of business that RIM did not see as relevant to its market. They did not realize it because they could not recognize how success was forming within their competitors, or how they were falling short of meeting the market need that was evolving beyond what they were willing to offer. They felt that their strengths, such as a strong battery, a browser that did not demand much data, compatibility with the newest cellular data networks, strong security, and streamlined features designed to please its main clientele should have been good enough to keep their lead (McNish and Silcoff 2015b). Even now, they believe that they should not have lost their market share, and it is only a matter of time before they recover their market lead (Dummett 2015). To this day, RIM executives

do not understand the reasons why Blackberry was successful at the start, much less how to duplicate that success in the future. Their competitive advantage was the clients' perception that their brand represented the highest level of technical competence in their field. When Apple took that from them, they realized that they "were not the dominant smartphone company anymore." As they told McNish and Silcoff: "We're grappling with who we are because we can't be who we used to be anymore, which s***ed...It's not clear what the hell to do." (McNish and Silcoff 2015a, 170).

Government agencies have suffered similar fates, for similar reasons. In the example from the introduction of this thesis, the MRS Alliance, along with the various NAVSEA agents responsible for surface Navy maintenance management, did not decompose their successes to understand their critical attributes, and did not leverage their knowledge-based advantages to sustain those competitive advantages. When the day came in 2008 to show their understanding and expand their competitive advantage, they failed to recognize that the time had arrived, much less were they prepared to present actionable recommendations. As SURFMEPP has replaced them at the head of the surface Navy maintenance market, it already faces the pressure to force its KM methodology and organizational structure to standardize processes, even in areas where its knowledge is not robust enough to justify it. As the upstart market leader, it must remain focused on the kind of organization structure suits it best, and subordinate its KM systems to fit that structure while resisting external pressures to yield.

This concluding chapter summarizes the key findings of this research, its limitations, specific recommendations to address the findings, and recommended areas for further study.

A. KEY FINDINGS

This thesis proposes that organizations create their own sources of competitive advantage by developing KM systems and processes that internalize the uniqueness of their knowledge and disseminates the appropriate chunks of knowledge throughout the organization. The main lesson of this analysis is that competitive advantages from knowledge superiority are as mobile as the people, systems, or attributes in an organization that represent said advantages. Organizations maximize the power of

knowledge for competitive advantage by disseminating and institutionalizing that knowledge, but doing so reduces the uniqueness of that knowledge, and makes them susceptible and vulnerable to competition via recruiting, imitation, or both. If instead knowledge is isolated and allowed to clump in very few individuals and limited codification, the company protects itself from imitation but its knowledge loses its power due to obsolescence and internal inefficiencies. Finding a balance between maximizing power and uniqueness is elusive, and even if well-balanced, there are situations a competitor can use to leverage weaknesses in the organization's KM system and overtake it, as evidenced by the rapid rise and fall of market leaders in both private and public industry.

The key findings of this research are:

- The required extent of knowledge codification depends on the KM methodology that best fits an organization's structure. Machine bureaucracies, like fast food franchises, require extensive and detailed codification to standardize processes and copy working templates exactly. Divisional bureaucracies or adhocracies, like technology firms and many government agencies, particularly new ones, do not at all. In fact, they are harmed by extensive codification, which in addition to the misfit with the organization's structure also create a sense of knowledge completeness that these structures are not designed to operate in.
- Knowledge-based competitive advantage resides in the holder of said knowledge, be it an individual, a codified set of instructions, or in the architecture of the organization itself. The more portable the knowledge, the more vulnerable the organization is to losing its competitive advantage to imitators. In other words, an organization's susceptibility and vulnerability to competition are inversely proportional to both its control of access to the knowledge and the mobility of that knowledge. It is possible to increase the power of the organization's knowledge with minimal compromise of its uniqueness if it masters the knowledge at the functional level, and uses that understanding to control unnecessary access to that knowledge. The organization would understand how to allocate knowledge chunks, and ensure that the dissemination of the knowledge is limited on a need-to-know basis, protecting the uniqueness of it as a whole.
- Successful initiatives are the result of decisions during their design process, many of them subtle and easy to overlook without a process to track those decisions and analyze how they directly contributed to the success of the initiatives. That analysis provides the organization a functional decomposition of those successes, and is a critical element in

duplicating successes without necessarily duplicating the processes that led to the first or best success. This is critical to design the proposed KM system, which can support the organizational structures that need more complex KM methodologies than exact duplication of processes.

- When the KM methodology calls for coordination that focuses on results instead of processes or standardized skills, each individual that is responsible for delivering those results becomes the commander or senior executive of that deliverable. Therefore, the C2 training generally reserved for the most senior leaders becomes required for each of the lower-level decision makers and their information management staffs.

B. LIMITATIONS

Even in the best situations, where the organization understands why and how it is successful, KM systems cannot account for other organizational weaknesses. These include misfit organizational configuration (Mintzberg 1981), competitor's ability to innovate based on their own knowledge assets (Porter 1985), inadequate C2 systems and training which can lead a leader to make bad decisions based on incomplete information or incorrect projections of future outcomes (Shattuck and Miller 2006). There are three major limitations that this research does not or cannot address.

The first is the scope of the proposed KM system. While it is designed for certain organizational structures, and it can be tailored for any of them since its function remains the same regardless of the firms' design, it cannot determine the direction of the organization and the design that would support it. This is entirely in the purview of its leaders.

A second limitation in this research is the specific design of the KM system beyond a functional description. The business-case analysis for an organization to implement such a system is outside the scope of this research, including the acceptable performance and efficiency factors.

The third limitation entails talent acquisition. There is ample research into the benefits and potential difficulties in recruiting and retaining various types of talent, including in the reference material for this thesis, but the analysis to determine the best fit of talent for the organization based on its design and KM methodology is beyond the scope here.

C. ITEMS FOR FURTHER STUDY

This thesis represents but a small contribution to integrate the various KM, C2, and other workforce and business management tools to deliver a comprehensive solution to an age-old problem. There are several areas to expand these efforts and contribute further to provide tools for organizations to leverage their knowledge effectively while mitigating the risk of imitation from competitors. These include, in no particular order:

- How to translate organizational functionality to define positional knowledge and skills requirements
- How to reverse-engineer successes that were not functionally documented or deliberately designed
- Which organizational structure is the most appropriate based on market demands or strategic goals
- How to prioritize KM methodologies when an organization has multiple organizational structures, much like systems of systems
- How to assign value and preeminence to specific knowledge chunks over others
- How to manage organizational change and adapt KM methodologies to it
- Appropriate training of decision makers and their information-filtering staffs, particularly as this relates to the most fitting means of coordination for a given organizational structure
- Updated analysis of adhocracies as the Information Age has evolved since Mintzberg's 1981 work.

D. CLOSING REMARKS

Creative Destruction may be as inevitable and inherent to competitive markets as Schumpeter says. After all, market leadership may be a result of knowledge superiority, but that is relative, rather than absolute. The constant market-changing innovations demonstrate that there is another dimension of knowledge, which no KM system can mitigate fully. The beauty or horror of the free-market economy is that nothing can stop true innovation.

However, much of the churn in market leadership, corporate or public, is due to weaknesses that the market leader allowed its competitors to exploit when it was within

its power not simply to prevent competitors from closing the gap but for itself to expand the competitive advantage. The reasons for this are varied, and the research in this thesis shows how a small number of critical oversights can lead successful organizations to make decisions that cost them significant market share or influence. The organizations may have implemented KM systems to mitigate this risk, but missteps in their application have led them to neutralize the benefits that these systems provide. This adds to the problem by instilling a false sense of security once implemented.

The scope of this thesis narrowly focused on KM systems and their fit with organizational structures, though there are many factors that affect the effectiveness of KM initiatives. Some that are far outside the scope of this thesis. However, the research here is a starting point for organizational leaders to become more effective and to avoid making mistakes that counter the benefits that KM systems can provide.

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