



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**LEVERAGING SOCIAL NETWORKING
TECHNOLOGIES: AN ANALYSIS OF THE KNOWLEDGE
FLOWS FACILITATED BY SOCIAL MEDIA AND THE
POTENTIAL IMPROVEMENTS IN SITUATIONAL
AWARENESS, READINESS, AND PRODUCTIVITY**

by

William G. Polania

September 2010

Thesis Advisor:
Second Reader:

Glenn Cook
Karl Pfeiffer

Approved for public release; distribution is unlimited

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE September 2010	3. REPORT TYPE AND DATES COVERED Master's Thesis	
4. TITLE AND SUBTITLE Leveraging Social Networking Technologies: An Analysis of the Knowledge Flows Facilitated by Social Media and the Potential Improvements in Situational Awareness, Readiness, and Productivity			5. FUNDING NUMBERS	
6. AUTHOR(S) William G. Polania				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB Protocol number ____N.A.____.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE A	
13. ABSTRACT (maximum 200 words) The efficient transfer of explicit and tacit knowledge within an organization can yield a distinct competitive advantage in both military and private sector operations. An organization that can adapt faster and operates more efficiently has a winning advantage over its adversary or competition. The research establishes the foundation for knowledge and social dynamics, provides vignettes of knowledge flow facilitated social media, and as a result develops a knowledge facilitation social media framework. The framework is applied to a Type 1 case study involving a Marine Corps combat unit, Air Naval Gunfire Liaison Company (ANGLICO), in order to determine how social media might be leveraged to produce improvements in readiness, productivity, and situational awareness.				
14. SUBJECT TERMS Networks, Social Media, Social Networking, Knowledge Flow, Knowledge Sharing, Knowledge Transfer, Knowledge Management, Military Operations			15. NUMBER OF PAGES 113	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU	

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release: distribution is unlimited

**LEVERAGING SOCIAL NETWORKING TECHNOLOGIES: AN ANALYSIS OF
THE KNOWLEDGE FLOWS FACILITATED BY SOCIAL MEDIA AND THE
POTENTIAL IMPROVEMENTS IN SITUATIONAL AWARENESS,
READINESS, AND PRODUCTIVITY**

William G. Polania
Captain, United States Marine Corps
B.A., Old Dominion University, 2002

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT

from the

**NAVAL POSTGRADUATE SCHOOL
September 2010**

Author: William G. Polania

Approved by: Glenn Cook
Thesis Advisor

Karl Pfeiffer
Second Reader

Dan Boger
Chairman, Department of Information Sciences

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

The efficient transfer of explicit and tacit knowledge within an organization can yield a distinct competitive advantage in both military and private sector operations. An organization that can adapt faster and operates more efficiently has a winning advantage over its adversary or competition. The research establishes the foundation for knowledge and social dynamics, provides vignettes of knowledge flow facilitated social media, and as a result develops a knowledge facilitation social media framework. The framework is applied to a Type 1 case study involving a Marine Corps combat unit, Air Naval Gunfire Liaison Company (ANGLICO), in order to determine how social media might be leveraged to produce improvements in readiness, productivity, and situational awareness.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	SOCIAL MEDIA FACILITATED KNOWLEDGE FLOWS	1
B.	RESEARCH QUESTIONS.....	2
	1. Primary Question.....	2
	2. Secondary Questions.....	3
C.	POTENTIAL BENEFITS	3
D.	METHODOLOGY	4
E.	ORGANIZATION OF STUDY	4
	1. Chapter II: Knowledge and Social Dynamic Fundamentals	4
	2. Chapter III: Collaborative Social Media Vignettes.....	4
	3. Chapter IV: Model Development and Case Study Analysis	5
	4. Chapter V: Conclusions and Recommendation	5
II.	KNOWLEDGE AND SOCIAL NETWORK FUNDAMENTALS	7
A.	KNOWLEDGE AS A RESOURCE	7
B.	UNDERSTANDING KNOWLEDGE WITHIN THIS CONTEXT	9
	1. The Hierarchy of Knowledge.....	9
	a. Components of the Hierarchy of Knowledge.....	9
	b. Hierarchy of Knowledge Dissention.....	11
	c. Hierarchy of Knowledge Summary.....	13
	2. Basic Tenets of Knowledge.....	14
	a. Knowledge as Explicit or Tacit.....	14
	b. Relative Value of Data, Information, Explicit and Tacit Knowledge	14
	c. Knowledge Flows, Transfers, and Sharing.....	15
	d. Knowledge Transfers	17
	e. Knowledge Sharing.....	17
	f. Knowledge Flow, Transfer, Sharing Summary.....	18
	g. Knowledge Paradigm Shift.....	18
C.	PEOPLE REMAIN THE CRITICAL COMPONENT.....	20
D.	SOCIAL NETWORKS, SOCIAL MEDIA, AND KNOWLEDGE FLOWS	21
	1. Facilitating Knowledge Flows in Social Networks and Social Media.....	22
	a. Safety and Trust	22
	b. Accessibility.....	23
	c. Knowledge	23
	d. Engagement in a Collaborative Social Network Site.....	25
	e. Knowledge Facilitation through Social Media Narrative	26
	2. Social Network Conditions and Culture.....	27
	a. Top Down Ignition and Bottom Up Emergence	27
	b. Organizational Culture	27

III.	COLLABORATIVE SOCIAL MEDIA.....	29
A.	XEROX.....	30
1.	Knowledge Management Domains.....	30
2.	Eureka & Amber Web.....	31
B.	TOSHIBA	34
C.	MENTORSHIP AND VIRTUAL LEARNING.....	35
1.	E-mail Mentoring.....	36
3.	Virtual Simulation	37
D.	GRASSROOTS MENTORING COMMUNITIES.....	38
E.	FEDERAL SECTOR.....	39
F.	ARMY BATTALION COMMAND KNOWLEDGE SYSTEM	41
IV.	KNOWLEDGE, SOCIAL MEDIA MODELS AND CASE STUDY ANALYSIS	45
A.	DEVELOPING THE LEARNING STATE MODEL	45
1.	Learning States Founded in the Hierarchy of Knowledge.....	47
B.	THE KNOWLEDGE MODEL	47
1.	Knowledge Matrix	47
2.	Knowledge Model Applied.....	49
C.	UNDERSTANDING KNOWLEDGE, LEARNING, AND KNOWING WITHIN THE MODEL	53
1.	Knowledge	53
2.	Learning.....	54
3.	Knowing.....	54
4.	Knowledge Model Parting Words.....	55
D.	SOCIAL MEDIA MODEL	56
1.	Analysis of Social Media Examples.....	56
E.	AIR NAVAL GUNFIRE LIAISON COMPANY CASE STUDY.....	61
1.	Methodology	62
2.	Background	63
3.	Current Flows of Knowledge	65
4.	Issues Exacerbated in the Absence of a Collaborative Medium....	67
5.	Case Study Parting Words.....	74
V.	CONCLUSIONS AND RECOMMENDATIONS.....	77
A.	SUMMARY OF RESEARCH	77
B.	CONCLUSIONS	79
1.	Research Question Findings.....	79
C.	RECOMMENDATIONS.....	84
1.	Virtual Communities for Readiness and Productivity	84
2.	Narratives for Situational Awareness and Readiness.....	87
3.	Social Media and Reliefs in Place	87
D.	FUTURE RESEARCH OPPORTUNITIES.....	88
	LIST OF REFERENCES.....	91
	INITIAL DISTRIBUTION LIST	97

LIST OF FIGURES

Figure 1.	Knowledge Hierarchy (From Nissen, 2006).....	11
Figure 2.	Spectrum of Knowledge Strategies (From Battle Command Knowledge System)	20
Figure 3.	Army Narrative Engineering (From U.S. Army).....	42
Figure 4.	Learning State Model.....	46
Figure 5.	Knowledge Matrix (After FBI Knowledge Matrix).....	48
Figure 6.	Basic Knowledge Model.....	48
Figure 7.	State 1 of Knowledge Model	50
Figure 8.	State 2 of Knowledge Model	51
Figure 9.	State 3 of Knowledge Model	52
Figure 10.	Complete Knowledge Model	53
Figure 11.	Marriage of Collaborative Social Media and Organizational Goals (From BCKS).....	60
Figure 12.	Social Media Consideration Model	61
Figure 13.	ANGLICO Organizational Structure (From Koch)	63
Figure 14.	Social Media Knowledge Flow Facilitation Framework	78
Figure 15.	Virtual Right Seat Objectives (From BCKS)	88

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS AND ABBREVIATIONS

AAR	After Action Report
ANGLICO	Air Naval Gunfire Liaison Company
ARFORGEN	Army Force Generation
BCKS	Battle Command Knowledge System
BDE	Brigade
BERTL	Business Equipment Research and Test Laboratories
CALL	Center for Army Lessons Learned
CAS	Close Air Support
DARPA	Defense Advanced Research Projects Agency
FCT	Fire Power Control Team
FM	Field Manual
GSA	Government Services Agency
ISF	Iraqi Security Forces
IT	Information Technology
ITS	Individual Training Standards
JTAC	Joint Terminal Air Controller
KM	Knowledge Management
LAFD	Los Angeles Fire Department
MAGTF	Marine Air Ground Task Force
MCCLL	Marine Corps Center for Lessons Learned
METLS	Mission Essential Task List
MIS	Management Information Systems
MiTT	Military Transition Team
NASA	National Aeronautics and Space Administration
NGF	Naval Gunfire
RCT	Regimental Combat Team
RSS	Really Simple Syndication
SAKE	Safety Accessibility Knowledge Engagement
SALT	Supporting Arms Liaison Team
SECI	Socialization Externalization Combination and Internalization
SITREP	Situation Report
SOP	Standard Operating Procedure
SLENZ	Second Life Education in New Zealand
TABS	Toshiba American Business Solutions
TLCTS	Tactical Language Culture Training Simulator
TTP	Tactic Technique and Procedure
UPS	Uninterrupted Power Supply

THIS PAGE INTENTIONALLY LEFT BLANK

ACKNOWLEDGMENTS

I offer a heartfelt thanks to my advisor, Glenn Cook, who took me under his wing and guided me through the process. A special thanks to my second reader, Karl Pfeiffer, who turned me onto a gold nugget that shaped the entire research. To the instructors of the Naval Postgraduate School, I thank you for infusing me with the knowledge that allowed me to conduct this analysis. I thank my military brethren who in some way have contributed to the presentation of this thesis.

Thanks to my parents and family for their encouraging words. I thank my wife who has remained patient, thoughtful, and understanding throughout this demanding period. I appreciate your humor and enthusiasm even when I might have been in quiet despair. I can't thank my two boys, Jonathan and Tristan, enough. When dad was tired and weary, they helped with proofreading references, spotting acronyms and anything else they thought they could do to contribute. They were fantastic and I am in grateful to them. They gave me strength. I love you boys very much.

Lastly, I thank God. This would not have been possible without someone looking over me.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

A. SOCIAL MEDIA FACILITATED KNOWLEDGE FLOWS

The advent of Semantic Web, Web 2.0, and Web 3.0 Social Semantic Web has presented organizations with a plethora of knowledge flow facilitating collaborative tools which if leveraged correctly can dramatically improve readiness, productivity, and situational awareness. The decomposition of knowledge flows remains in its formative stages; moreover, social media is an even more recent phenomenon. The rapid and prominent emergence of electronic social networking connects people more readily than ever before through asynchronous means. Private and public organizations alike recognize the potential power of these electronic human interactions but largely remain sublime in its application.

As a service, the Marine Corps has invested heavily in the pipes that transfer data but the transfer of information and knowledge is still relegated to the formalized and structured regimen typical of military organizations. For instance, a unit in the pre-deployment training phase relies heavily on the daily situation report (SITREP) it receives from the unit it is going to replace in the combat theatre. However, the SITREP goes through several filters before being released and as a result represents what is perceived to be most relevant to the boss and his boss. The information requirements differ at each level of the hierarchy and as a result the SITREP does not reflect the subset of information or knowledge that would be useful to all levels of the hierarchy.

Moreover, a unit in the pre-deployment training phase relies on the after action reports (AARs) of units in the combat theatre. These structured after action reports are also filtered, but more importantly they are not interactive; they only represent a one way delivery of information that might be transferred to actionable knowledge providing a forum existed within which the topics could be discussed. Such a forum would give context, meaning, and bring the AARs to life.

The efficient transfer of explicit and tacit knowledge within an organization can yield a distinct competitive advantage to both military and private sector operations. An organization that can adapt faster and operates more efficiently has a winning advantage over its adversary or competition. Likewise, a physically and technologically weaker enemy that can adapt faster threatens to always be one step ahead. Consider a unit conducting distributed operations. The varying elements are adapting to their locales and conditions on the ground. They are learning and evolving; however, the means with which they can communicate their adaptations to their counterparts is limited. For example, consider how much more dangerous the insurgency would be if they maintained a means to communicate the knowledge learned in one region to all the insurgents in the remainder of the theatre. Their successes in defeating the latest tactic technique and procedure (TTP) would be multiplied throughout the theatre eliciting insurgent successes faster than can be adapted to. In analogous form, maintaining an ability to communicate the creative measures implemented in adapting to the enemy, ensures that those successful TTPs are assimilated more rapidly yielding a comparative advantage, due in great part to the sharing and transfer of knowledge. To this end, the research explores the exploitation possibilities and conceptual application of knowledge flow facilitating social media intending to develop a competitive advantage through the acceleration and facilitation of knowledge flows.

B. RESEARCH QUESTIONS

1. Primary Question

- Can social media be leveraged to gain operational advantages and training efficiencies within and between Marine Corps units conducting pre-deployment training and executing relief in place operations?

2. Secondary Questions

- What knowledge flow requirements exist within and between units conducting pre-deployment training and executing relief in place operations?
- What are the knowledge flow requirement challenges within and between Marine Corps units conducting pre-deployment training and executing relief in place operations?
- How can social networking technologies be adapted to facilitate knowledge flows within and between Marine Corps units?

C. POTENTIAL BENEFITS

The Department of the Navy Chief Information Officer recently noted that leveraging the collective knowledge in inventory of the Department of Defense's members was critical to problem solving (Carey, 2010). Practices that tap into the intellectual capital of the whole are indicative of organizations that recognize people and what they know as the most important asset the organization can leverage. The challenge has been in how to best facilitate the aforementioned.

The research establishes a fundamental understanding of knowledge flow and social media tenets with the intent of presenting practical solutions capable of being implemented today. Pragmatic knowledge and social media models are derived from the fundamentals presented providing a keen understanding of why and how social media facilitates knowledge flows. More importantly, the research demonstrates how these social media facilitated knowledge flows are providing realized returns to organizations in the private, public, and military sector.

More specifically the research determines, through the analysis of a Marine Corps case study, the applicability of social media to military training and operations, and demonstrates the material benefits possible through the conceptual application presented herein. Holistically, the tenets, models, and recommendations made are applicable to the spectrum of organizations private and public alike.

D. METHODOLOGY

The research is primarily concerned with determining how social media might be leveraged to provide the Marine Corps with a competitive advantage; however, in the course of doing so establishes tenets, models, and recommendations that apply to all organizations.

The research first establishes the knowledge and social networking framework within which the potential benefits of these social interactions might be qualitatively evaluated. A solid understanding in the foundation of both knowledge flows and social media dynamics facilitates understanding how collaborative social media are facilitating the private, federal, and military sector knowledge collaborations. From the tenets presented in Chapter I and the social media vignettes described in Chapter III, a pragmatic knowledge and social media model is developed and presented in Chapter IV. The research then uses the tenets, models, and framework as the backdrop for addressing the challenges in the Chapter IV case study.

E. ORGANIZATION OF STUDY

1. Chapter II: Knowledge and Social Dynamic Fundamentals

This chapter presents the literature review associated with the discovery of knowledge and social networking dynamics. The chapter provides a solid understanding in the foundation of both knowledge flows and social media dynamics. The constitutions of knowledge and its flows are presented from many points of view in order to collectively excise a holistic set of tenets. Moreover, the examination of social interactions is dissected in the second half of the chapter in order to ascertain the social dynamics of these exchanges. This is of particular importance in order to qualitatively assess the social media vignettes presented in the following chapter.

2. Chapter III: Collaborative Social Media Vignettes

Presented with a background in knowledge flows and social networking, Chapter III presents a cross section of vignettes from a cross section of organizations. These

varying vignettes demonstrate successes and failures in multiple different social media formats. The intent of this chapter is to provide a practical backdrop from which the fundamental tenets from Chapter II can be observed in action. This provides a rich appreciation for how social media might be leveraged to facilitate realized gains. The fundamental construct provided in Chapter II and the practical observation of social media in this chapter provides the relevance, context, and meaning to the model development in Chapter IV.

3. Chapter IV: Model Development and Case Study Analysis

Knowledge flow and social media models are developed in this chapter in order to construct an all encompassing knowledge flow facilitating social media framework. These models are based in part on the fundamentals derived from Chapter II, the pragmatic observation of the cross section of vignettes in Chapter III, and the analysis of the vignettes. The developed framework is then applied to the Marine Corps case study as a qualitative means of assessing the knowledge flow challenges and how they might be addressed through social media.

4. Chapter V: Conclusions and Recommendation

Conclusions are drawn from the analysis of the case study and recommendations are presented specifically addressing how social media can be applied to effect readiness, productivity, and situational awareness improvements. Albeit the knowledge flow and social media challenges are presented in a Marine Corps specific setting, the challenges are the inherently the same challenges experienced by private and public organizations alike. Moreover, the recommendations presented are adaptable to meet the organizational needs of non-military related organizations. The chapter answers the questions the research intended to address and provides future work recommendations in the fields of quantitative knowledge value added analysis, modeling social network analysis, and survey assessment of exemplified successes in social media vignettes - specifically elements of the Battle Command Knowledge System.

THIS PAGE INTENTIONALLY LEFT BLANK

II. KNOWLEDGE AND SOCIAL NETWORK FUNDAMENTALS

In order to discuss the potential individual, group and organizational benefits of collaborative social networks, there must first be an understanding of the knowledge and social media framework within which the benefits of these social interactions will be qualitatively evaluated. A solid understanding in the foundation of both knowledge flows and social media dynamics, presented in the first and second half of this chapter respectively, facilitates understanding how collaborative social networking services are facilitating the private, federal, and military sector knowledge collaborations presented in Chapter III . From the tenets presented in this chapter, and the vignettes described in Chapter III , a pragmatic knowledge and social media model is developed and presented in Chapter IV, highlighting the manner in which social media facilitated knowledge flows benefit the individual, group, and organization. The end goal is to address the challenges in the Chapter IV case study by applying the models founded in the knowledge and social media dynamics literature review presented herein.

A. KNOWLEDGE AS A RESOURCE

There are many varying views and studies from prominent knowledge researchers; however, the one common thread in all views is that knowledge within an organization or individual remains an exploitable asset from which an organization could potentially gain competitive advantages (Nissen, 2006; Shariq & Vendelo, 2006; Snowden, 2005). Discounting a discussion of costs, it is commonly agreed to that the transfer of knowledge within an organization from where it exists to where it is needed results in value added. Thomas Stewart (1999), author of Intellectual Capital: The New Wealth of Organizations notes that "knowledge has become the preeminent resource" and that as an economic output both information and knowledge are more important than any industrial age product.

Organizations have invested heavily in knowledge management systems in an attempt to both capitalize on its knowledge in inventory and also mitigate the setbacks from losing knowledge resident in key personnel (Housel & Bell, 2001). A 1998 study of

European firms by Klynveld Peat Marwick Goerdeler quantified the number of companies experiencing severe setbacks from a knowledge drain. The European firms in the study divulged that 50% had experienced serious setbacks resulting from knowledge losses due to personnel losses. Moreover, 13% of the firms reported having realized monetary losses as a result of knowledge losses from losing just a single person (Alavi & Leidner, 2001).

Research into the knowledge drain being currently experienced by the Los Angeles Fire Department (LAFD) following the tragedy of 9/11, highlights the importance of knowledge as a resource within an organization; particularly an organization whose lack of experience may result in lives lost (Butler, 2010). In the aforementioned case, research suggested that establishing a social collaborative site facilitating knowledge flows from personnel planning on retiring and those already retired, would provide a means of addressing the inexperienced recruit syndrome the LAFD and many other fire departments nationwide were experiencing. The transfer of knowledge from where it exists to where it does not is also observed in life and death situations in the private sector as well. Davenport and Prusak (1998) describe a case where the surgical teams of five northern New England medical centers participated in a mentoring program meant to transfer knowledge from the experienced to the inexperienced. The results were astonishing. The participating hospitals collectively experienced a 24% reduction in surgical mortality rates (Davenport & Prusak, 1998). Leveraging knowledge as a resource in the aforementioned examples is not only critical to providing competitive advantage but critical to the survival and efficiency of some organizations.

According to Wickramasinghe (2006), knowledge is not a new concept and debates about it predate to classical Greek philosophy, but as Nissen (2006) points out "knowledge flow theory is only emerging and beginning to cohere and coalesce" (Nissen, 2006). As a result, different and often times confusing views have emerged (Housel & Bell, 2001). However emerging through the cloud of knowledge flow opinions is a single notion that knowledge is the means by which value is created in the

information age and remains the single most important resource any organization can leverage to seek and maintain competitive advantage (Alavi & Leidner, 2001; Davenport & Prusak, 1998; Nissen, 2006; Snowden, 2005).

B. UNDERSTANDING KNOWLEDGE WITHIN THIS CONTEXT

A simple explanation for knowledge might be to state that knowledge is that which exists within the minds of people (Alavi & Leidner, 2001). This short concise answer is analogous to the explanation commonly provided about metadata: it is data about data. The explanation would be accurate but far too succinct and superficial to provide the context and meaning needed to begin making autonomous inferences. To gain an understanding of the context in which knowledge is being discussed herein, a grasp of the hierarchy of knowledge is necessary.

1. The Hierarchy of Knowledge

A foundation in the hierarchy of knowledge is necessary for understanding the models developed in Chapter IV. The hierarchy of knowledge can be used to characterize and provide a framework for the exchanges that occur between people (Nissen, 2006). Transgressing through the hierarchy facilitates the creation of knowledge in both its explicit and tacit forms and the components of the hierarchy of knowledge facilitate this value creation (Nonaka, 1994).

a. Components of the Hierarchy of Knowledge

Knowledge practitioners who subscribe to the hierarchy of knowledge might characterize the succinct explanation of knowledge provided above as a data exchange; it lacks any relevance or meaning. Dretske (1981) and Nissen (2006) note that without any further delivery of data or accompanying information, the data received in itself has little context or meaning and it alone does not facilitate any action by the receiver of said exchange. Any further exchange providing relevance, meaning, and context is considered information. In this hierarchical characterization of exchanges, data

is converted to information as context and meaning are provided, and knowledge is created from information when it is processed in the minds of people (Nissen, 2006) and becomes personalized (Alavi & Leidner, 2001).

The hierarchy of knowledge is described in a 2001 MIS Quarterly article and its description is consistent with the knowledge management/knowledge flow literature reviewed; the hierarchy of knowledge consists of data, information, and knowledge (Alavi & Leidner, 2001). For semantic purposes, many researchers ascribe to the framework of data, information, and knowledge as a means of categorizing the myriad examples of exchanges possible between people, and as a means of assigning some measure of value to the exchange based on the categorical limitations.

Nissen's (2006) knowledge hierarchy model captures the mainstream concept of the hierarchy of knowledge, and provides solid footing for understanding the learning state model developed in Chapter IV. Figure 1 provides a pragmatic illustration of the data, information, knowledge hierarchy. The Nissen (2006) model depicts the abundance of data and information at its base relative to the lesser amount of knowledge at the peak of its hierarchy. This conforms to the notions prescribed by both Shenk (1997), in Data Smog : Surviving the Information Glut, and Alberts, Garstka, & Stein (1999), in Network Centric Warfare: Developing and Leveraging Information Superiority, that data and information are in great supply in the information age. The pyramidal effect of knowledge atop the model conforms to the notion that knowledge expressed in either tacit or explicit forms is in shorter supply (Davenport & Prusak, 1998). Knowledge practitioners largely agree that only about 20% of tacit knowledge has been made explicit or shared and the model aptly abstracts this concept (Hansen, Nohria, & Tierney, 1999). The model also provides insight as to how data, information, and knowledge facilitate individual, group, or organizations to act. As exchanges occur between communicating parties and the hierarchy of knowledge is transgressed from data to information to knowledge, the relative impact of each stage facilitates greater action by the recipient of the exchange (Nissen, 2006). The increasing return on data, information,

and knowledge exchanges in both the learning state model and the knowledge model presented in Chapter IV have foundations in the concepts presented in the Nissen (2006) model in Figure 1.

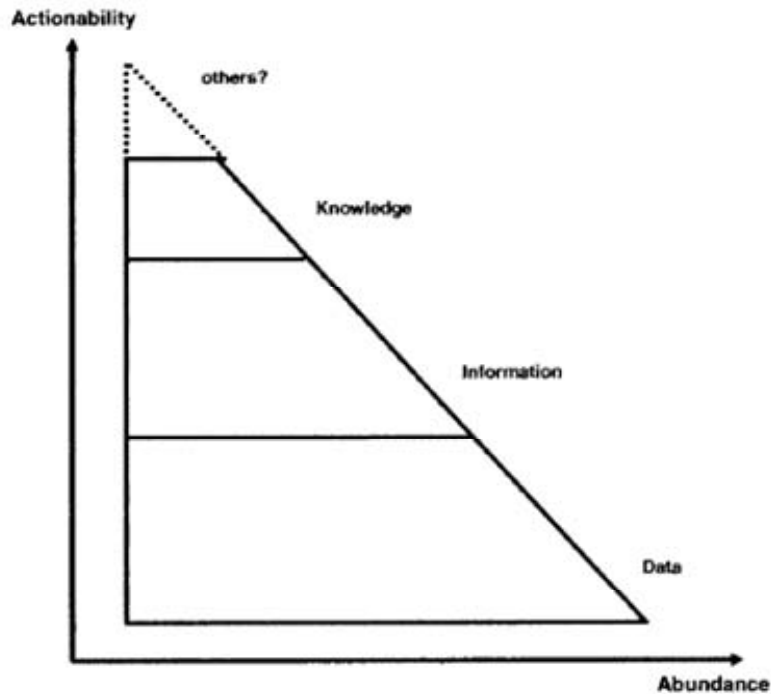


Figure 1. Knowledge Hierarchy (From Nissen, 2006)

b. Hierarchy of Knowledge Dissention

Although the description of the hierarchy of knowledge is consistent throughout the literature, the relevance of the knowledge hierarchy is contested among knowledge practitioners. Alavi and Leidner (2001) disparage certain views of the hierarchy of knowledge, specifically views held largely by the information technology community. Alavi and Leidner (2001) criticize the hierarchical flow of knowledge specifically highlighting that "the presumption of a hierarchy from data to information to knowledge with each varying along some dimension, such as context, usefulness, or interpretability" misses the grander point that knowledge is simply personalized information made unique to the individual possessing the knowledge.

Although Alavi and Leidner (2001) discourage the relevance of the knowledge hierarchy in the information technology perspective, other researchers do consider it germane to the discussion of knowledge flows. Nissen (2006) subscribes to the relevance of the information technology view of the hierarchy of knowledge. In Harnessing Knowledge Dynamics, he distinguishes between them in great detail and establishes the categorical differences as one of his thirty knowledge principles, specifically noting: "understanding whether flows of data, information, or knowledge are required in a particular situation depends upon what needs to be accomplished (e.g. resolving uncertainty, deriving meaning, or enabling action, respectively)" (Nissen, 2006). Interestingly enough, Tuomi (1999) also agrees with the relevance of the hierarchy of knowledge but with a slight twist. Tuomi (1999), on the other hand, contests the flow of the hierarchy of knowledge. Tuomi's (1999) perspective on the flow of the data, information, knowledge hierarchy is reversed from the Nissen (2006) description, and as a result proposes that the direction of the knowledge hierarchy flow is relevant because it impacts the manner in which knowledge facilitating information systems are developed.

Moreover Alavi and Leidner (2001) also suggest that categorizing data as just raw numbers or facts bears no relevance to the knowledge framework; however Nissen's (2006) characterization of data, wherein he describes data as needing more information to gain relevance, implicitly suggests that the introduction of data serves as one of several sources igniting the exploratory learning cycle. The most relevant concept however, is that the knowledge hierarchy in and of itself is limiting (Nissen, 2006) in the absence of human interaction (Jacobson, 2006). The depths of the knowledge-learning forces and the breadth of the learning transgressed is entirely a people driven affair. This is the reason why Tuomi's (1999) concern of the knowledge hierarchy flow is irrelevant since the information system behind a social networking service is not concerned with instantiating explicit or tacit knowledge but facilitating the social interaction of its participants (Snowden, 2005).

c. Hierarchy of Knowledge Summary

The varying scholarly opinions are detailed here in order to both present dissenting and alternate views, but more importantly to illustrate that the field of knowledge management and its instantiation or facilitation in knowledge management systems is a relatively new topic akin to the infancy of social networking services (Snowden, 2005). The conflicting views on the knowledge hierarchy prove Housel and Bell's (2001) contention that organizations are either stymied or propelled into poor knowledge management choices as a result of conflicting knowledge management views.

The succinct answer describing knowledge as being that which exists in the minds of people might have sufficed if all readers had the same knowledge base from which they could draw upon to ascribe the same meaning (Alavi & Leidner, 2001). However as evidenced with the metadata explanation - it is data about data - not all readers have the same base of knowledge and as a result not all readers would ascribe the same relevance, context, and meaning. Knowledge practitioners consider these nuances very important and parse out the nature of knowledge and the characterization of exchanges (data and information) that serve as its stimuli in order to determine how knowledge may be facilitated. Moreover, according to some knowledge practitioners, the manner in which knowledge is perceived and the manner in which exchanges are characterized drive how a knowledge management information system might be designed (Alavi & Leidner, 2001; Tuomi, 1999).

Elaborating on the knowledge hierarchy literature review was necessary since: (1) it serves as the basis for the learning state model presented in Chapter IV; (2) any exchanges between people can be characterized within the hierarchy (Nissen, 2006); and (3) it is familiar territory for knowledge practitioners (Alavi & Leidner, 2001; Tuomi, 1999). A follow on discussion of knowledge being either tacit or explicit is also germane to this discussion for: (1) it lays the foundation for the knowledge matrix presented in Chapter IV; (2) the tacit-explicit spectrum characterizes the richness, difficulty, and value of the exchange (Nissen, 2006; Nonaka, 1994); and (3) it is familiar territory for knowledge practitioners (Nissen, 2006; Nonaka, 1995; Snowden 2005).

2. Basic Tenets of Knowledge

a. Knowledge as Explicit or Tacit

To gain an appreciation for how social networking services might generate value through the facilitation of knowledge flows, it is imperative to grasp Nonaka's (1994) concept of knowledge existing along a continuing spectrum from explicit to tacit. Von Hippel (1994) characterized tacit knowledge as being 'sticky.' Since then, knowledge practitioners have adhered to the notion of tacit knowledge being 'sticky' as a means of describing the difficulty in transferring tacit knowledge from owner to recipient. Tacit knowledge exists along the very top of Nissen's (2006) knowledge hierarchy, illustrating that tacit knowledge is less abundant than explicit knowledge within the knowledge domain. One reason for its scarcity is that tacit knowledge is considered more difficult to transfer across two points (Nissen, 2006). Even in person it is very difficult to communicate tacit knowledge without taking measures to assist in extricating the tacit knowledge from its owner (Snowden, 2005). Tacit knowledge is what exists in the minds of people, made unique by how it was processed, perceived, and experienced (Alavi & Leidner, 2001); as a result tacit knowledge is more complex than explicit knowledge, explaining why it is less likely to be documented (Stewart, 1999).

Explicit knowledge on the other hand is considered knowledge that has been codified, written, or expressed in some tangible form (Pratt, 2006). Explicit knowledge is considered the easier of the two to transfer between owner and recipient, and explicit knowledge is considered easier to store to effect knowledge reuse (Oshri, 2006). Explicit knowledge can be in the form of a codified set of tactical radio programming instructions or a pilot's pre-flight pilot checklist. Explicit knowledge is more formalized than its tacit counterpart (Hansen et al., 1999).

b Relative Value of Data, Information, Explicit and Tacit Knowledge

If basic economic principles are applied, the difficulty and scarcity of tacit knowledge makes it a valuable resource; however, Nissen (2006) points out that this is a

misnomer. Knowledge in either tacit or explicit forms do not hold sway over each other. Moreover, when referring to the knowledge hierarchy in Figure one, Nissen (2006) points out that it is important to observe the "vertical axis of the hierarchy in a value free manner." Knowledge is neither more important than data nor information. The difference in the knowledge hierarchy domains is in how much direct action can be applied from the exchange of data, information, explicit or tacit knowledge (Nissen, 2006). Tacit knowledge has the greatest potential for facilitating direct action from its exchange and as a result organizations inherently place more value on this type of exchange (Nissen, 2006). However, Tuomi (1999) and Nissen (2006) maintain that each level of the hierarchy facilitates the other; therefore data, information, and knowledge in both its forms should be equally weighted in terms of their facilitative learning capacity.

c. Knowledge Flows, Transfers, and Sharing

Knowledge as a whole also has a 'reach' quality which marks a distinction in knowledge as either being held by an individual or a collective (Pratt, 2006). Moreover, Nissen (2006) purports that this reach quality is incorporated into the notion that knowledge has a lifecycle. He describes that knowledge might be created, organized, formalized, shared, applied, and refined. This lifecycle transpires as knowledge transgresses from the individual, to the group, to the organization. As the tacit knowledge made explicit in this process is internalized by the individual, it once again becomes personalized and therefore tacit, prompting the start of the lifecycle again. The Nissen (2006) lifecycle bears some resemblance to the Nonaka and Konno (2000) SECI model wherein they describe the flow of knowledge as spiraling through socialization, externalization, combination, and internalization.

According to some knowledge practitioners, information technology does not facilitate the flow of both explicit and tacit knowledge equally (Nissen, 2006). Along the same perspective, Wickramasinghe (2006) considers knowledge to be either objective or subjective. Using this terminology, explicit knowledge is objective and more easily facilitated by information technology (Davenport & Prusak, 1998). Wickramasinghe (2006) categorizes tacit knowledge as subjective knowledge and like Nissen (2006)

declares the instantiation of tacit knowledge in information technology systems difficult to do unless it is in the form of expert or virtual systems. As a result of the inequity in how information technology systems facilitate explicit (objective) or tacit (subjective) knowledge flows, Ribiere and Roman (2006) suggest that when it comes to knowledge management systems, the organization's information technology strategy should reflect the knowledge it is meant to facilitate. Ribiere and Roman (2006) propose organizations employ two very different strategies for knowledge flows; Hansen et al. (1999) describes these strategies as either codified or personalized. The former is an explicit knowledge flow facilitation strategy and the latter is a tacit knowledge flow facilitation strategy. The balance of the strategic employment varies with the organization and their goals (Ribiere & Roman, 2006; Hansen et al, 1999)

Codified knowledge flows are those facilitated most by information technology and codified knowledge is advantageous because of its reuse (Ribiere & Roman, 2006). Davenport and Prusak (1998) note that the codification of knowledge is meant to convert knowledge, "to make it as organized, explicit, portable, and easy to understand as possible" (Davenport & Prusak, 1998). Knowledge made available through databases, search and retrieval tools, and knowledge extraction tools are considered codified knowledge and resemble the description provided for explicit knowledge (Ribiere & Roman, 2006). Examples of codified knowledge include videos from the Center for Army Lessons Learned (CALL) and 'how to' videos from You Tube. There can however be some injection of personalization in codified knowledge flows. For example, an Army soldier who is afforded an opportunity to view a CALL video and an opportunity to discuss its content with personnel having experienced the depicted actions demonstrates a hybrid knowledge flow strategy. Ribiere and Roman (2006) contend that codified and personalized knowledge flows are not diametrically opposed strategies but can serve to be supporting actors of both explicit and tacit knowledge strategies.

Personalized knowledge is people focused and only needs information technology as a means of facilitating people dialogues (Ribiere & Roman, 2006). According to Ribiere and Roman (2006) tacit knowledge flows are best facilitated by

linking people through the development of people networks. Likewise, the former World Bank Knowledge Management Program Director, Stephen Denning (2007), champions the linking of people to facilitate tacit knowledge flows. Denning (2007) is well known for introducing the power of the narrative at the World Bank and numerous other organizations adopting a subjective knowledge strategy. Moreover, Hansen et al. (1999) make the case that a tacit knowledge facilitation strategy is less information technology intensive relative to that of a codified knowledge strategy. The argument is that tacit knowledge flows are made possible through the use of people networks, and that these people networks are not as information technology intensive relative to the requirements of a codified knowledge strategy, e.g. databases and search and retrieval tools.

d. Knowledge Transfers

Davenport and Prusak (1998) state that if an organization wants effective knowledge transfers, then all that is needed is "hire smart people and let them talk to one another" (Davenport & Prusak, 1998). This is a simple explanation that conveys several notions. The knowledge transfer must occur between people that can deliver it and absorb it - a knowledgeable person who can provide it and a capable person who can receive it. Moreover, the receiver must not only have cognition of its receipt but must also apply the knowledge received before it is considered transferred (Davenport & Prusak, 1998). Moreover, Davenport and Prusak (1998) note that as an organization gets larger, the possibility of knowledge existing in one area of the organization and lacking in another is more probable, while simultaneously inversely decreasing the likelihood of knowing where it exists and being able to navigate to it.

e. Knowledge Sharing

King's (2006) description of knowledge sharing as being multi-directional, exhibiting informality, and having few rules matches the type of knowledge hierarchy exchanges likely to occur on a people network (Snowden, 2005). This latter description of knowledge sharing bears resemblance to the Ribiere and Roman (2006) personalization concept. Davenport and Prusak (1998) depict knowledge sharing in

relation to knowledge hoarding. You are either a provider of knowledge or a receiver of knowledge. Nissen (2006) describes knowledge sharing within his knowledge lifecycle model and indicates that knowledge sharing occurs once knowledge has been created, organized, and formalized.

f. Knowledge Flow, Transfer, Sharing Summary

As Housel and Bell (2001) suggest, the myriad opinions, views, and constructs blur what actions should be taken, but the takeaway here is that tacit knowledge flows are generally not considered to be facilitated by information technology in and of itself (Davenport & Prusak, 1998); however, the manner in which tacit knowledge flows may be facilitated by information technology is tied to the networking of people (Wickramasinghe, 2006). The dichotomous split is that while information technology, aside from virtual and expert systems, is purported to be ineffective at instantiating tacit knowledge flows (Nissen, 2006) it is argued that information technology can facilitate them through the formation of people networks (Snowden, 2005).

As discussed below, the knowledge constructs framing how well explicit or tacit knowledge is instantiated, facilitated, or transferred between entities might not be pragmatic enough, and the definitions that have been constructed to frame the knowledge concept may be far too limiting; moreover, in the opinion of Snowden (2005) and other narrative endorsers (Denning, 2007) these constructs are influencing organizations to miss the value in facilitating knowledge flows by other means.

g. Knowledge Paradigm Shift

Knowledge in its many forms has been defined in multiple ways: the components facilitating the creation of knowledge have been largely defined within the knowledge hierarchy construct of data, information, and knowledge (Nissen, 2006; Tuomi, 1999); the knowledge domain in particular has been further defined by the tacit-explicit spectrum (Nissen, 2006) and further characterized as having subjective-objective qualities respectively (Wickramasinghe, 2006); and knowledge flows have been

categorized as either exchanges under the knowledge transfer/knowledge sharing banner (King, 2006) or as being codified or personalized (Ribiere & Roman, 2006). The abundant terminology serves to prove Snowden's (2005) precept. He contends that tacit-explicit definitions are problematic, consuming, and distracting. Snowden (2005), who founded the Cynefin Centre, and according to Stewart (1999) is an expert in tacit knowledge, suggests that the time for parsing explicit and tacit knowledge has passed. He warns that limited, rigid, and formalized methods and tools attempting to characterize knowledge flows and the natural processes occurring within dynamic human social interactions are flawed because they cannot capture the evolving human nature of knowledge and learning. He notes:

That the distinction between tacit and explicit knowledge, while it provided utility as a means of making knowledge a less problematic word, is no longer useful, since the concept of tacit knowledge has become problematic in turn. We now need to recognise the importance of both narrative and concrete knowledge: we always know more than what we can say and we will always say more than we can write down. (Snowden, 2005)

Lending support to Snowden's (2005) contention that the human dynamic is primarily important, Jacobson (2006) contends that capitalizing on the human interactions facilitating the knowledge sharing is a powerful means to leverage the organization's human capital. Wickramasinghe (2006) suggests that instead of relying entirely on information technology to exploit the benefits of knowledge flows, a holistic approach marrying the people and technology is required for any knowledge creation endeavor. Within their knowledge management strategy diagram listed in Figure 2, the Army's Battle Command Knowledge System (BCKS) captures the very same sentiment of adopting a holistic approach by depicting the explicit-tacit pursuit as existing on a continuum dependant on the specific goals sought.

purports to facilitate knowledge flows without people is less efficient, if effective at all, relative to one that has people at its core serving as contributors and recipients of knowledge hierarchy exchanges (Jacobson, 2006).

Social networks are people driven. A article by Liebowitz (2007), the first Knowledge Management Officer at NASA's Goddard Space Flight Centre, noted that facilitating knowledge flows between people "has a critical influence on work and innovation... (and) can have a major impact on performance, learning, and innovation." The emphasis is that people make knowledge transfers possible and their interaction facilitates those flows (Jacobson, 2006). The common denominator in facilitating knowledge flows is the networking of people (Snowden, 2005).

D. SOCIAL NETWORKS, SOCIAL MEDIA, AND KNOWLEDGE FLOWS

Nelson and Hsu (2006) contend that "social networks and knowledge management (KM) are complex, multifaceted phenomena that are as yet imperfectly understood." Nonetheless, they contend that social networks have sizeable impacts on how quickly and effectively knowledge can be both created and disseminated within an organization (Nelson & Hsu, 2006). Social media are in a further state of infancy relative to the prolific research conducted on social networks through social network analysis (Cross, Parker, Prusak, & Borgatti, 2001; Cross & Parker, 2004); however, as Bennington and King note (2010), "the desired end-state of electronic social networks is comparable to its traditional counterparts." Many of the knowledge practitioners referenced thus far support the proposition that the interconnectedness of people facilitate knowledge flows (Jacobson, 2006; Liebowitz, 2007; Snowden, 2005). Moreover, research conducted by experts in the management, communication, social psychology, and sociology fields have determined that what you come to know is substantially impacted by who you know; the efficiency in learning how to solve problems and garner information is in direct relation to the personal relationships developed (Cross et al., 2001). Emerging technologies in the form of social media facilitate knowledge learning, knowledge creation, and sharing within organizations (Cross & Parker, 2004); examples of such cases are presented in Chapter III. However, in order to establish a qualitative

basis for assessing the potential knowledge flow return on investment from collaborative social media, it is important to establish the tenets under which a collaborative social network might facilitate data, information, and knowledge flows. From the tenets described herein a pragmatic collaborative social network services model is developed in Chapter IV.

1. Facilitating Knowledge Flows in Social Networks and Social Media

A quantitative study of a firm renowned for its leading edge knowledge management investments was conducted by an executive director and research associate at the IBM Institute for Knowledge Management in conjunction with two research professors, one at Boston College and the other at the University of Virginia's McIntire School of Commerce (Cross et al., 2001). The study concluded with four knowledge flow facilitating tenets that drive success in social network endeavors: safety, access, knowledge, and engagement nicely captured in the acronym SAKE.

a. Safety and Trust

Safety as a measure refers to how well social network relationships make it possible to admit a lack of knowledge. If safety is considered along a spectrum, the least safe sites, or least safe relationships between collaborating partners, discourage the admittance that someone does not know something (Cross et al., 2001). According to Nelson and Hsu (2006), the greater the expectation that a particular snippet of information should be standard knowledge, the safer the relationship needs to be before someone will admit they do not know the subject matter. Therefore, the other end of the safety spectrum is a site whose participant relationships openly encourage the introduction of what might be otherwise considered asinine questions on a relatively non-safe site. Snowden (2005) equates this aspect of a relationship as a condition of trust; the importance of trust in social networks has been well documented.

The emergence of trust in a social network among participants that might have never met, but who are nonetheless inherently tied in a community practice, is not an immediate phenomena occurring as a result of an information technology initiative

(Snowden, 2005). Trust is a voluntary act that develops over time and as a result of the human interactions within the social network (Snowden, 2005). The notions of trust and safety are analogous; whereby both trust and safety address the facilitation of the hierarchy of knowledge irrespective of how explicit or commonly known the knowledge is within the organization (Nelson & Hsu, 2006). The significance of this relationship tenet is that networks promoting a safe environment facilitate discussion of riskier more innovative ideas lending itself to creating knowledge that might otherwise be stifled (Cross et al., 2001).

b. Accessibility

An organization can have a plethora of knowledge in inventory, however if access to that knowledge, information, or data is not facilitated then that knowledge is never applied to solving problems in other parts of the organization (Cross et al., 2001; Denning, 2007). The notion is that the social networks must afford its participating members the ability to access the knowledge it needs in a timely fashion (Cross et al., 2001). For example a database or share point portal site containing vast amounts of explicit knowledge has the potential to be very helpful (Natarajan & Shekar, 2006) but its inaccessibility to all members participating in a community of practice restrains the knowledge flow that might have been otherwise facilitated (Cross et al., 2001). The notion that the accessibility of knowledge stores is paramount to facilitating knowledge flows is not unique. An Air Force research paper falling in line with the grander Department of Defense 2025 vision notes that the goal is to connect everyone everywhere in order to facilitate knowledge stores found within "people, digital libraries, and massive interconnected knowledge bases around the world" (Sikes, Cherry, Durall, Hargrove, & Tingman, 1996). Accessibility of the knowledge stores where they may exist is elemental to knowledge flows (Cross et al., 2001).

c. Knowledge

The aforementioned level of accessibility and interconnectedness does not imply that more communications, more meetings, and more e-mails are desired or even

required; as Cross, Nohria, and Parker (2002) point out the goal should be to facilitate accessibility to knowledge stores be that in the form of people or explicit knowledge artifacts. Therefore, awareness of where knowledge exists within the organization is crucial to linking people endowed with it, pointing to its sources, or extricating it for application or adaptation (Davenport & Holsapple, 2006; Cross et al., 2001). A social network analysis study of knowledge flows among immunologists noted that the immunologists within this particular Fortune 250 Pharmaceutical Company were largely unaware of each others' knowledge and as a result were unable to bring to bear the stores of knowledge housed within the organization (Cross et al 2001). Denning (2007) of the World Bank addressed the issue of knowledge and being aware of what other people know. He established helpdesks that its employees could go to for further referral to the stores of knowledge held by people or explicit knowledge artifacts held in data repositories.

(1) Actors, Tie Strength, and Identity. The centrality of actors, the strength of ties between them, and the roles within the social network drives how well social networks facilitate knowledge flows (Nelson & Hsu, 2006). The more central an actor is in a network the more critical it is for that actor to facilitate knowledge flows (Nelson & Hsu, 2006); consider the example of the World Bank and the help desk wherein the help desk is an actor with maximum centrality. The centrality of an actor may facilitate knowledge flows as in the World Bank case but also becomes a bottleneck for such flows and limits the flattened organizational effect that may come from a network with less actor centrality (Cross et al., 2002).

The Strength of the ties between the actors also has bearing on how well tacit or explicit knowledge may flow within the network (Nelson & Hsu, 2006). Nelson and Hsu (2006) explain that explicit knowledge is better facilitated by weak ties while tacit knowledge flows are better facilitated by strong ties. Tie strength is characterized by the entrenchment of the knowledge sharing partners; entrenchment is defined by emotional intensity and length of time of the partnership. Strong ties are more influential and are better capable of conveying complex knowledge, tacit knowledge, but they are also more stubborn to innovation and change. These relationships also require

less brokerage - persons that can facilitate the knowledge flow between two parties. On the other hand weak ties require lots of human interaction to facilitate the knowledge flows.

Snowden (2005) argues that a social network is better served by adopting an 'identity' with a unifying purpose. This moves away from an individualistic social network relationship to one of a group with a coalescence of purpose (Snowden, 2005). In such a setting the limitations observed with the strength of ties might be overcome.

d. Engagement in a Collaborative Social Network Site

Nissen (2006) proposes that a knowledge owner must be competent and knowledgeable for sharing to be effective. Likewise, Jacobson (2006) points out that the receiver must also be equally competent to absorb the shared knowledge. Therefore, the case is made that knowledge sharers should have a shared baseline of expertise and education similar to those found in communities of practice (Coakes & Clarke, 2006). In addition the individual endowed with the knowledge must also be willing to share the knowledge (Cross & Parker, 2004) and the recipient must be motivated to want to acquire the knowledge. Knowledge sharing is then influenced by the motivations to share (Nelson & Hsu, 2006) and by the ability to acquire and absorb.

(1) Motivations to Engage in Knowledge Sharing. Motivations to share knowledge may be altruistic, driven by Maslow's hierarchy of needs, or have other compensation mechanisms (Nelson & Hsu, 2006). Davenport and Prusak (1998) describe how British Petroleum motivates its employees to engage in knowledge sharing by presenting an annual "Thief of the Year" award recognizing the person that has stolen the best ideas. Moreover, Texas Instruments awards a "Not Invented Here, But I Did It Anyway" award as a means of motivating employees to acquire knowledge by sharing knowledge inside and outside the firm (Jacobson, 2006).

e. Knowledge Facilitation through Social Media Narrative

Denning (2007), former World Bank Knowledge Management Program Director, has championed the power of the narrative to convey knowledge flows. He has told the following story of a Zambia health worker accessing the World Wide Web:

In June of last year, a health worker in a tiny town in Zambia went to the Web site of the Centers for Disease Control and got an answer to a question about the treatment of malaria. Remember that this was in Zambia, one of the poorest countries in the world, and it was in a tiny place six hundred kilometers from the capitol city. But the most striking thing about this picture, at least for us, is that the World Bank isn't in it. Despite our know-how on all kinds of poverty-related issues, that knowledge isn't available to the millions of people who could use it. Imagine if it were. Think what an organization we could become. (Phoel, 2006)

Phoel (2006) notes that the story does several things: (1) it conveys the power of the narrative; (2) it conveys the power of knowledge management; and (3) conveys the power of interconnecting people to facilitate knowledge flows (Phoel, 2006). According to Phoel (2006), Denning had unsuccessfully attempted to convey the same point through the use of business language: statistics, models, and power points. Instead the narrative above successfully conveyed the message and motivated the World Bank audience to action (Denning, 2007).

The founder of the IBM's Cynefin Center argues that the narrative needs to play a more central role in knowledge flows (Snowden, 2005). In 1998 Davenport and Prusak noted that if an organization wanted to effect knowledge transfers then it should simply increase the dialogue opportunities within its organization to reduce the gaps of knowledge from where they existed to where they were needed; however, they also noted that this gap increased as the organization's size increased simply because it was harder to effect dialogues on a grand scale or through large geographic disbursement. However, since 1998 there has been a paradigm shift with respect to how easily people can be interconnected through the use of myriad social media (Rees & Hopkins, 2009). The Army has recognized the power in exploiting social media to facilitate the narrative in

order to affect knowledge transfers and knowledge sharing; the following is an excerpt from the Army's Battle Command Knowledge System (BCKS) capturing the aforementioned points:

The Army understands this and uses stories or vignettes in its major field manuals to help transfer thoughts, concepts, values or competencies. Storytelling can impact critical processes, including: knowledge creation, sharing and exploitation; building and integrating individual, team and organizational expertise; leadership and leader development; improving situational awareness, organizing and articulating perception, interpretation and actionable prediction in an operational environment. BCKS' success with digital storytelling has far reaching implications for knowledge transfer across the Army enterprise and should be included in any leader's knowledge management "toolkit." (U.S. Army, 2010)

2. Social Network Conditions and Culture

a. Top Down Ignition and Bottom Up Emergence

Snowden (2005) argues that top level management should set the conditions, in effect stimulate the start of the social network but it should allow for the network to emerge and grow on its own. This way, the management can allow "novel and desirable emergent phenomena ... be nurtured, while undesirable ones can be detected early and either destroyed or influenced so that they self destruct" (Snowden 2005).

b. Organizational Culture

Cross et al. (2002) point out that a common myth that top level management cannot do much to assist the development of informal networks. However they notes that top management can ensure that the formal hierarchical structure existing in the physical organization is not also mirrored in the social network. Such networks defeat the purpose of facilitating knowledge flows because they lose their flexibility (Cross et al., 2002). Moreover, top management can also influence the appropriate culture. If the organization is adept at knowledge hoarding vice knowledge sharing, then management can enact changes that motivate a sharing culture (Cross et al., 2001).

Lastly, management can also influence the culture by prizing collaborative work and praising those endeavors over individual accomplishments. The former encourages a sharing culture whereas the latter encourage behavioral norms that discourage the sharing of knowledge.

III. COLLABORATIVE SOCIAL MEDIA

The chapter intends to demonstrate through the presentation of private and public sector collaborative social networking examples, how social media are being leveraged to provide access to myriad sources of information, enhancing the participants' learning and understanding, thereby benefitting the individual and organization. The social media examples presented satisfy one or more of the aims Davenport and Prusak (1998) set out for knowledge management projects. They make the knowledge clumped in one disparate location visible in another and provide context for its role in the organization, in large part by establishing a knowledge learning culture promoting knowledge sharing, all due to the web of collaborations made possible by the knowledge infrastructure whose conditions were set to encourage a web of connections (Nelson & Hsu, 2006).

The high failure rate of IT initiatives and the numerous cases of IT systems purporting to instantiate tacit knowledge has raised the level of skepticism with respect to how well IT can be leveraged to provide organizational knowledge value added (Housel & Bell, 2001). A review of the knowledge management and knowledge flow literature reveals a general consensus among knowledge practitioners that the terms information and knowledge sharing, along with other similar terminology, have been abused and can be a bit of a misnomer (Alavi & Leidner, 2001; Housel & Bell, 2001; Nelson & Hsu, 2006; Nissen, 2006; Snowden, 2005).

In many instances, information sharing has summed up to share point portals serving as repositories of documents that may have some explicit value. However, finding a snippet of information in a data repository might leave the recipient of said data with words that have little context (Nissen, 2006). However, if this document repository was also tied or inherently part of a social networking collaborative medium, and the capability to query or be inquisitive about the data at hand existed within the structure of the service, then knowledge flows as described in Chapter II could be facilitated (Greaves & Mika, 2008).

Moreover, the rapid pace with which electronic collaborative social media are progressing leaves a trail of terms associated with the Semantic Web, Web 2.0, or Web 3.0 Social Semantic Web (Greaves & Mika, 2008; Rees & Hopkins, 2009). Among the many terms associated with the aforementioned technological domains includes but is not limited to: blogs and podcasts; wikis and other collaborative spaces; social networks such as Facebook and LinkedIn; other user generated content; virtual social environments; mashups; instant message and chat (Rees & Hopkins, 2009). In an effort to eliminate limiting semantic constructs, other restrictive interpretations, and remain relevant through future technological offspring, the Rees and Hopkins (2009) approach is adopted in referring to any of the aforementioned, and any future system manifestation of collaborative social capabilities as social media systems or social networking systems.

The social media system examples provided herein exhibit the elemental processes Nonaka (1994) identifies as necessary precursors to knowledge creation: they make possible the socialization of knowledge; they facilitate both the internalization and externalization of knowledge; and allow for autonomous inferences to be created through the combination of the knowledge in inventory and the knowledge in motion (Nelson & Hsu, 2006; Nissen, 2006). The thread transgressing through this communal interaction is that the mechanisms for learning are facilitated by the linkages in the social media web. It becomes more than just shuttling information around computers; a problem Nissen (2006) warns is common in knowledge management systems. The overreliance on IT has missed the critical people component, and has in large part failed to exploit the knowledge enhancement opportunities in employee networks in a way that could lead to explosive individual and organizational performance improvements (Nelson & Hsu, 2006; Parker, Cross, & Walsh, 2001).

A. XEROX

1. Knowledge Management Domains

The people driven nature of social networking is in part what makes the knowledge exploitation potential so attractive. By the mid 1990s, after failing to

capitalize on early inventions coming from its Palo Alto Research Center (Housel & Bell, 2001), Xerox sought to develop a means for its employees to share their knowledge capital. A 1999 Management Review article referenced a case study of Xerox's knowledge management systems noting that 80% of its IT was focused on adapting to the social dynamics of its workplace environment (Hickins, 1999; Nelson & Hsu, 2006). Their effort in 1996 began with a collaborative effort with "Ernst & Young, the American Productivity & Quality Center, and Boston University" to develop a library of case studies which could be analyzed for knowledge management commonalities. The study revealed 10 domains of knowledge management (Powers, 1999).

1. Sharing knowledge and best practices
2. Instilling responsibility for knowledge sharing
3. Capturing and reusing past experiences
4. Embedding knowledge in products, services, and processes
5. Producing knowledge as a product
6. Driving knowledge generation for innovation
7. Mapping networks of experts
8. Building and mining customer knowledge bases
9. Understanding and measuring the value of knowledge
10. Leveraging intellectual assets

Xerox's director of corporate strategy in 1999 indicated that the knowledge management system they developed was active in only seven of the domains while other companies like Chevron were only active in best practices (Powers, 1999).

2. Eureka & Amber Web

Based off its findings in 1996, Xerox forged a long range 'Xerox2005' plan that among other things sought to leverage knowledge through collaborative people driven social systems (Powers, 1999). Among its early successes was the Eureka initiative. Common to many of the social networking successes discovered in the literature review, Eureka was an effort to share and reuse intellectual capital by facilitating its 25,000 worldwide service technicians to share their non-textbook repairs (Powers, 1999). Xerox in essence created a service technician community of practice. Prior to the Eureka effort,

technicians could only learn of new repair techniques from other technicians in their immediate physical circle (Gordon, 2010). In the absence of any collaborative medium, repairs were largely done based off of experience, innovative repair solutions learned around the proverbial water cooler, or completed per the service manual instructions (Powers, 1999). With an approximate one million service calls per month performed by over 25,000 technicians, a tremendous untapped knowledge in inventory existed organization wide.

As Mottl (2001) notes, many scenarios the service technicians experienced weren't found in "training books, documents, or vendor updates"; however that is not to say that the problem had not already been experienced somewhere else in the organization (Powers, 1999). Dan Holtshouse, Xerox director of corporate strategy and Xerox knowledge initiatives at the time, provided an example of a problem-solution scenario that occurred between a Toronto and Brazilian service technician. The Brazilian service technician, stumped for a repair solution not previously codified or experienced within his region, queried the knowledge sharing site with the repair problem; his initial course of action after exhausting all locally known solutions was to replace the \$40,000 Xerox printer altogether. To his surprise, a Toronto technician had experienced the same problem on the same model and communicated that the repair issue would be solved by installing a connector device (Gordon, 2010; Powers, 1999). By some accounts, the connector cost only 90 cents (Powers, 1999) and by others it cost \$90 (Gordon, 2010); notwithstanding the discrepancy in the cost of the connector, this success story was commonplace as a result of the collaborative social media site (Gordon, 2010; Powers, 1999).

Gordon (2010) who served numerous positions within Xerox, among them as Senior Director and General Manager of Outsourcing Services, provides a personal tale of how the Eureka project was almost cancelled after investing millions in a smart artificial intelligence database not achieving the desired results. The collaborative portal and searchable database built did not initially enjoy the participation levels hoped for; the

service technicians were neither providing tips nor solutions, nor were they exploiting the very expensive tool with the voraciousness expected by Xerox executives and Palo Alto Researchers (Gordon, 2010).

Breaking from the norm, Xerox leveraged anthropologists to examine the behavior of the blue collar service technician work force, and determined that the organizational culture had to change (Gordon, 2010). Brown (2000), former chief scientist and director of the Palo Alto Research Center, recalls anthropologists concluding that although management frowned on service technicians when they socialized on company time, it was during these periods of socialization that the most valuable work was being accomplished; "the tech reps were not just repairing machines; they were co-producing insights, and observations through language and rituals to explain how to repair the machine better, and faster" (Gordon, 2010). The collaborative social media offered an opportunity to virtually socialize and receive recognition for their ingenuity; however, the ability to be recognized was not a part of the original design and therefore the impetus for motivating the collaboration was missing (Gordon, 2010).

Three months after redesigning the site to account for Maslow's top hierarchical needs Xerox's efforts yielded success (Gordon, 2010). Stimulus for the site had come top down and growth of the site was bottom up (Powers, 1999). The organization adjusted the site to allow for peer recognition; the ability "to tell stories on how to fix things based on personal experiences and allow fellow peers to reaffirm the practice explained or augment with additional insight—like Wiki Encyclopedia, but with a thumbs up and thumbs down counting system" (Gordon, 2010). Facilitating knowledge flows from where they existed to where they were needed resulted in a 5-10% parts and labor cost reduction (Powers, 1999). To date, 95% of the technicians access the knowledge sharing site daily, resulting in an annual cost savings of \$30 million; this is all directly attributed to the knowledge sharing site the technicians so avidly use (Gordon 2010).

Xerox's initial success with Eureka prompted the creation of a second social media collaborative site. This site however adhered to an even more informal structure; Xerox's scientists were the audience of Xerox's second Web-based social media collaboration (Powers, 1999). In an attempt to remedy the issues that contributed to

Xerox missing out on the innovations created at the Palo Alto Research Center, the collaboration site was established in order to allow the scientists to collaborate amongst themselves. The resulting knowledge sharing collaboration was termed Amber Web and later became known as the collaboration tool sold on the market under the brand name DocuShare (Powers, 1999; Velker, 1999).

The anthropological lessons learned from the Eureka project were applied to Amber Web. Scientists needed a less regimented social gathering place that allowed a lot more freedom in the maintenance and regulation of the space (Powers, 1999). Speaking in reference to the social space, Holtshouse was quoted as saying "no one runs it or specifically controls it" (Velker, 1999). As a result the site required little maintenance; only one administrator tended to the site for a third of the work day. Moreover, unlike the millions spent on the Eureka project, Amber Web was able to be deployed for much less.

Once it was converted into a software product line item branded DocuShare, it was able to be deployed for \$15 - \$45 thousand depending on the scale of the deployment. The site's success is marked by more than just the ability to market it as a product, since its introduction the site grew from 500 research engineers to over 30,000 employees (Powers, 1999). Moreover, the site has grown to include more than just scientists; it now also includes engineers, product designers, business planners, and marketers. The collaboration of multiple functional areas has allowed for greater returns to the organization; product designers and business planners now share ideas, approaches, and knowledge on the communal site (Powers, 1999; Velker, 1999). Moreover, Xerox's former senior management attribute Xerox's high retention rates to the employee empowerment made possible through its social media (Gordon, 2010).

B. TOSHIBA

In August 2009, Toshiba launched a Web 2.0 social media site intended to capture the 80% of organization's knowledge not already made explicit in documents (Toshiba America Business Solutions Inc., 2009). The social media site was borne from a need to tie in multiple functional areas into a single communal space in order to share knowledge

on best practices and facilitate end-user generated knowledge. The Toshiba eXCHANGE site was intended to make possible many of the same functions found now on popular social networking sites such as LinkedIn, Facebook, and YouTube. Specific tools included: an online member presence allowing voluntary direct connection; organizational blogs; organizational video content; feedback mechanisms allowing users to rate content on a value basis; really simple syndication (RSS); (Wiki); and intelligent search engines facilitating information location (Toshiba America Business Solutions Inc., 2009).

With the internal deployment of the social media application, Toshiba intended to increase communications throughout its organization tying in disparate locations. Their hope was that the introduction of a collaborative social media site would reduce their sales cycle providing a competitive edge (Toshiba America Business Solutions Inc., 2009). Toshiba was recognized for its innovation in August of 2010 by the independent Business Equipment Research and Test Laboratories (BERTL) for developing a product that was expected to shape the manner in which business operated within the next couple of years (Halid05, 2010).

C. MENTORSHIP AND VIRTUAL LEARNING

Not all knowledge management social media initiatives have yielded promise. As indicated by Housel and Bell (2001), the field of knowledge management remains in its infancy, and the manner in which some organizations have attempted to leverage technology to facilitate knowledge flows is often done on outdated assumptions or attempted in incompatible organizational cultures. The previous examples illustrated successful collaborative social media initiatives book-ending a decade, demonstrating that successful social media examples are not recent phenomena. On the other hand the following two examples present recent social networking and social media case studies that either failed or had significant challenges; one is based on a well-known traditional application and the other on cutting edge social media technology.

1. E-mail Mentoring

In 2007, Allied Health attempted to implement an e-mail mentoring system in order to provide the support and professional development necessary to maintain its nursing and other health staff clinically current. Before launching a fully fledged e-mail mentoring system, a pilot study was conducted; the pilot study was also the subject of a case study. The mentoring system meant to address certain areas of concern, specifically: retention and recruitment, and professional isolation due to geographical dispersion.

The study intended to observe the benefits of the exchanges by comparing the control group with the experimental group; wherein, the former was not mentored while the latter was mentored. The volunteers were matched one on one in mentor-mentee fashion. The goal of the pilot study was to assess if the mentored group experienced greater satisfaction and reduced stress relative to the group that was not mentored. The metric analysis never came to fruition since the e-mail mentoring initiative broke down after only six months into a one year planned study.

Although the collaborative mentorship initiative failed to take hold, Stewart (2009) points out the takeaways. The participants largely desired the mentorship; however, dedicating time to the endeavor was an issue. Moreover, the participants in both the mentor-mentee roles lacked the motivation to frequently conduct mentorship engagements. On average, the participants only communicated four times a month with some not doing so at all. Stewart (2009) concluded that the one on one mentorship was not conducive and that "a community approach to mentoring using open social networking tools spreads the mentoring 'load' and allows the mentee to have more than one perspective on an issue, and increases the access to knowledge and networking opportunities." Moreover, the case for social media was made because it also provided support for key roles, e.g., mentor to mentor. Additional relevant reasons were also pointed out, among them: poor computer skills, lack of understanding online mentoring context, and trust challenges in accepting a long distance mentor relationship

3. Virtual Simulation

On the other end of the technological spectrum was the use of the virtual environment Second Life to educate student midwives in training. Knowledge practitioners have stated that sticky tacit knowledge flows are best facilitated through expert systems and virtualization (Housel & Bell, 2001; Nissen, 2006). Spurred by the latter, an 18-month virtualization project was undertaken in New Zealand in 2007 using Second Life to examine how learning might be enhanced in a multiuser virtualized learning environment simulating several stages of the midwife process. Designed as a social networking environment, Second Life was chosen as the platform of choice because it was considered the most stable of the virtual environment platforms (Winter, 2010). The Second Life Education In New Zealand group (SLENZ) simulated the midwife role from the receipt of a patient phone call going into labor through the first hour following birth of the child. Collaborative learning was facilitated by mentorship, meeting with experts and conducting discussions, undergoing tutorial sessions, and engaging in pairs and role playing the birthing scenario.

The final evaluation report provided mixed results. Although the virtualized environment was able to produce unique experiential learning situations and facilitated social networking cross-cultural collaborative problem solving, the entire evolution was hamstrung by technical difficulties and user resistance to the new learning environment (Winter, 2010). The technical issues experienced due to bandwidth limitations and high-end terminal equipment hardware requirements overshadowed the knowledge gain successes some of the participants reported (Winter, 2010).

Although the aforementioned virtual simulation did not produce the collaborative knowledge flows desired, there are examples of successful explicit and tacit knowledge creating virtual environments. One such example is the Tactical Language and Culture Training System (TLCTS). TLCTS marries artificial intelligence in a virtual environment in order to model the decision-making process; moreover it brings to bear automated speech recognition with feedback mechanisms aiding the system to learn and account for dialects and accents (Johnson & Valente, 2009). As reported in a 2009 issue

of AI Magazine, the primary function of the DARPA funded system is to facilitate language and cultural skills learning in order to complete specific tasks (Johnson & Valente, 2009). The system has been employed by Marine Corps and Army units conducting combat missions in Iraq and Afghanistan. The system has the potential to be used as a team building tool, e.g., special operations team collectively working together speaking tactical Pashto with local leaders; however, this level of social collaboration has not been widely used because of the intensive bandwidth terminal end equipment restrictions. Nonetheless, units that have adopted the system have had great success in both retaining the language and culture training and more importantly saving lives. Third Battalion, Seventh Marines (3/7 Marines) mandated two members of each squad to undertake 40 hours of training on the system (Johnson & Valente, 2009). The participant surveys and officer interviews attribute the unit not experiencing a single casualty in part to the benefits gained from the TLCTS training (Johnson & Valente, 2009).

D. GRASSROOTS MENTORING COMMUNITIES

Virtualization and artificial intelligence systems can be costly endeavors. In 2009, TLCTS research was estimated to have been \$5 million with an additional \$1 million to make it a deployable system; moreover, each new course development is approximately \$300,000 - \$600,000 (Johnson & Valente, 2009). The enterprise deployment costs of a system like DocuShare is estimated at \$45,000 (Powers, 1999). However examples of social media with much more humble beginning are abound.

Sites like SmallWarsJournal.com, ProfessionalSoldiers.com, SailerBob.com, Airwarrior.com, and the NavalInstitute.org are being established at the grass roots levels and hosting discussions on a range of professionally enhancing issues to those in the military profession (Dixon, 2007; Dixon, Allen, Burgess, Kilner, & Schweitzer, 2005; Small Wars Journal, 2009). These sites are a popular medium for officers and enlisted to share knowledge and seek mentorship (Long & Schweitzer, 2004). Senior military officers comment and write about topics that might be expected in a professional military journal; the following are some of recent and interesting topics:

- o Rebuilding the Force Unconventional Advisory Forces in Counterinsurgency (Small Wars Journal, 2009)
- o Fighting for a Narrative: A Campaign Assessment of the US-led Coalitions (Small Wars Journal, 2009)
- o Psychological and Information Operations in Afghanistan (Small Wars Journal, 2009)
- o Hezbollah in the Tri-Border Area of South America (Small Wars Journal, 2009)

Some of these commercial sites are used by military Public Affairs to pass on information of interest to the community. For example on AirWarrior.com, an Air Force public affairs official posted an article on the new combat systems officer course opening in Pensacola (Severns, 2010). Furthermore, on the NavalInstitute.org site a Marine Corps Captain with the 15th MEU posted a personal account of the Magellan ship pirate takedown operation he participated in the day prior to his posting (Martin, 2010). The value in these sites has not gone unnoticed by the federal sector.

E. FEDERAL SECTOR

The Chief Performance and Management Deputy Director for the Office of Management and Budget was quoted in a Federal News Radio interview as stating that "the federal government missed out on the productivity boom that transformed the private sector over the past two decades" (Galagan, 2010). The Deputy Director's comments are substantiated when one observes the 139 days on average it requires the U.S. Department of Housing and Urban Development to hire someone, the 160 days a veteran must wait on average before receiving benefits, and the three years it takes to have a patent request processed (Galagan, 2010). Moreover following Cyber Shock Wave, a cyber defense exercise held to test the nation's response to a cyber attack, participant and former Homeland Security Secretary Michael Chertoff further pointed out that the nation lacked the social media collaborative spaces necessary for government and private sector cyber-defenders to share knowledge and best practices. Such a resource would improve the nation's cyber defense posture (Starks, 2010).

Intelink, which houses Intellipedia, is a well-known site among intelligence practitioners. Its host of social media collaborative resources provides a space for its vastly spread network of users to learn, collaborate, and share through the use of picture, video, and document sharing (Galagan, 2010). Intellipedia, a subset of Intelink, is modeled after Wikipedia and provides a similar Wiki experience, except here a user can access classified and unclassified material, post what they know, and if authorized make changes to intelligence material on the site. This capability represents a tremendous leveraging of human capital given that the site has over 250,000 users (Galagan, 2010).

In the fall of 2010, the Government Services Agency (GSA) is planning on debuting 'FedSpace' (Galagan, 2010). Unlike many previous federal uses of social media as a public affairs venue for reaching out to the public, FedSpace is branded as being designed 'for feds by feds' (Galagan, 2010). The goal for FedSpace is to provide a space for sharing best practices and knowledge, allow for project collaboration, support communities of interest, and allow user generated content. FedSpace was in part driven by the administration's Open Government Memorandum and Open Government Directive; it will in essence establish a federal enterprise intranet bridging the gap between varying agency resources not currently visible to each other. The debut of FedSpace illustrates how the federal government is attempting to capitalize on its vast knowledge resources (Galagan, 2010).

NASA describes Spacebook as an enhanced intranet serving as yet another example of efforts being made to capitalize on knowledge in inventory within the public sector (White House, 2009). Spacebook provides NASA personnel and NASA contractors the means to learn through their connections to each other. In Facebook type fashion, its users can create "their own pages where they can publish their own status, share files, connect with others, follow other's activity, and join communities of interest" (White House, 2009). NASA believes that science discovery cannot be left alone to individual endeavors but must be nurtured with a constant flow of ideas that coalesce into new ideas (White House, 2009). These creative ideas are not physically bounded to one local area. A collaborative site that provides the means of connecting disparate

intellectual minds and equips them with the capability of publishing user generated content, provides the social collaborative space the elasticity to flex with the evolving needs of its socially dynamic users (White House, 2009).

The aforementioned federal examples of social media initiatives demonstrate initiatives prompted top down; however the Army provides an example of a grass roots social media endeavor that became so successful in providing mentorship that it was formally adopted by the Army, brought under the Army's .mil domain, and served as the impetus to their formidable knowledge management system (Dixon, 2007).

F. ARMY BATTALION COMMAND KNOWLEDGE SYSTEM

In the spring of 2000, a group of Army officers spurred by the desire to create a social media site where former and present company commanders could find mentorship, advice, and professional development created CompanyCommander.com (Dixon, 2007; U.S. Army, 2010). This professional forum served as the impetus to the creation of the Army's Battle Command Knowledge System (BCKS). The company commander community of practice was considered a knowledge rich environment, teaching leaders to be effective leaders in a demanding and rapidly changing battle environment (Dixon et al., 2005). The knowledge exchanges observed on the site were wide ranging, but at the heart were conversations about topics that truly mattered to the company commanders:

‘How do I deal with the death of a soldier I am responsible for?’ ‘Is it my responsibility to help soldiers be comfortable with the reality of killing or just train them to do it?’ ‘How do I keep soldiers physically fit for the mountainous terrain and overwhelming heat and cold of Afghanistan?’ ‘What have we learned about how to interact with Iraqis?’ (Dixon, 2007)

Schweitzer, an Army military officer and co-founder of CompanyCommander.com, points out that leadership cannot be summed up in doctrine and is abound in ambiguous aspects that can be aided by peers whose experiences can be profoundly deepening environment (Dixon et al., 2005; Long & Schweitzer, 2004). The Army leadership became acutely aware of the organizational value that could come from providing the conditions for a rich exchange of ideas and experiences. The BCKS site boasts that the Army is on the forefront of getting knowledge from soldiers who have it to

those that need it by "combining people, processes, and technology to help soldiers share what they know, solve problems, and grow professionally" (U.S. Army, 2010).

The Army's Digital Stories section has wholeheartedly adopted the power of the narrative through story telling; Figure 3 serves as a powerful example of the Army's Battle Command Knowledge System marries social media technology with human social dynamics to affect knowledge transfers. "Digital Story Telling is a KM process that applies 'narrative engineering' capabilities to enhance tacit knowledge transfer... the 'Breakdown' video provides an example of using digital storytelling to transfer several key training points, including: training and leader shortcomings, maintaining personal relationships with others, and the importance of cultural awareness in a counterinsurgency environment" (U.S. Army, 2010).



Figure 3. Army Narrative Engineering (From U.S. Army)

Moreover, the digital story telling board is not a single knowledge artifact existing on its own; it is tied into the slew of other communities of practice that have since been started inside the Army's Battle Knowledge Management System. As Long and Schweitzer (2004) point out, these communities of practice have facilitated further refinement of the knowledge learned through the digital stories by tapping into the experience of the collective. In 2009 the Army had over 150,000 members participating in over 60 forums (U.S. Army, 2010). Since adopting CompanyCommander.com from its commercial maternal mother, the Army has published its first knowledge management

directive (U.S. Army, 2010). In it they list the Army's knowledge management guiding principles and the seven major objectives of the Army knowledge system (U.S. Army, 2008).

THIS PAGE INTENTIONALLY LEFT BLANK

IV. KNOWLEDGE, SOCIAL MEDIA MODELS AND CASE STUDY ANALYSIS

Emerging technologies in the form of social media facilitate knowledge learning, knowledge creation, and sharing within organizations (Cross et al., 2001); examples of such cases were presented in Chapter III. However, in order to establish a qualitative basis for assessing the potential knowledge flow return on investment from collaborative social media, it is necessary to establish a pragmatic knowledge and social media model that can be applied to the case study presented herein.

From the tenets presented in Chapter II and an analysis performed herein of the vignettes described in Chapter III, a pragmatic knowledge and social media model is developed and presented in this chapter. The models are intended to highlight the manner in which social media facilitated knowledge flows benefit the individual and organization. The end goal is to address the challenges in the case study by applying the models founded in the knowledge and social media dynamics literature review.

A. DEVELOPING THE LEARNING STATE MODEL

Returning to an earlier explanation of knowledge in which it was stated that knowledge is that which exists within the minds of people (Alavi & Leidner, 2001). This short concise answer is analogous to the explanation commonly provided about metadata: it is data about data. The explanation would be accurate but far too succinct and superficial to provide the context and meaning needed to begin making autonomous inferences. However short, succinct, and incomplete the initial explanation of knowledge might have been, the impetus for learning was nonetheless created.

The individual, having been informed of such a concept, no longer remains 'oblivious' to the knowledge concept. Instead the individual is now 'ambiguous' about its relative importance and uncertain as to how it intertwines with what is already known. An individual interested in peeling the knowledge layers back, an 'inquisitive' individual, would be compelled to ask questions resulting in more complex and meaningful explanations of knowledge. These further explanations provide meaning, context, and

relevance. The explanations provided “facilitate” the individual's ability to begin creating autonomous inferences about how the knowledge is applied; the ambitious might even begin to contemplate creative means to leverage this new found knowledge. The aforementioned learning sequence is captured in Figure 4.

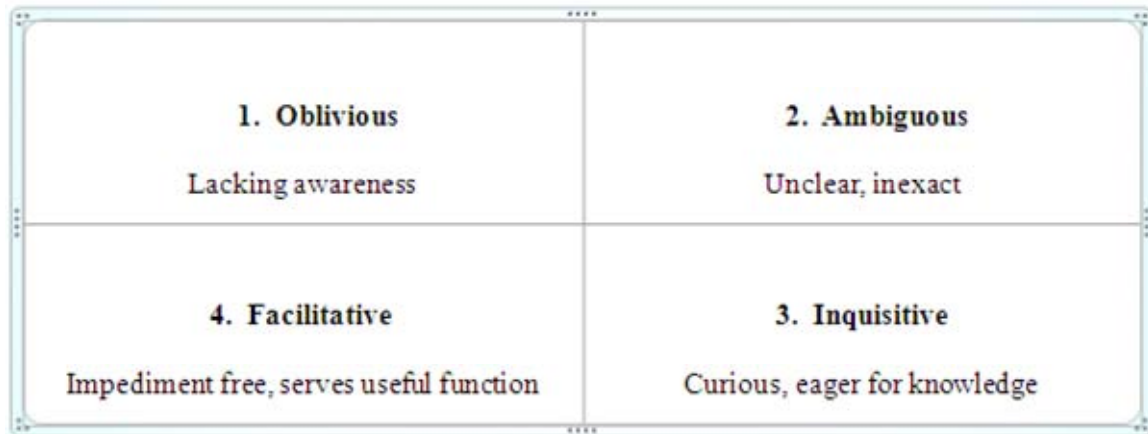


Figure 4. Learning State Model

The preceding paragraph is intended to point out the pragmatic learning stages an individual might undergo with the introduction of a new concept, idea, process, experience, or approach - new is relative to the individual being informed. Consider an individual that is first introduced to: a new leadership approach (Small Wars Journal, 2009); a new intuitive manner to assess and identify the dangers of a fire (Butler, 2010); a new trend recently observed in terrorist money laundering and financing activities (Paulling, 2009); a differing holistic perspective on treating an unusual gunshot wound (Professional Soldiers, 2010). An individual is first oblivious to the approach, process, idea, or experience after being informed; the individual's ambiguity on the matter prompts queries leading to a better contextual construction. Understanding the relevance, application, or environment of this new found information, the individual is now armed with the means to develop their own thoughts on the matter, augmenting this new found knowledge with their own personal experiences, personalizing and creating new knowledge unique to themselves.

The aforementioned list of exchanges is not all inclusive. It is a sample illustration of actual day to day exchanges facilitated by social media everyday resulting in realized knowledge transfers or knowledge creation. The type of knowledge facilitated by such media, explicit or tacit, remains to be discussed but the point persists that individuals undergoing these exchanges on collaborative social media sites are likely to undergo some or all four of the pragmatic learning stages listed in Figure 4: Oblivious, Ambiguous, Inquisitive, and Facilitative. Entry into the exploratory learning cycle can occur at any one of the stages depending on what the individual already knows.

1. Learning States Founded in the Hierarchy of Knowledge

The four learning stages described are part of the knowledge model proposed and developed in this chapter; however, it is founded in the hierarchy of knowledge. The notion prescribed by the simple and pragmatic four learning stages are that data, information, or knowledge received serves as the genesis of interaction on a collaborative social media site, propelling the transgression through the applicable learning stages.

B. THE KNOWLEDGE MODEL

1. Knowledge Matrix

Following the tragedy of September 11, 2001, the FBI had to rethink how it shared information and knowledge within and with other organizations. The 911 Commission Report (2004) noted that "each agency's incentive structure opposes sharing, with risks (criminal, civil, and internal administrative sanctions) but few rewards for sharing". The FBI as a result turned an eye to knowledge management to infuse knowledge sharing rather than knowledge hoarding. A knowledge matrix was borne from their efforts to present a simple conceptual framework of knowledge management. The matrix in Figure 5 is an adaptation of the knowledge matrix posted on the on the intranet site of the FBI's Chief Knowledge Officer (Paulling, 2009).

We Don't Know What We Don't Know	We Don't Know What We Know
We Know What We Know	We Know What We Don't Know

Figure 5. Knowledge Matrix (After FBI Knowledge Matrix)

This nonsensical pragmatic approach illustrates the various informed levels an individual, group, or organization might be categorized into, topic dependant. The power in this matrix is the use of the pronoun. 'We' can be replaced with 'I' or 'Us' and it would indicate the static state of knowledge for the respective entity. The matrix is further modified, incorporating the learning state model. Each state of the knowledge matrix is married to its corresponding learning state in Figure 6.

1. Oblivious We Don't Know What We Don't Know	2. Ambiguous We Don't Know What We Know
We Know What We Know 4. Facilitative	We Know What We Don't Know 3. Inquisitive

Figure 6. Basic Knowledge Model

Within the framework, the importance of the entity is emphasized while the nature of the data, information, and knowledge flow is only background and merely part of the categorical transaction that occurs between individuals, groups, or organizations. The simplistic framework belies the complexity of its roots, but its simplicity makes it possible to convey to the laymen how a collaborative social media might dramatically improve situational awareness, readiness, and productivity.

2. Knowledge Model Applied

Consider the case of a Marine Corps Communications Officer planning the regimen of training for the unit's communicators bound for a combat deployment. Anxious to prepare the command's communicators beyond the fundamental Individual Training Standards (ITS) and the unit's mission specific Mission Essential Task Lists (METLS), the Communications Officer and the Communications Chief participate in a community of practice looking for ideas that might enhance the communicators' what-if scenario training. With the rapid pace of new communications equipment and capabilities being introduced, the communications planning staff concede that they simply 'don't know what they don't know' and as a result are in an 'oblivious' state. To think otherwise would be to imply that all they needed to know was outlined in Field Manuals (FMs), After Action Reports (AARs), or captured in the Marine Corps Center for Lessons Learned (MCCLL). Their current state of awareness is shown in Figure 7.



Figure 7. State 1 of Knowledge Model

A query to the community elicits a response about the ability to communicate target pictures over radios. This is relevant given that the unit's mission is to coordinate ordnance delivery on targets. Being able to provide a picture of the target to the commander authorizing the ordnance delivery would enhance the unit's ability to accomplish its mission. Categorically, the snippet received from the community of practice might only be considered data since it lacks context and meaning (Nissen, 2006). However, the communications planning staff is now aware that they don't know enough about something they now know about. They can choose to remain in this state, or they can allow their ambiguousness about the subject matter motivate more queries. Figure 8 notes their state of uncertainty.

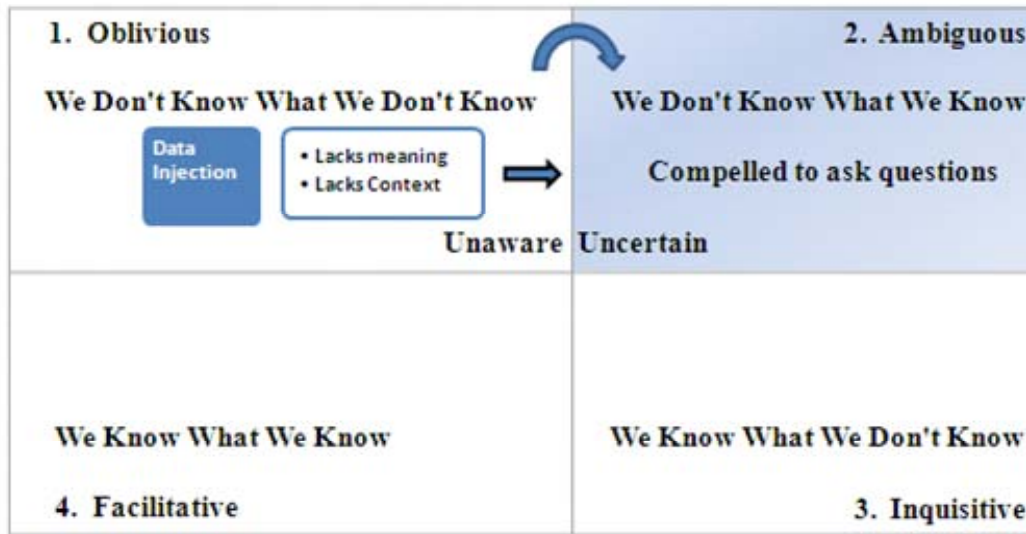


Figure 8. State 2 of Knowledge Model

The follow on queries are initially naïve demonstrating a lack of know how in this process, so the queries elicit more descriptive responses from multiple sources. One community of practice member provides a link to a video that demonstrates how it is physically done, while another community practice member provides a link to a document prepared by their organization that captures the settings required on the radio, while yet another provides a narrative account of how his unit managed to use the same technique on different types radios and provides the rationale for why that was necessary. Although the questions asked were naïve and random, it prompted the sources of knowledge to share what they knew about communicating pictures over the radio. As a result the Communications Officer and Communications Chief now 'know what they don't know'; this is depicted in Figure 9.

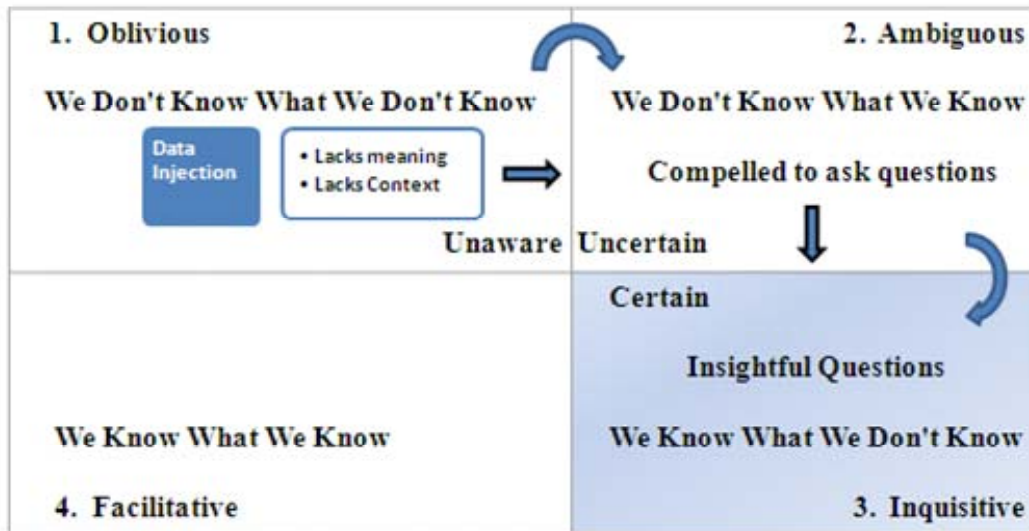


Figure 9. State 3 of Knowledge Model

Highly motivated and inquisitive with this new find, the staff submits further queries. However, these queries are precise, specific, and thought provoking aiding the facilitation of the knowledge sharing and/or transfer. Submitting to the notions proposed by Snowden (2005), this elicitation of insightful questions demonstrating purpose and certainty recreates the content of the knowledge sources' knowing and as a result facilitates their knowledge use and recall. This follows the thought that "we always know what we need to know when we need to know it" (Snowden, 2005). Figure 10 depicts the state of the communications staff undergoing this exploratory cycle of learning.

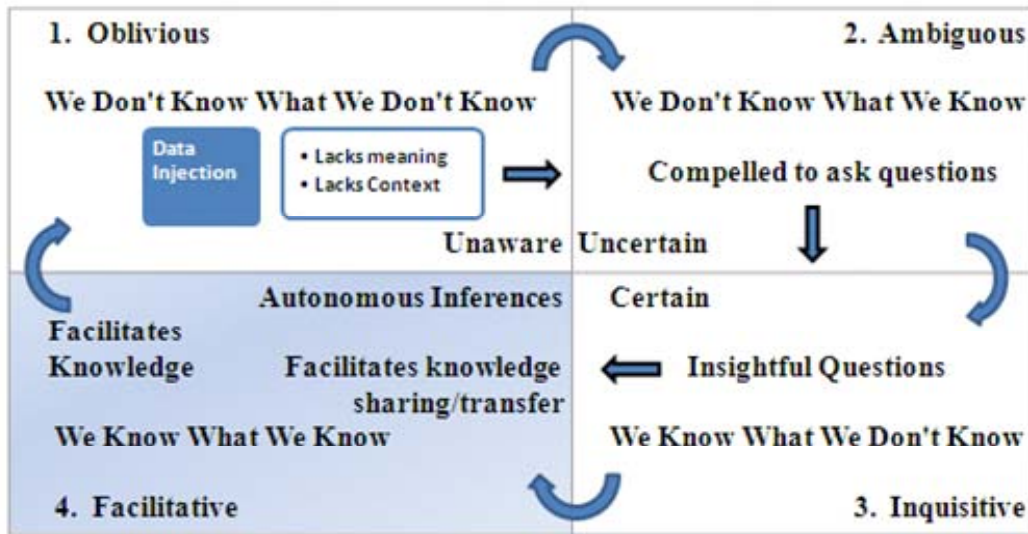


Figure 10. Complete Knowledge Model

Having satisfied the information requirements necessary to facilitate action, the communications staff plans, coordinates, and executes training based on the new found knowledge. Moreover, by marrying their own personal experiences to this knowledge and determining how it can be uniquely applied to the organization, the cycle of learning has second and third order effects that will impact tactics, techniques, and procedures (TTPs) within the organization. The knowledge is codified and made unique to their unit. This knowledge is then shared with the unit planning to replace them in the combat theatre one year later, thus beginning the cycle of learning and facilitating knowledge creation in a distant location all over again.

C. UNDERSTANDING KNOWLEDGE, LEARNING, AND KNOWING WITHIN THE MODEL

1. Knowledge

From a knowledge hierarchy perspective, data was received inspiring the ambiguous state. More data and explicit information provided enough context to transgress the staff to the inquisitive state. In this state the insightful, thought provoking questions prompted more inspired responses.

Snowden (2005), who founded the Cynefin Centre, suggests that "we always know more than what we can say, and we will always say more than what we can write down". This is why better questions inspire better responses. The responses received from these thought provoking questions facilitated action on the part of the staff. The knowledge framework represents the human factors in these exchanges.

2. Learning

Learning in this framework meets the Nissen (2006) interpretation since learning is knowledge in motion between two coordinates. It exemplifies the learning states that people find themselves in and the motives or mechanics by which they move from one learning state to the next. The same however cannot be said with the concept of knowing.

3. Knowing

The concept of knowing and its use in this pragmatic knowledge framework may be troubling to some so it is worth parsing out. Knowing, according to some knowledge practitioners refers to knowledge in action and as a result knowing doesn't occur until doing occurs - doing is a knowledge based action (Nissen, 2006). This interpretation presents a problem in this framework since the recipient of this knowledge, for instance the Communications Officer, will likely never do the act of programming a radio, acquire a satellite, take a picture, and transmit the picture over the radio as a potential target - neither in training nor in combat. For that matter, under this interpretation, it is very unlikely that the Communications Chief will ever 'know' either. However, the Communications Officer did do something with what was learned and although the officer does not actually execute the process, what was learned through the interaction is used to effect changes in a manner commensurate to the level of responsibility. Knowing in this respect is very personal and as a result the knowing varies with each individual. Similar to the notion that information/knowledge requirements vary by individual according to their hierarchical responsibilities (Hayes-Roth, 2006) so too does what an individual may do with any given piece of data, information, or knowledge.

In the example provided, the Communications Officer could have decided to not to seek any more information past the inquisitive state. After all, enough had been learned in order to: block out a segment of time in the training schedule for the training event; request the dedicated satellite service required; and discuss with the Operations Officer the potential change in tactics, techniques, and procedures facilitated with this new found capability. In this case the Communications Chief would have continued to carry the torch, but like the officer the chief might have decided not to continue developing his knowledge on the matter once the explicit procedures were received and handed off to the Radio Chief to perform the training. Note however, that action benefitting the unit in both cases came as a result of what the staff members had learned, and although they did not 'know' how to program a radio to perform the subject action, they knew enough to effect a tremendous impact.

Knowing in the sense of doing doesn't occur with everyone and if the knowing-doing relation were to be maintained, then the importance of the Communications Officer and the Communications Chief beginning the initial query might be discounted; indirectly suggesting a lesser need for the collaborative social media site. Moreover, the organization's gains might be slighted by characterizing everything right up until the point that the unit's communicators execute the training as simply increasing the knowing-doing gap (Nissen, 2006). Like the proverbial ripple in the pond, the unit and its sister organizations were positively impacted, and the increases in productivity measured in the unit's ability to deliver bombs on target with much more efficiency, represented a gain for the individuals, the group of similar performing units, and the organization.

4. Knowledge Model Parting Words

The key element in the framework is the people and their interactions. The framework is built to be simple so the construct of the interactions and their benefits can be perceived while yet allowing enough flexibility in the knowledge terminology to remain relevant. Housel and Bell (2001) have noted that the study of knowledge

management is in its infancy; there are concepts yet unimagined, with this in mind the knowledge model was built to be practical, capturing the basic tenets that will remain true through pedagogical changes.

D. SOCIAL MEDIA MODEL

1. Analysis of Social Media Examples

The Eureka effort overcame the challenges present with many organizations limited to only sharing localized knowledge. Prior to the Eureka effort, technicians could only learn of new techniques from other technicians in their immediate physical circle (Gordon, 2010). This explains why in many organizations one group might clearly outperform another even though both are similarly equipped and manned.

Such a case is not inconceivable between two infantry battalions within the same regiment. The company commanders in one infantry battalion might outperform the company commanders in another infantry battalion during pre-deployment training; the delta in performance comes as a result of the combat experience inherent in the cadre of better performing commanders (Dixon, 2007). The territorial nature of commands can preclude the sharing of knowledge between commands, and therefore the command lacking combat veterans is not able to gain from the overall regimental knowledge in inventory (Dixon, 2007). Whether separated by geographical distances, as was the case for the Eureka technicians, or separation due to the culture of the organization, as is suggested in the example of the infantry battalions, similarly equipped and manned elements can exhibit drastically different performance levels as a result of knowledge gaps. The key to an organization increasing their competitive edge is to tap into its knowledge of inventory by creating ways of increasing access to its knowledge stores and ensuring its organization promotes and rewards knowledge sharing.

The community of practice created by Xerox through its Eureka project was built on the "more adaptive coalescence of purpose" instead of an "aggregation of function" (Snowden, 2005). A social network community based on identity instead of

individualism and assembled under a unified purpose experiences a much more powerful stimulus (Snowden, 2005), generating the kind of voluntary sharing that propels the success of the knowledge model presented.

Consider this analogous to a community created solely for company commanders; it is a community with an identity 'company commanders' and coalesced with a single purpose of grooming commanders (Dixon, 2007; Snowden 2005). The Army refers to their CompanyCommander.mil community as a community of practice with a single purpose. Moreover, the Army creates subsections of the different types of company commanders. For example, there are Signal Corps Company Commanders, Maintenance Company Commanders, and Infantry Company Commanders among many others. As observed by the examples of the Eureka technicians and the scientific community participating in NASA's Spacebook, a group that identifies by identity can overcome trust issues arising from the lack of strength in participant ties. The lack of close interpersonal relationships is not an issue when the community they belong to has a strong identity.

The Xerox Amber Web effort sprung from the successes experienced with Eureka took on a different approach. Although the social networking conditions were stimulated top down and the site's successes emerged from its bottom up growth in the same Eureka manner, Amber Web tended to be much more informal than Eureka. Adherence to a more informal structure followed the informality tenets prescribed by Cross et al. (2001). The informality of the site prompted frank and open discussion on a variety of subjects. This might be a problem if the intent was to communicate with a single purpose - as was the case with the Eureka technicians.

The drawback here is that the incredible growth Amber Web experienced might work against it in the long run. The site was originally created for its scientists to communicate; however eventually the business planners also joined. The site's growth from 500 to 30,000 could serve to dilute the original intent of the site: collaborate among the scientific community to avoid missed opportunities from its Palo Alto Research Center. The Army's BCKS organization warns of the dangers of informal social networks noting that these networks lack the close personal ties needed to effect knowledge transfers (U.S. Army, 2010); moreover, with a lack of an identity as Snowden (2005)

suggests is necessary, the social network might succumb to a general forum lacking the dialogue the organization had intended to promote. It is not about size if the content is lacking. Growth in a social network should follow the intended goal.

NASA's Spacebook has adhered to its intended goals. The site was established for its scientist community and it maintains that identity. The team mentality within NASA makes Spacebook an ideal collaboration space. Scientists have been able to grow ideas from each other. The process of adapting and personalizing resulting in the creation of multiple nuances of innovative ideas is an organization value added. Consider Spacebook to be NASA's own think tank producing results from its rich knowledge in inventory; its size is only 850 members since having been started in 2009, similar to the original 500 Xerox's Amber Web began with before it lost its scientific only flavor and grew to 30,000 members (Powers, 1999; White House, 2009).

Organizations that can evolve faster are more adaptive to their environments (Hayes-Roth, 2006); the flow of ideas connecting the multitude of organizational synapses that would have otherwise been limited to local knowledge in inventory produces an organization that evolves faster than its competitors. Organizations can exact competitive advantages by setting the conditions for their collaborative sites, allowing it to grow in grass roots fashion, nurturing the organizational values it holds dear, and identifying undesirable phenomena that can be influenced to self correct.

The commercial site ProfessionalSoldiers.com is a Special Forces only collaboration site that is quick to self correct. Likewise, communities with identities like those observed on CompanyCommander.mil quickly self correct as well. The professionalism on these sites trumps the varied commentary observed on informal sites with no singly focused purpose.

Consider the case of the e-mail mentorship. Although the notion of mentoring disparate locations and linking people to effect professional growth was admirable, many of the tenets for facilitating knowledge flows were missing. Access to the knowledge in inventory was limited to only one mentor vice a community of midwives spanning a spectrum of experience. Moreover, the conditions and the relationships were established

top down. The strength of ties was weak and as a result so was the trust between the mentor and mentees. Lastly, motivation to be an active participant in the mentor-mentee relation was lacking. This explains why participants were unwilling to want to continue the mentor-mentee activities in their personal time.

Both virtual scenarios situations could have been greatly enhanced, if both had access to a greater pool of collaborators with whom they could learn from, contribute, or train with. The technology in both these cases limited their ability for further exploitation. The midwife case was more wrought with technological challenges than the tactical language system because it was not as well funded. However, the point persists; a social media collaboration looking to facilitate knowledge flows must take into account its information technology structure and note its limitations in order to qualitatively assess the return on knowledge from such an endeavor.

The Toshiba and Battle Command Knowledge System are examples of how a collaborative site can bring all manner of collaborative technology to facilitate knowledge flows. However, this does not imply that throwing social media technology in a mixing bowl and making it accessible produces desired results. On the other hand, the knowledge strategy should be chosen surgically in order to meet the organization's desired goals.

Although the Toshiba example demonstrates a hodgepodge of technology, it does not make the case of how it was going to surgically use that technology to facilitate explicit or tacit knowledge flows. Moreover, even though the Army has leveraged all manner of technological advances in social media and made it available to its members, it has surgically adapted those technologies to ensure the knowledge flows facilitated meet the specific goals sought. With respect to virtual communities, Figure 11 depicts how the Army's Battle Command Knowledge System has matched goals sought with the collaborative social media means to accomplish said goals.

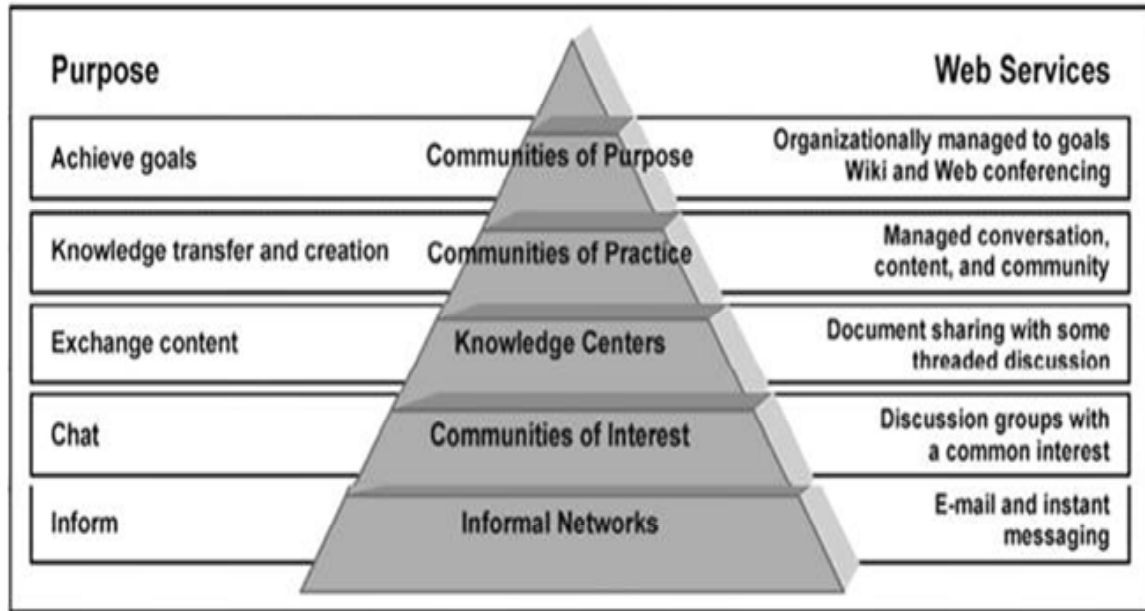


Figure 11. Marriage of Collaborative Social Media and Organizational Goals (From BCKS)

From the many cases of social media observed in Chapter III, the tenets of human social interactions and knowledge flows in the literature review, and the analysis of the social media vignettes, the social media model in Figure 12 is presented. The model provides considerations that should be taken into account when evaluating a social media endeavor intended to facilitate knowledge flows.

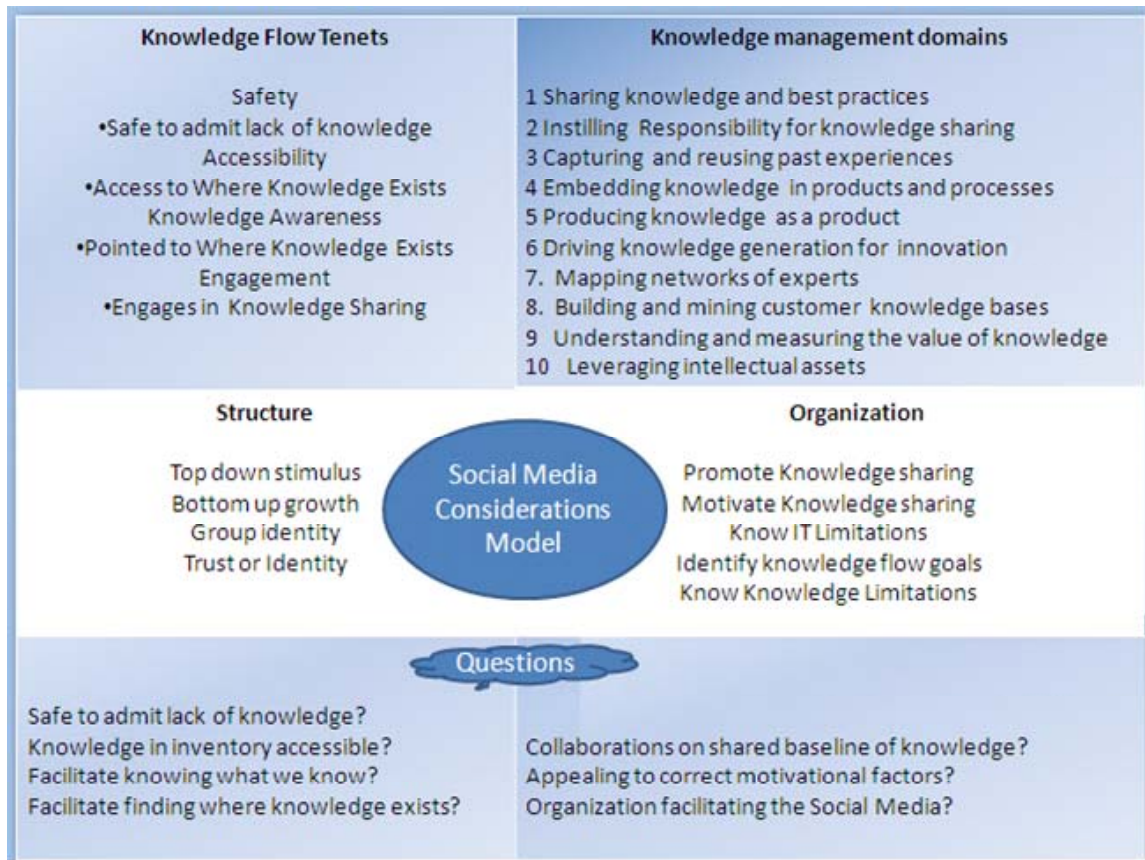


Figure 12. Social Media Consideration Model

E. AIR NAVAL GUNFIRE LIAISON COMPANY CASE STUDY

The case study presented is of a Marine Corps Combat Unit that has prepared for and executed a combat deployment. As a result of the classified nature of combat operations and the sensitivity of many of the details described herein, the names, locations, operations, and timelines involved with the case study have all been replaced with alternates. Any mention of actual locations has been first observed in an unclassified approved for public release document; references are provided in those cases. Billeted positions are favored throughout the presentation of the case study. The case study is of a Marine Corps Unit: Air Naval Gunfire Liaison Company (ANGLICO).

1. Methodology

Adhering to the case study tenets presented by Yin (1994) in *Case Study Research Design and Methods*, this is a Type 1 case study. The unique and extreme nature of this case study qualifies under the Type 1 parameters of a single case, single unit of analysis. The military unit in the case study is an extremely intensive knowledge driven unit. Among Marine Corps units it is highly unique bearing subject matter experts at every level of the unit's hierarchy (Grice, 2009). The case study spans three timeframes: the pre-deployment phase, relief in place operations, and sustained combat operations in the combat theatre. Although ANGLICO is unique in capability, structure, and mission, the knowledge challenges presented bear resemblance to knowledge challenges in other military, civil, and public organizations.

Adhering to the Yin (1994) case study tenets, the case study analysis is provided from both direct observation and participant-observer. The investigator was primarily assigned as the Communications Officer within the unit. ANGLICO is a communications intensive unit with an imbedded communications element equipped with a comprehensive suite of communications equipment and personnel at every level of the organization's hierarchy. The intense nature of communications in terms of personnel and equipment provided the Communications Officer access to every level of the organization. Moreover, the demanding communications training requirements of an ANGLICO provided the investigator with keen insight on pre-deployment training at every level of the organization. Additional billets held by the investigator providing unique insight from several different perspectives including Commander of the Headquarters element during all three phases of the case study. This provided further insight to the non-communications related training requirements. Moreover, the investigator also held the billet of Information Management Officer through all three phases of the case study. This latter billet facilitated the investigator's understanding of knowledge flow challenges from an information management perspective. Lastly, while in the combat theatre the investigator was able to fly by helicopter or other means to visit and discuss relevant matters with many of the teams dispersed throughout the 1600 square mile area of operations.

2. Background

ANGLICO has a long proud history of service to the country but often little is known about it so a bit of background is necessary to understand the complexity and knowledge intensiveness of its operations. ANGLICO has been in existence for over 50 years. Its mission is "to provide Marine Air Ground Task Force commanders a liaison capability... to plan, coordinate, employ, and conduct terminal control of fires in support of joint, allied, and coalition forces" (Grice, 2009). ANGLICO provides the Marine Air Ground Task Force Commander (MAGTF) a trusted agent that can provide non-Marine units with planning and expertise to leverage Marine and Navy combat power in the form of close air support (CAS), naval gunfire (NGF), artillery, and mortars. Each of these specific aforementioned areas of expertise requires a tremendous amount of knowledge. Subject matter experts in each of these categories reside at every level of the organization depicted in Figure 13.

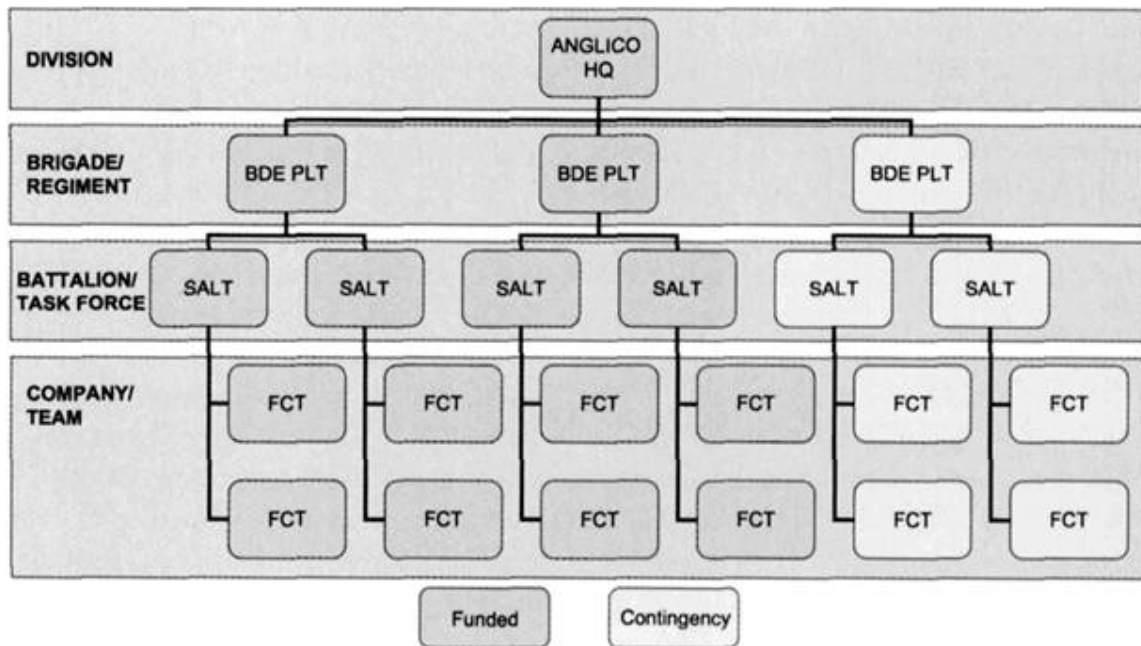


Figure 13. ANGLICO Organizational Structure (From Koch)

Commanders have leveraged ANGLICO's capabilities to nonorganic units including: the Republic of Korea marine corps and army; the Army of the Republic of

Vietnam; Australian army; British Royal Marines; Polish army, Special Operations Forces; coalition forces from Bahrain, United Arab Emirates, Qatar, Oman, Saudi Arabia, and Kuwait; U.S. Army; military transition teams (MiTTs), and Iraqi Security Forces (ISF) among others (Grice, 2009). ANGLICO has served in operations spanning from: the pacific amphibious landings of World War II; landings at the Battle of Inchon, Korea 1950; Lebanon; Dominican Republic; Grenada; humanitarian missions spanning the globe; Desert Shield and Desert Storm; to Operation Iraqi Freedom; and Operation Enduring Freedom among others (Ahern, Cunniffe, & McCarthy, 2005; Grice, 2009; Koch, 2007). As evidenced by the aforementioned lineage, ANGLICO serves the joint community and as a result of serving multiple types of forces the knowledge flow demands are great.

Each element of the ANGLICO team depicted in Figure 13 augments a supported element in order to provide it with the planning expertise to employ the full spectrum of fire support available to the Navy-Marine Corps team. ANGLICO is equivalent to a standard Marine Corps battalion level command, but it is readily equipped to provide support from a division level unit to a line company as depicted by the chart. The level of expertise required to provide this level of support resides in: the Headquarters; the Brigade platoon (Bde); the Supporting Arms Liaison Team (SALT); and the Fire Power Control Team (FCT).

Each team has doctrinal support missions; however, the nature of joint and coalition forces support has meant that ANGLICO has had to maintain a level of flexibility unique to even Marine Corps units. No two combat deployments in the last five years have been the same. The level of fluidity with respect to the terrain being covered, to the units being supported, to the manner in which the support is provided is uniquely challenging. The unit is comprised of: naval aviators capable of performing close air support and surface to surface integration; artillery men and scout observers; communicators; naval officers qualified in naval surface fires; interpreters; and the full complement of supply, logistical, motor vehicle support personnel one might find in a Marine Corps battalion. All of this capability is wrapped into a unit comprising of approximately 200 Marines and sailors (Grice, 2009; Koch, 2007).

ANGLICO is a very top heavy organization relative to its Marine Corps brethren. The Marine Corps averages the lowest enlisted-officer ratio of all the services at 8.33 enlisted per officer (Marine Corps Community Services, 2007); however, ANGLICO is officer heavy relative to the remainder of the Marine Corps at about 4.03 enlisted per one officer. Given the high level order tasking performed by each team in ANGLICO, there is at least one officer or one staff noncommissioned officer (SNCO) embedded at each level of the unit; e.g. a four man FCT has an officer in charge. As noted by Riley (1991), "The density of officer-led teams with a high number of NCOs provides an infrastructure much like that of the Special Forces." This again is indicative of the demanding knowledge requirements.

Teams are expected to perform any number missions from being able to: conduct a helicopter-borne combat resupply; prepare a traditional fire plan; establish a fire support coordination center; establish a tactical air control party; perform the functions of offensive air, aerial reconnaissance, electronic warfare, control of aircraft and missiles, and assault support; or explain how the Marine Corps planning process works (Grice, 2009). Each and every team must inherently be able to execute any of the aforementioned tasks. More importantly each team at every level likely serves as an advisor to the supported unit commander providing expert advice on planning and employment of Navy and Marine Corps fires.

3. Current Flows of Knowledge

Marine units preparing for a combat deployment and anticipating relief in place operations with the unit they will be relieving in the combat theatre are data, information, and knowledge hungry. The primary means of communications with the unit in theatre and the unit set to replace them is the Situation Report (SITREP). Telephone and e-mail is of course available but telephone calls are generally not used for communications given the time differences, the desire not to interrupt the unit during combat operations, or simply not knowing the battle rhythm or when the counterpart will be available. Telephone calls are usually conducted by the highest levels of the command: generally the Operations Officer (OpsO), the Executive Officer (XO), or the Commanding Officer

(CO). E-mail is also another asynchronous means of communications that is problematic. The fire and wait aspect of the communiqués between the counterparts is generally not very conducive to pass on tacit knowledge of the area or other matters that require vetting and elaboration.

Moreover, the SITREP is a document fit for a hierarchal vertical organization. The SITREPS are daily reports generated by all the teams and vetted through their vertical chains of commands. At every level of the chain of command through the headquarters, the SITREP gets 'scrubbed' for details that would otherwise be considered minutiae. Even if the reports get to the headquarters in raw form, the final product produced at the Headquarters from the compilation of team reports is prepared commensurate to the levels of responsibility of senior officers; as Hayes-Roth (2006) declares, the information needs are not the same at all levels of the organization. In other words, team leaders at the FCT, SALT, Bde levels, and headquarters staff personnel largely receive snippets of interesting data and information that do not enable action on the receiving end.

Another means to potentially garner information from is the mid-deployment lessons learned prepared by the combat unit in theatre. This document is specifically prepared for the unit that is planning the execution of the relief in place. The document is prepared by each functional area and combat team in the combat theatre and the lessons learned are consolidated at the headquarters for further submission to the unit doing the relieving. This document is generally full of useful information but often lacks the context and elaboration required to enact action. The lack of a dialogue restricts how much could actually be ascertained from the lessons learned.

Lastly, another means of gathering information relative to the combat theatre the unit is preparing to deploy to is to use the Marine Corps Center for Lessons Learned (MCCLL). One prevalent issue with using MCCLL is presented by Capt Cuomo: "MCCLL doesn't normally produce information that's specific to an area of operation (AO) or that speaks directly to the lessons learned by a squad leader or platoon commander in a specific town-not ideal in a COIN (counter insurgency) fight where the nature of the insurgency from town to town, and even from block to block, is often very

different" (Cuomo, 2007). Moreover, although MCCLL is a great tool in the absence of anything else, it is only capturing explicit knowledge at best with no means of opening a dialogue to explore the context and relevance in order for the individual to be facilitated to take action with it.

4. Issues Exacerbated in the Absence of a Collaborative Medium

An unclassified MCCLL report released during the pre-deployment phase advised of possible fire hazards in overtaxing electrical wiring and infrastructure in buildings with existing combat operations centers. Naturally an e-mail was sent requesting to know if this was a problem in theatre. The response was 'it was not a problem', and to the credit of the unit in theatre there was not a problem with the electrical system. However, the lack of a genuine dialogue failed to produce further insightful questions that might have highlighted other serious deficiencies that weren't asked.

Applying the tenets of the knowledge and social model, the unit in the pre-deployment phase simply didn't know what they didn't know. However, if a knowledge sharing community existed between the two units, then the asking unit could have tapped into the knowledge in inventory within the deployed unit. Instead of an asynchronous e-mail transaction with a single individual, the ANGLICO community members could have posted and responded to the question 'are there any electrical issues we need to be aware of?' The result would have been a collective response that would have highlighted other deficiencies. It might have come to light that although the headquarters did not have any power issues, many of the teams did have issues that no one was aware of. A discussion of power might have led to the revelation that none of the teams nor the headquarters' combat operations center had uninterrupted power supplies (UPS) for back-up power. Back-up power is important to any organization; however, as Snowden (2002) suggested, people always know more than what they say. Their knowledge needs to be facilitated.

The takeaway in the above example is that in such a case, knowledge limited to one person is less desirable than knowledge from a collective. Emailing the entire combat unit in theatre would have been entirely inappropriate. However, if a community of practice site for all ANGLICOs existed, then one of the ANGLICO members might

have aired that an electrical issue existed at a particular site. That one question would have had second and third order effects. A discussion of power would have led to a discussion of backup power in static positions or perhaps a discussion of backup power in mobile situations. The end result is that the chain of events would have resulted in both units being better prepared for an uneventful loss of power; an event that is not too farfetched for a combat zone.

In a similar situation, a SITREP from the unit in the combat theatre included a team comment indicating it was necessary to buy LNA cables (low noise amplifier). That was it. It said nothing more. The order in the rear was then buy LNA cables in preparation for the deployment. However, no one knew why or what purpose they served. The commentary was not only devoid of the technical specifications that would be needed to proceed with a purchase, but it lacked any details for its purpose which might have facilitated the unit in the rear to determine specifications required based on its planned use. The SITREP was not the appropriate venue for such details. It took two weeks before running to ground the reason for why these cables were needed. Given the acquisitions processing time, two weeks was a considerable amount of time to wait before taking action. Moreover, as it turned out, the cables needed to be of a particular length and quality with specific connectors in order to remote the unmanned aerial vehicle (UAV) feeds. Based on the response from a single element, it was thought that 50 ft of cable was an adequate length. However it wasn't until a personal visit into theatre on a site survey coordination trip, that it was discovered that 50 feet of cable was not enough at all team sites. Some sites needed 100 feet due to the nature of their set up. These small and seemingly inconsequential issues had real effects on the ground. The liaison teams attempting to determine hostile intent and hostile action from the video feeds were making due with poor signal quality on ad hoc cables.

Here is another case where knowledge did not rest in any single person. The collective needed to fill the gaps because there were knowledge gaps in theatre about who had problems. Without knowing that other teams in theatre were viewing their feeds static free, it became simply a matter of working with what you had and not griping about it. Due to the unit dispersion, it was not uncommon for teams to not see each other for six

months; even in theatre, a community of practice that could have tapped into its rich and varied sources of knowledge was critical even if it was just designed for sharing knowledge internally to the unit in theatre.

Placement of combat gear on the body was another issue toiled over during the pre-deployment phase. The unit lacked ANGLICO combat veterans who could indicate how the many pieces of ANGLICO equipment a Marine carried were best positioned.

Although the placement of gear appears as if it requires no more than an explicit description, easily addressed with a diagram noting prescribed position of the combat equipment, the placement of combat equipment on the body is a tacit knowledge decision. Optimal equipment positioning is learned from its wear in multiple combat situations determining how it is best positioned for maximum efficiency. Provided a collaborative site existed between the unit in combat and the unit in the rear, a simple query on the matter might produce: the combat unit's standard operating procedures (SOP); multiple pictures detailing how team leaders, radio operators, and scout observers wore their gear; and or video taken by a team operator(s) describing why the gear was worn in a particular way. The asynchronous means of communication, e-mail, yielded a copy of the combat SOP; however, that came devoid of any content, relevance, or rationale for why. The why is the type of knowledge that would have facilitated the unit in the rear to begin making its own inferences on the matter. Knowing the why from many different combat perspectives would have facilitated the creation of tacit knowledge much more rapidly during the rear unit's pre-deployment training. The combat SOP only provided the explicit results of their tacit thought as it was at the time of its publishing. The best responses on the matter would have been from the team members themselves who had tested the combat SOP and discovered what gear placement might have been best under certain conditions.

The ANGLICO Training and Readiness (T&R) manual drives the training schedule. The T&R establishes the training requirements. Subject matter experts (SMEs) develop mission essential task lists (METLs) derived from the Marine Corps task list (MCTL) (CMC, 2007). However, the T&R indicates that it only establishes the minimum standards for training (CMC, 2007). A community of practice that tied all

three active duty ANGLICOs together would serve as a rich repository of knowledge experience, from which innovate training ideas and other emergent phenomena could be nurtured. Such discussions occur on the Army's BCKS site. It is best to be prepared when you get into theatre then to determine that you need to learn something on fly.

A major concern of team leaders turning over responsibility to the incoming unit was about conveying the lay of the land. This meant more than just going over points on a map, but getting to understand the type of relationships that the outgoing team had established during their tenure. One team leader conveyed that the supported foreign nationals despised the military turnovers because the foreign nationals felt they were starting from scratch. A Marine Corps Gazette article describes a similar experience (Russell, 2009). One team leader described that after working so hard at establishing a secure relation it was a shame he was not able to convey all that he knew to the team replacing him in the few short days they had together to turn over. This disruption in relations could be mitigated by early engagement of the team leaders in the rear and the team leaders in the combat theatre. Pictures, videos, and narratives could be provided as early as possible. This builds the situational awareness and mentally prepares the incoming teams of their area of responsibilities even before they assume it or step foot into the area. Another team described that if it took writing a diary, then that is what would be done. Team leaders placed a tremendous amount of pride in the work they had accomplished over their tenure and wanted the successes experienced to be carried forward.

The loss of tacit knowledge is not unique to any one unit or combat area of operations. Another article in the Marine Corps Gazette titled Intelligence Information Management described the following case:

During a recent deployment to OIF as a battalion S-2, I discovered that one of our local tribal leaders was in fact a nationally influential businessman. I pulled everything possible on this individual from the TFC databases, spoke to the regimental combat team (RCT) S-2 to try to gather additional details and searched every theater-level database I could find. I spoke to radio battalion to seek any information they had on the individual. After several hours of researching, I wrote an assessment of how this individuals connections might impact our A O. The next day an

officer who had been out of theater for approximately a year contacted me via e-mail. He had extensive knowledge of my person of interest. He knew about connections that no one in the current intelligence chain was aware of. The amount of information he provided dramatically improved my and my commanders' knowledge of this key personality and his impact on our AO. I was staggered by the amount of quality knowledge that had been lost in the year since he departed theater. And while it was satisfying to feel like I'd "unlocked the code" regarding this person of interest, I also realized that the discovery of this knowledge was based on chance and one individual's being "on the ball." But it was none too surprising that this type of knowledge had just "disappeared," despite the fact that the officer with the knowledge confirmed he had turned it over to his relief. The failure isn't based on individuals; it's systemic. (Kralovec, 2009)

The aforementioned comment makes the case for a community of purpose. The Army terminology for a community of purpose is a community that is put together with a single purpose with a set duration. Communities of purpose between people turning over are a potential notion worth exploring.

In a combat zone, being able to adapt to the changing conditions faster than the enemy provides an advantage. On the other hand, consider an insurgent enemy with an ability to communicate successful new methods to overcome the latest improved explosive device (IED) defeat tactic. Communicating the technique to other insurgent regions faster than a trend can be determined provides the enemy a considerable advantage.

A team leader in location Yankee conjured a new manner of exploiting the technology they had recently been issued. While other teams fumbled with how to use the technology, the team leader at Yankee was tech savvy and immediately embraced the technology. Determined to find a more efficient means of identifying hostiles, the team leader leveraged historical intelligence data, aerial feeds, with radio and message traffic of the ground being covered to better advise the supported commander. This technique however ingenious was only being practiced by the team leader at Yankee. With no readily available means to convey the technique to all the other teams spread throughout

the area of operations, the successes as a result of the new technology was limited to only Yankee.

In the combat theatre, with elements spread out, it is critical to have a means of sharing knowledge in a manner that flattens the organization's flow of knowledge. Eventually the technique was picked up by the headquarters and was slowly disseminated to other teams; however, a faster assimilation process is preferred.

Many within the ANGLICO community will note that ANGLICO is about the big “L.” The big L refers to the critical liaison mission performed as the MAGTF Commander's representative. Bringing the intent of the MAGTF Commander and having the means to leverage a tremendous fires capability on behalf of the supported unit can be quickly turned on its head if the relationship between the supported unit and the liaison element sours. Challenging liaison-supported element relationships are not the norm but they do occur. Generally it is a matter of the supported unit not understanding what an ANGLICO can bring to bear for the unit. Generally, a good team leader can sell the team's capability set and seamlessly integrate into the supported unit's planning process. In this manner, the team can serve their role as advisors on how to best leverage the combined fires available.

However, the skills required to perform the aforementioned are not part of any formal training program. These skills are tacit skills. Generally, the best team leaders are the ones that have performed the liaison mission before. They recognize the tenuousness of the supported unit and are prepared to relieve tensions before the friction points become a problem. Mentorship in such situations is essential. In preparation for a subsequent combat deployment, the veteran combat team leaders were often providing stories of the challenges they faced and how they were overcome. The confidence inspired in this group of new joint terminal air controllers (JTACs) was palpable relative to the lack of confidence in preparation for the initial deployment. Knowledge flow challenges in the initial pre-deployment phase were primarily due to a knowledge gap that existed within the ANGLICO community. There were the very experienced and the very inexperienced. Such conditions could be alleviated through capturing the story telling. Other organizations including the Army have turned to storytelling and

folksonomies to convey tacit knowledge that would have been otherwise very difficult to convey explicitly in other forms (U.S. Army, 2010).

Another aspect of the above observation is that of the liaison element of the mission. On several occasions the investigator conducted initial staff-staff coordination with the senior elements of the supported units in anticipation of the joint endeavor. The trepidation observed at the senior elements of the supported unit was generally due to not knowing what: (1) an ANGLICO could do for them; (2) why they needed an ANGLICO to begin with; and (3) the tension that arises when limited resources must be shared with another augmenting element. These concerns were generally laid to rest with the senior staff once the above concerns were addressed. ANGLICO brought a tremendous knowledge base that could be used to wield a tremendous combined arms effect. Without an ANGLICO, coordinating the use of Navy-Marine corps fire power assets was difficult. Lastly, ANGLICO was almost an entirely self contained unit that not only brought fire support coordination knowledge to the fight, but was handsomely equipped with an array of mobile and man-packed communications equipment generally providing an advanced capability set to the supported unit.

Although the concerns at the senior levels were laid to rest, the trepidation continued to exist with the subordinate elements ANGLICO was planned to augment. It was observed that these concerns generally persisted until the teams were able to formally present themselves and their capabilities. Although this sounds like the normal course of things, the liaison process could be entirely improved through a community of purpose. A community of purpose would provide a purpose driven social media collaborative space with the sole intent of linking the ANGLICO unit and the joint forces to be supported in a collaborative space inherent with explicit and tacit forms of knowledge sharing. The collaborative space could have data repositories that have videos of ANGLICO in action and documents describing its structure and inherent capability set at each level of the ANGLICO organization. Moreover, the aforementioned can also be matched with a forum capability that facilitates the varying states of the knowledge model. The end result is a supported unit relationship that builds strong roots before even entering combat training and combat operations.

Through the course of the research, the investigator has become aware that such a capability existed within the Army at the time of conducting coordination for a liaison mission performed with one of the Army's premiere fighting forces. The Army has an inherent capability within the Battle Command Knowledge System to create communities of purpose (U.S. Army, 2010). Moreover, it has the ability for joint forces with a common access card (CAC) to join their community. A collaborative endeavor could have been established between the two units, facilitating a dialogue between the many elements of the supported unit and the ANGLICO team leaders. This might have served to facilitate the planning by Army supported unit planners at every level. Without any prior contact, many of the Army subordinate elements first learn how to integrate ANGLICO into their planning cycle only after the teams show up on their door steps. Although the deployment with the Army unit went extremely well, no doubt in great part to the professionalism of the team leaders at every level, the potential collaboration possibilities on a collaborative site with all the aforementioned capabilities represents a missed opportunity. These missed opportunities are not uncommon. It is a representation of the first state of the knowledge model; we simply do not know what we do not know.

5. Case Study Parting Words

There are undoubtedly network challenges in a combat environment. Moreover, not all combat environments are equally mature facilitating the sort of discourse suggested to the lowest levels of the organization. Nonetheless, the case study is meant to illustrate a cross section of the knowledge challenges many organizations will or have experienced in the three phases discussed herein. Moreover, analogous knowledge gaps exist in the private and public sector. These challenges are not going away. They are persistent problems that serve as sources of inefficiency. On the other hand, there is no doubt that technology is continuing to evolve and that the shortfalls in network access and bandwidth limitations will be addressed in the short run. The knowledge flow problems are long term problems that need to be recognized, and adaptive approaches need to be developed in tandem to current technologies and in the advance of future

technologies. Facilitating knowledge from where it exists to where it does not places the primacy on the most enduring asset, people.

THIS PAGE INTENTIONALLY LEFT BLANK

V. CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY OF RESEARCH

The research set out to ascertain if knowledge flows were facilitated by social media, and if the application of social media could address the knowledge flow challenges presented in the case study. The end state was to make a determination about the ability for social media to facilitate knowledge flows resulting in realized gains to readiness, productivity, and situational awareness. In order to accomplish the aforementioned objective, a solid understanding in the foundation of both knowledge flows and social networking dynamics was necessary. The Chapter II literature review was dedicated to the discovery of knowledge flows and social network dynamics. Having established a foundation for conducting an examination of social media facilitated knowledge flows, a cross section of social media vignettes were presented in Chapter III. The examples described provided keen insight as to how private, public, and military organizations have leveraged Semantic Web, Web 1.0, Web 2.0, and social semantic Web 3.0 technologies to effect knowledge transfers and knowledge sharing. Having gleaned the fundamentals of knowledge flows and social networks from both an academic and practical perspective, both a knowledge flow and social media model were developed in Chapter IV. These models were developed with the intent of providing a framework by which the case study could be qualitatively examined. The combination of the two developed models is presented herein as the Social Media Knowledge Flow Facilitation Framework. The framework captures the marriage of the knowledge flow and social networking tenets derived from the literature review and the lessons learned from the social media vignettes in Chapter III. It serves as a framework for any organization seeking to effect knowledge sharing and knowledge transfers through the use of social media. The pragmatic nature of the framework belies the complexity of its roots; the underlying tenets of the framework are detailed in the development of the models.

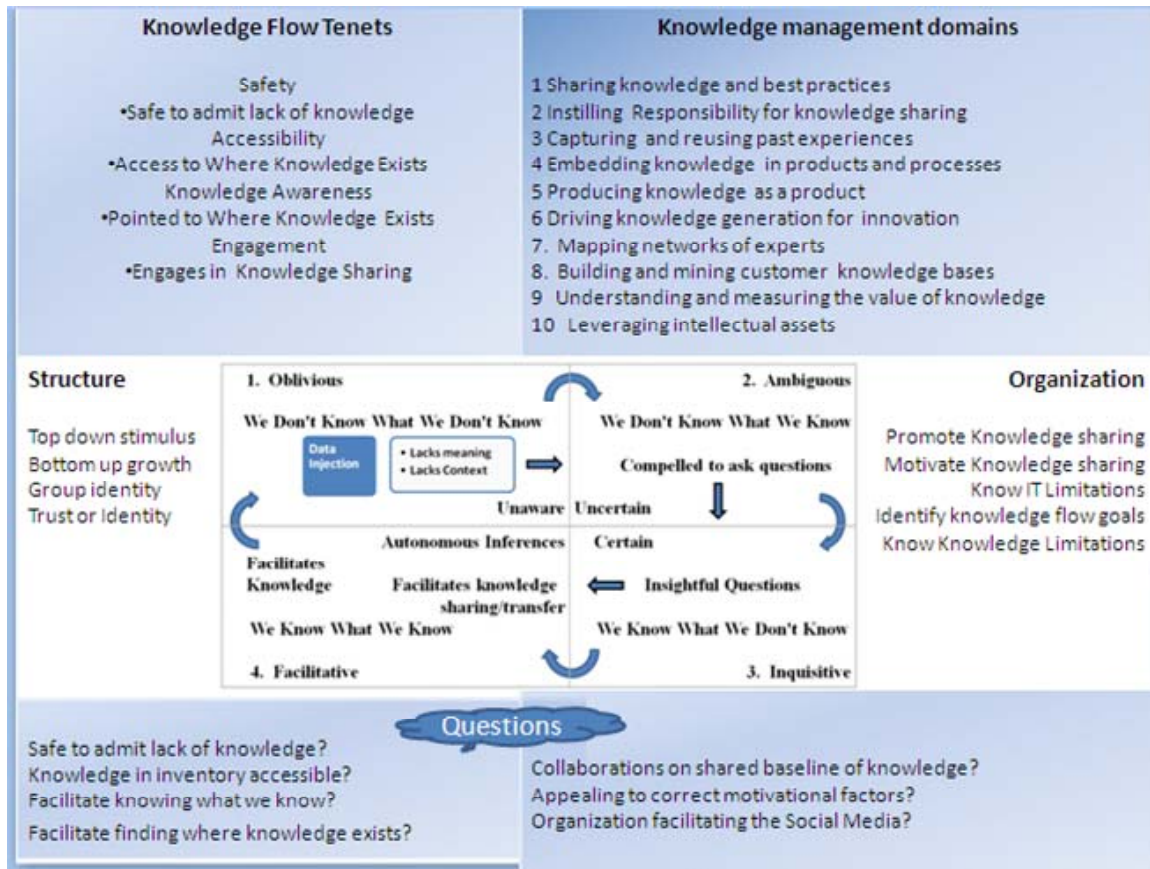


Figure 14. Social Media Knowledge Flow Facilitation Framework

The Chapter IV case study presented was of a knowledge intensive military organization. Albeit the knowledge flow challenges presented in the case study were military oriented, the challenges were representative of knowledge flow challenges inherent in private and public organizations. The competitive advantages sought from facilitating knowledge from where it exists to where it is needed is a persistent theme crossing organizational constructs and culture. This chapter draws conclusions from the development of the models, the analysis of the vignettes, and the decomposition of the case study. These conclusions serve to answer the questions that served as the impetus of the research.

B. CONCLUSIONS

1. Research Question Findings

Can social networking technologies be leveraged to gain operational advantages and training efficiencies within and between Marine Corps units conducting pre-deployment training and executing relief in place operations?

The examination of the case study provided a plethora of examples of how social media could address the knowledge clumping experienced by units conducting pre-deployment training, reliefs in place, and sustained combat operations. The research has demonstrated that the beneficial results ascribed from leveraging any number of social media technologies to the aforementioned activities can be impactful, bearing the potential to generate realized momentum.

For instance, returning to the example presented by the case study of a unit that performs an arduous liaison mission with myriad coalition and joint forces. Social media could be leveraged to transfer: explicit knowledge in the form of documents; tacit knowledge in the form of narratives; and tacit and explicit user generated content in a forum type environment. ANGLICO, the case study unit, bears an enduring challenge in selling the reason why they are needed by the coalition or joint force they have been tasked to provide fire support coordination support. As the MAGTF Commander's representative, they link the augmented non-Marine unit to the Marine contingency bearing the ability to levy a devastating array of combined fires. Moreover, ANGLICO also provides the augmented unit the ability to levy the aerial reconnaissance assets afforded to the MAGTF Commander. As is said in the business, 'ANGLICO is a good piece of gear'. Nonetheless, in the absence of strong interpersonal relationships the Marine Corps ANGLICO unit often finds itself building and nurturing these liaison relationships on the fly. Although the astute team leaders of the organization have made it work with an impressive array of units worldwide, the leveraging of social media prior to the combat deployment presents a unique opportunity to demystify and fortify the liaison relationship prior to leaving the garrison site. Moreover, the knowledge gained by both entities facilitates the complex integration of each into the other's operational

planning cycle. Arguably, the speed with which a unit can “hit the ground running” presents a sizeable advantage relative to one that experiences the operational lull often associated with the conduct of a RIP. This application of social media is not relevant to only military units looking to establish relationships before serving in the combat zone; this approach is also applicable to private organizations looking to develop interpersonal relationships between their geographically dispersed divisions. How such measures might be leveraged is further discussed in the recommendation section

What knowledge flow requirements exist within and between units conducting training and executing relief in place operations/?

From the knowledge flow literature review and from the cross section of challenges presented, it is apparent that both explicit and tacit knowledge requirements exist during the varying stages of the training-deployment cycle. The knowledge flow intensiveness of the organization presented in the case study typifies the knowledge flow requirements of many other military units. Moreover, these knowledge flow requirements are analogous to many in the private and public sector.

For example, following this year's Cyber Shock Wave exercise, top leaders in the cyber defense community noted that a collaborative space bridging the private and federal cyber defense warriors was necessary for sharing both explicit and tacit knowledge; the absence of such a collaborative site has weakened the nation's cyber defense posture (Starks, 2010). These same knowledge sharing and knowledge transfer requirements are required within and between units conducting training and executing turnovers in the combat theatre.

Tactics, techniques, and procedures (TTPs) change from deployment to deployment and deriving those changes can come from a codified document. However, the manner in which those TTPs are employed and carried out is a tacit decision. For example, the Army has created an experiential learning social media space where units preparing to deploy can view and listen to narratives provided from units in the field. The research has established that narratives are one means of transferring tacit knowledge. The verbal and nonverbal cues provided in visual narratives provide more

context and meaning then any set of codified TTPs or rules of engagement (ROEs). The leader of an Army observation post (OP) can describe with painstaking detail the myriad of considerations undertaken in the seconds he assessed what to do as a vehicle proceeded at high speeds towards the checkpoint. Armed with the explicit TTPs for such a case, the explicit response was to engage at a specified distance; however the decision was weighed against a number of other considerations which relied on tacit knowledge - the knowledge that existed in the mind of the service member.

The case study pointed out how ANGLICO is replete with tacit knowledge requirements specifically when it comes to the performance of the liaison mission. The skill sets required to sell your capabilities and the interpersonal skills required to win the hearts and minds of the supported unit are not explicitly described in the ANGLICO training and readiness manual. Having "knowledge of the structure of all elements of a MEU sized MAGTF organization" in and of itself does not sell a mission (CMC, 2007). Therefore the transfer of these tacit skills internally within the unit from the combat veterans to the rookie team leaders greatly enhances the unit's liaison mission effectiveness. Moreover, the example was provided of two battalions within the same regiment bearing starkly different performance due to the lack of combat veterans in one relative to the other. Providing a means to facilitate the transfer of explicit and tacit knowledge among units within the same geographical space or separated across continents adds value to any organization.

What are the knowledge flow challenges within and between Marine corps units conducting pre-deployment training and executing relief in place operations?

Nissen (2006) indicated that knowledge is characterized by its inertia. Knowledge clumps and, according to von Hippel (1994), it is sticky and thereby difficult to move about. Snowden (2005) indicated that people always know more than what they can say and their knowledge must be facilitated, implying that knowledge is a human interactive phenomena. The research has maintained that a great many attempts have been made at instantiating knowledge in IT systems (Housel & Bell, 2001), and many have failed because according to Nissen (2006) tacit knowledge flows are generally only possible to instantiate through simulation and expert systems. Moreover instead of

instantiating knowledge in IT systems, the former World Bank Knowledge Management Program Director, Denning (2007), champions the narrative as a means of facilitating tacit knowledge flows; he is supported by the director of IBM's Cynefin Center in that respect (Snowden, 2005). All the aforementioned sums up to the following: tacit knowledge transfers do not occur on their own.

As a result, the organization must facilitate these flows if they are to achieve the competitive advantages that Stewart (1999) espouses are required to survive in the new age economy. With respect to the military, as presented in the research, it is not about achieving competitive advantage to improve the bottom line; it is about adapting faster than the enemy can. It is about adhering to the tenets of Hayes-Roth (2006) in that the organism that evolves faster, learns faster, and incorporates the surviving successful traits into its new being faster, then maintains into a unique advantage. The military organization maintains an unmatched degree of flexibility capable of flexing to the new emerging phenomena because it has refused to allow its knowledge in inventory to remain inert, clumpy, sticky or static in the minds of people. This applies whether it is on the battlefield flexing to the varying mental states of a three block war, or whether it is NASA conducting brainstorming sessions among a collaborative group of 500 scientists. In order for these flows to occur, the primacy of two tenets maintain: the people and the organization.

Of all the services, the Marine Corps is best poised to exploit the sharing culture of its youthful members. 66% of the organization is under the age of 25, the youngest of all services; 24% are not even of legal age to drink and 13% are teenagers (Marine Corps Community Services, 2007). Social media usage scatter plots from a perceptions study among Naval Officers affirms that the younger the service member the more prolific the use of electronic social networks (Bennington & King, 2010). From an individualistic perspective, the corps that comprises the Marine Corps has tremendous potential to exploit knowledge sharing through the use of social media.

The Marine Corps as an organization is unmatched at performing its niche of combat duties; however it is far behind its sister services when it comes to knowledge management (Johnson, 2010). Moreover, as observed in the Social Media Knowledge

Flow Facilitation Framework, the organization must promote knowledge sharing and motivate the composition of its organization to want to share that knowledge. Lastly, as indicated in the framework, it must identify its knowledge flow goals. In the absence of the aforementioned three organizational responsibilities, knowledge flows between and within Marine Corps units remains a local phenomenon attributed to astute personnel recognizing the need to learn from one another.

For example, in the absence of any formal collaboration medium, the team leaders in the case study established a 411 frequency on their own accord in which they could air out their 'naïve' questions. This medium although crude and rudimentary adhered to the four knowledge flow tenets of the framework. It was a safe environment among team leaders, free of the ridicule, sarcasm, and higher up criticism that might accompany the naïve questions on a formal net. Moreover, it was accessible to every team leader with a radio. Furthermore, the team leaders were aware of where the knowledge was, who had it, and who was willing to share it. Therefore a team leader might call upon a particular joint terminal air controller (JTAC) known for the ability to elegantly and efficiently develop a grid-reference-grid (GRG), while yet another query from the same source might go out to a second call sign known for maintaining an uncanny understanding of a particular coalition force culture. Because this was a 411 established by the JTAC community, the grass roots motivation observed in many of the commercial social media phenomena in Chapter III was also present here. All four knowledge flow tenets persisted in this situation; however, this was local emergence and not an organizational wide phenomena supported by infrastructure and strategy that strategically targeted the anthropological needs of its members in a way that both motivated them to share and supported them to share knowledge.

How can social networking technologies be adapted to facilitate knowledge flows within and between Marine Corps Units?

The Social Media Knowledge Facilitation Framework was created with the purpose of addressing how social media could be leveraged in any organization. The knowledge management domains drawn from a collaborative study prompted by a Xerox initiative provide an initial set of considerations for a social media undertaking (Powers,

1999). The very successful Eureka project associated with this study was only active in six of the ten domains (Powers, 1999), demonstrating that not all domains are required for success. For example, fans of quantitative study might measure the value of knowledge before pursuing a social media initiative, while others may intuitively apply the knowledge model in the framework and determine qualitatively that the facilitation of the knowledge flows validates the effort. The knowledge flow tenets described in the example of the 411 frequency are critical to the success of any social media endeavor meant to leverage the knowledge stores within its organization. The structure depicted in the framework provides the tenets derived from the literature review and the practical application in the vignettes. An organization can establish the top conditions but it must make the conditions for participation voluntary and allow for grass roots growth. The Army has done a terrific job of providing structure, support, left and right lateral limits, while yet allowing its professional communities to freely engage. Implementation of social media capabilities within the Marine Corps are further discussed in the recommendations below.

C. RECOMMENDATIONS

Adhering to the impetus of the research, the following recommendations center on improvements to situational awareness, readiness, and productivity in the Marine Corps. Nonetheless, the fundamentals of the prescribed recommendations are inherently applicable to a wide variety of organizations that: are geographically dispersed; are goal or mission oriented; operate with limited resources; have untapped knowledge in inventory. The private, public, and military examples of social media uses spanning the better half of a decade provide ready proof that realized benefits can be gained from a properly implemented knowledge facilitating social media initiative.

1. Virtual Communities for Readiness and Productivity

As pointed out in Chapter IV, virtual communities come in many flavors. The type of virtual community selected much match the intended goal. This follows the framework's recommendation of the organization identifying the knowledge flow goals.

The driving question in framing the organizational problem is: ‘what knowledge flows is the organization attempting to facilitate and towards what purpose?’ This might be stated otherwise by referring to the embedded knowledge model in the framework. Knowing what you know, can help determine knowing what you need to know, in order to accomplish the intended objective or mission. This helps frame the type of virtual community desired.

The virtual communities the Marine Corps can best leverage for improved readiness, productivity, and situation awareness include communities of purpose and professional forums. As discussed in the case study, ANGLICO team leaders must develop interpersonal relationships with their supported unit in order to effectively integrate into the operational planning cycle and serve as competent advisors. Doing so makes the team and the MAGTF Commander's assets much more effective. It was argued that the early establishment of the liaison-supported unit relationship improved the ability of the unit to seamlessly embed themselves with the supported unit. Adopting the Army definition of a community of purpose, this type of virtual community is purpose driven and for a set duration of time. Within the construct of the example, the intent of a liaison virtual community would be to provide the means for the planned joint force supported unit to discover ANGLICO, learn how to leverage it into its operational planning, and establish rapport through the interaction with team leaders. An alternative example is observed in the establishment of a community of purpose coming as a result of humanitarian disaster. The trust issues coming from the lack of strong interpersonal ties are overcome through the establishment of a single identity that serves as a unifying banner during this time specific, purpose driven virtual community. A commercial example is observed in the establishment of a community of purpose to solve a particular problem, as might be the case in a cyber defense community of purpose, or another may bring the collective knowledge in inventory to collaborate on a project.

The second virtual community recommendation for the Marine Corps is in establishing professional forums that are structured, provided left and right lateral limits for participation, and are facilitated by role players that have some measure of actor centrality. The conditions for such a site are set top down, but participation and growth

of the site is strictly voluntary. Mentorship forums strictly linking company commanders or noncommissioned officers, as the Army has done, can serve as powerful tools to help shape the community through leadership and peer to peer mentoring. The adoption of such a measure can be observed as the next level in the Marine Corps' mentorship program. Referring to the failed midwives e-mail mentorship program presented in Chapter III, mentorship through a collective involved in synchronous communication is superior to one on one asynchronous mentorship.

Lastly, a community can be established along functional lines. For example, an electronics maintenance chief professional community can serve to leverage the collective knowledge of the group. On the whole, productivity is increased through the facilitation of knowledge sharing and knowledge transfers. This is analogous to the recommendations coming out of Cyber Shock Wave. A forum, enhanced with the ability to access repositories of explicit knowledge and augmented with the ability for tacit knowledge sharing provides the means to gather best practices, innovate them, and make them even better practices. The Army's BCKS has established functional forums along the lines described. One such forum is LogNet that serves to bring together Army soldiers and civilian workers along functional lines (U.S. Army, 2010). NASA's Spacebook can be observed to be such a forum as well.

As suggested in the ANGLICO case study, establishing forums that brings together the collective knowledge of a single unit or a group of similarly performing units can be tremendous value added. As depicted in the hypothetical regimental command example with two sharply different performing battalions. The knowledge across elements of a unit are not evenly distributed and as a result create pockets of knowledge gaps. These knowledge gaps can be addressed in the same manner the Eureka project sought to address their knowledge gaps. However a professional forum entwined with the means to leverage all manner of social media to enhance the transfer and sharing of knowledge is even much more powerful.

2. Narratives for Situational Awareness and Readiness

Another recommendation for how social media can be leveraged to provide increased situational awareness comes in the form of narratives. Deriving a sense of what is transpiring in a certain area of operations from a SITREP is difficult at best. The document is devoid of the details that serve the informational needs of the lower levels of the hierarchy. This follows the notion that there are different information needs along the hierarchy matching the varying levels of responsibilities (Hayes Roth, 2006). Establishing the means to provide narratives of different areas of operation from team leaders who have nurtured relationships during the course of the deployment can serve to better prepare units going into these areas. Observing two young Army officers explaining, through a narrative on the BCKS site, the complexity of the relationships in their area of operations provides a unique dynamic sense of understanding and appreciation for the challenges being faced in their area relative to what could have been ascertained from a SITREP (U.S. Army, 2010). The latter example serves the needs of many levels because the interpretation of these narratives is personal. It has been maintained that tacit knowledge is personalized knowledge, and the manner in which a visual narrative is interpreted is relative to the manner in which it is perceived. Therefore, a General visually interpreting the narrative derives different meaning than the young officer or SNCO observing the same storytelling episode. As established in the literature review, codified knowledge like that in a SITREP is limited in its ability to share or transfer knowledge flows. Although the latter is relevant and retains value, the marriage of the narrative with the formality of the SITREP can serve as supporting actors to each other.

3. Social Media and Reliefs in Place

Leveraging social media to address the challenges of units conducting turnovers with each other in the combat zone is another recommendation with powerful potential. Incorporating the above examples, virtual communities and narratives, and applying them with the specific purpose of facilitating a virtual right seat capability has the potential to generate momentum that can decrease the operational lull that naturally occurs as one

veteran unit is replaced with a new unit. The Army has instituted such a virtual right seat capability within its BCKS. Figure 15 lists the following objectives for its social media driven virtual right seat capability.

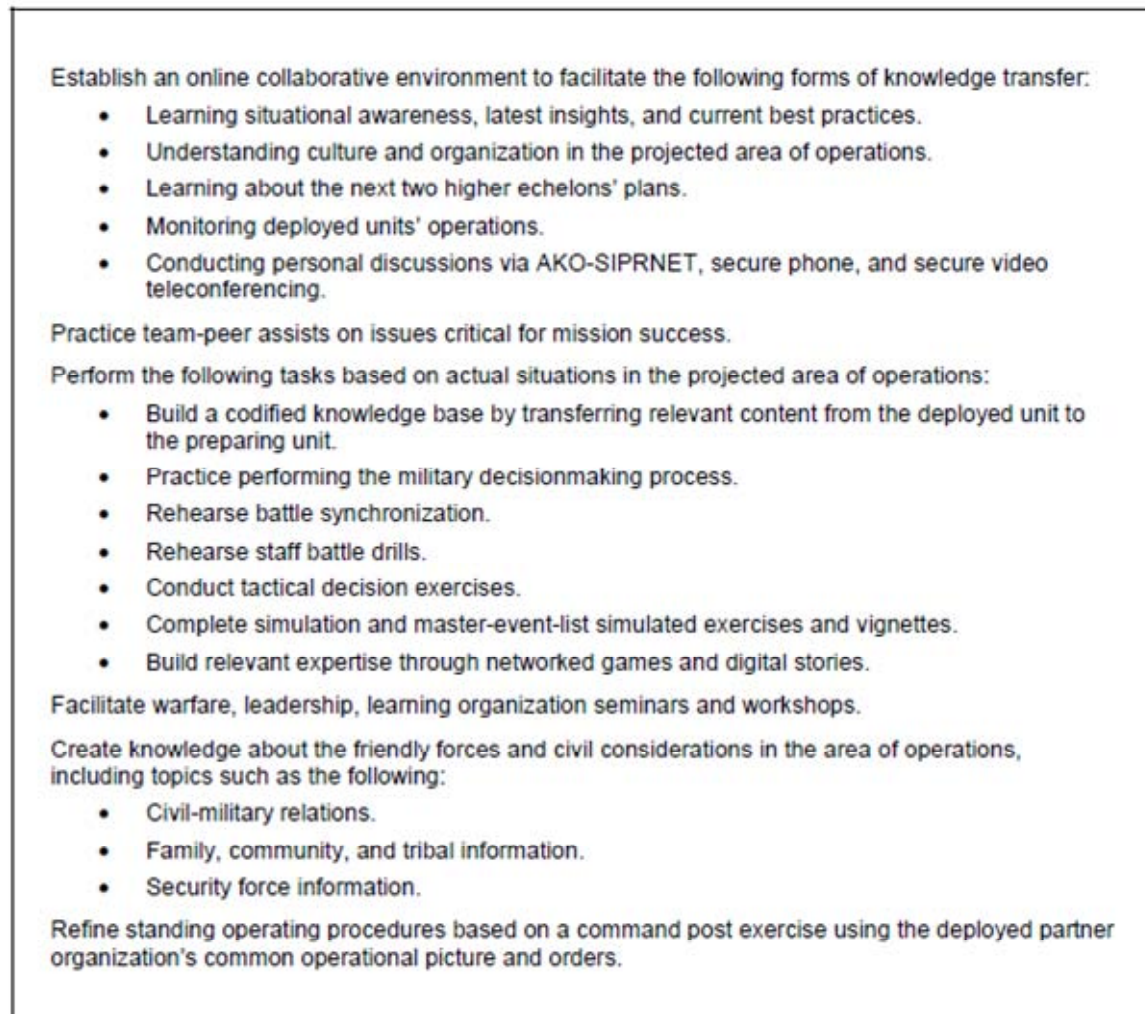


Figure 15. Virtual Right Seat Objectives (From BCKS)

D. FUTURE RESEARCH OPPORTUNITIES

Social media and its implementation to facilitate knowledge flows remains in its infancy. Social media has been largely leveraged by federal agencies as public affairs tool. The aim in additional research would be to continue furthering a plan for knowledge flow facilitating social media. The research determined that social media

does indeed facilitate knowledge flows and that leveraged properly can levy tremendous gains. With respect to the Marine Corps and other organizations lacking such a capacity, the specific aim in future research is in taking a concept of operations and developing an implementation plan. Implementation would need to consider the use of social media on the unclassified and classified sites. The Army's BCKS would be a good start in assessing how that has been addressed.

During the course of this research, the Army's Battle Command Knowledge System came to light. Further research may include assessing how well the Army's Battle Command Knowledge System has facilitated knowledge flows or how well it has done in meeting its objectives in order to determine if such a system should be mirrored. The research can be done in the form of surveys. Or instead fans of quantitative analysis might look to analyzing the knowledge value added through the creation of professional forums like companycommand.mil.

Technical research that feeds into a larger implementation plan could include a conduct of social network analysis. The goal in such research would be to build taxonomy and propose where connections need to be made first and foremost in order to capitalize on knowledge flows. Moreover, this can serve to map out structural holes. Snowden (2005) provides the background for why and how this could be beneficial in an implementation plan. Another avenue of technical research might be in folksonomies and the phenomena of tagging. Tagging is necessary for information to remain accessible in the long run. Such work might be important to implementation. Lastly, an alternate research approach might include an exploration into the new capabilities made available through Web 3.0 Social Semantic Web and how the paradigm shift associated with these new technologies.

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

- Ahern, P. W., Cunniffe, D. M., & McCarthy, M. J. (2005). Air Naval Gunfire Liaison Company. *Marine Corps Gazette* , 89 (11), 72–76.
- Alavi, M., & Leidner, D. E. (2001). Conceptual Foundations and Research Issues. *Knowledge Management and Knowledge Management Systems* , 25, 107–136.
- Alberts, D. S., Garstka, J. J., & Stein, F. P. (1999). *Network Centric Warfare:Developing and Leveraging Information Superiority*. D.C: DoD C4ISR Cooperative Research Program.
- Bennington, J. G., & King, R. H. (2010). *Perceptions On Social Networking: A study On Their Operational Relevance for the Navy*. Monterey: NPS.
- bertl.com. (n.d.). Retrieved September 1, 2010, from BERTL:
http://www.bertl.com/web/PORTAL_AWARDS_BEST;jsessionid=5B8AAW709EC15A90F6CC41420F6272AE
- Blacker, F. (1995). Knowledge, Knowledge Work and Organizations - An Overview and Interpretation. *Organization Studies* , 16 (6), 1021–1046.
- Brown, J. S. (2000). *The Social Life of Information*. Boston: Harvard Business School Press.
- Butler, P. I. (2010). *Succession Planning in Homeland Security-How Can we Ensure the Effective Transfer of Knowledge to a New Generation of Employees*. Monterey.
- Carey, R. (2010, February 13). CIO Blog. Retrieved August 5, 2010, from Department of the Navy Chief Information Officer, the DON IT Resource:
<http://doncio.navy.mil/blog.aspx?ID=891>
- CMC. (2007). NAVMC 3500.23: Air Naval Gunfire Liason Company Training and Readiness Manual. Washington D.C.: USMC.
- Coakes, E., & Clarke, S. (2006). Communities of Practice. In D. Schwartz, *The Encyclopedia of Knowledge Management* (pp. 30–33). Idea Group Inc.
- Cross, R., Nohria, N., & Parker, A. (2002). MIT Sloan. *Six Myths About Informal Networks - and How to Overcome Them*, 43, 67–75.
- Cross, R., Parker, A., Prusak, L., & Borgatti, S. P. (2001). *Knowing What We Know: Supporting Knowledge Creation and Sharing in Social Networks*. In *Transforming Culture: An Executive Briefing on the Power of Learning* (pp. 1–8). The Darden School Foundation.

- Cross, R., & Parker, A. (2004). *The Hidden Power of Social Networks: Understanding How Work Really Gets Done in Organizations*. Boston, Massachusetts: Harvard Business School Publishing Corporation.
- Cuomo, C. S. (2007). Three Tasks in 30 Days. *Marine Corps Gazette* , 91 (6), 34–38.
- Davenport, D. L., & Holsapple, C. W. (2006). Social Capital Knowledge. In D. Schwartz, *The Encyclopedia of Knowledge Management* (pp. 809–817). Idea Group Inc.
- Davenport, T. H., & Prusak, L. (1998). *Working Knowledge: How Organizations Manage What they know*. Boston: President and Fellows of Harvard College.
- Denning, S. (n.d.). stevedenning.com. Retrieved August 1, 2010, from Steve Denning: <http://www.stevedenning.com/About/default.aspx>
- Denning, S. (2007). *The Secret Language of Leadership: How Leaders Inspire Action Through Narrative*. San Francisco: Jossey-Bass.
- Dixon, N. M. (2007, Summer). CompanyCommand: A Professional Community That Works. *NASA ASK Magazine* , pp. 13–17.
- Dixon, N. M., Allen, N., Burgess, T., Kilner, P., & Schweitzer, S. (2005). *CompanyCommand: Unleashing the Power of the Army Profession*. (L. Gary, & L. M. Noudehou, Eds.) West Point, New York, United States of America: The Center for the Advancement of Leader Developing and Organizational Learning.
- Dretske, F. (1981). *Knowledge and the Flow of Information*. Cambridge: MIT Press.
- Galagan, P. (2010, Summer). Bridging the Skills Gap: Part II. *Public Manager* , 39 (2), pp. 52–55.
- Gordon, C. (2010, February 7). [helixcommerce.blogspot.com](http://helixcommerce.blogspot.com/2010/02/innovation-from-field-observation-xerox.html). Retrieved August 4, 2010, from The Innovation and Collaboration Blog Jam: <http://helixcommerce.blogspot.com/2010/02/innovation-from-field-observation-xerox.html>
- Greaves, M., & Mika, P. (Eds.). (2008, January 10). Semantic Web and Web 2.0. *Journal of Web Semantics* , 1–3.
- Grice, M. D. (2009). *ANGLICO: The Great Enabler*.
- Halid05, K. (2010, August 23). Toshiba Honored with BERTL's Innovation Award for Social Business Networking Site. NewsBank Inc., p. 1.
- Hansen, M. T., Nohria, N., & Tierney, T. (1999). What's your strategy for managing knowledge? *Harvard Business Review* , 77, 106–116.

- Hayes-Roth, R. (2006, April 11). Delivering Information Superiority in the Global Information Grid: Why Smart Push Dominates Smart Pull. Defense Systems.
- Hickins, M. (1999). Xerox Shares its Knowledge. *Management Review* , 40–45.
- Housel, T., & Bell, A. H. (2001). *Measuring and Managing Knowledge*. New York: George Werthman.
- Jacobson, C. M. (2006). Knowledge Sharing Between Individuals. In D. Schwartz, *Encyclopedia of Knowledge Management* (pp. 507–514). Virginia, United States of America: Idea Group Inc.
- Johnson, P. R. (2010). Developing a Knowledge Management Framework to Assist with Current USMC Information Management Practices. Monterey: NPS.
- Johnson, W. L., & Valente, A. (2009). Tactical Language and Culture Training Systems: Using AI Foreign Languages and Cultures. *AI Magazine* , 72–83.
- King, W. R. (2006). Knowledge Transfer. In D. Schwartz, *Encyclopedia of Knowledge Management* (pp. 538-543). Pittsburgh, Pennsylvania, United States of America: Idea Group Inc.
- Knights, M. (2006, August 15). Harness the Power of Collaboration. *Computer Weekly*, pp. 1–3.
- Koch, B. T. (2007, February). Evolution of Anglico. *Marine Corps Gazette* , pp. 25–29.
- Kralovec, M. T. (2009). Intelligence Information Management. *Marine Corps Gazette*, 93 (7), 35–42.
- Long, L., & Schweitzer, S. J. (2004). Information and Knowledge Transfer through Archival Journals and On-Line Communities. *Journal of Aerospace Computing, Information, and Communication* (AIAA) .
- Marine Corps Community Services. (2007). *The Marine Corps A Young and Vigorous Force: Demographics Update*. Washington DC: MCCS.
- Martin, C. A. (2010, September 10). The Magellan Star: Pirate Takedown, Force Recon Style. Retrieved September 11, 2010, from U.S. Naval Institute: <http://blog.usni.org/2010/09/10/the-magellan-star/>
- Mottl, J. M. (2001, September 24). How Xerox Got its Engineers to Use a Knowledge Management System. Retrieved August 8, 2010, from Tech Republic: http://articles.techrepublic.com.com/5100-10878_11-1048267.html?tag=content;leftCol

- Natarajan, R., & Shekar, B. (2006). Interesting Knowledge Patterns in Databases. In D. Schwartz, Encyclopedia of Knowledge Management (pp. 297–304). Idea Group Inc.
- National Commission on Terrorist Attacks Upon the United States. (2004). *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks upon the United States*. Crawfordville: W.W. Norton & Company.
- Nelson, R. E., & Hsu, S. (2006). A Social Network Perspective on Knowledge Management. In D. Schwartz, Encyclopedia of Knowledge Management (pp. 826-832). Southern Illinois: Idea Group Inc.
- Nissen, M. E. (2006). *Harnessing Knowledge Dynamics: Principled Organizational Knowing & Learning*. Hershey, PA: IRM Press.
- Nonaka, I. (1994, May 1). A Dynamic Theory of Organizational Knowledge Creation. 14–37.
- Nonaka, I., & Takeuchi, H. (1995). *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation*. New York: Oxford University Press.
- Nonaka, I., Toyama, R., & Konno, N. (2000). SECI, ba and Leadership: A Unified Model of Dynamic Knowledge Creation. *Long Range Planning*, 33, 5–34.
- Oshri, I. (2006). Knowledge Reuse. In D. Schwartz, Encyclopedia of Knowledge Management (pp. 487–492). Idea Group Inc.
- Parker, A., Cross, R., & Walsh, D. (2001). Improving Collaboration With Social Network Analysis. *Knowledge Management Review*, 4 (2), 24–29.
- Paulling, K. C. (2009). *Transforming Counterterrorism Training in the FBI: Preserving Institutional Memory and Enhancing Knowledge Management*. Monterey.
- Phoel, C. M. (2006). Leading Words: How to Use Stories to Change Minds and Ignite Action. *Leadership Communications*, 3-5.
- Powers, V. J. (1999). Xerox Creates a Knowledge-Sharing Culture Through Grassroots Efforts. *Knowledge Management In Practice*, p. 4.
- Pratt, N. (2006). A Hierarchical Model for Knowledge. In D. Schwartz, Encyclopedia of Knowledge Management (pp. 211–220). Idea Group Inc.
- Professional Soldiers. (2010). Retrieved September 1, 2010, from Professional Soldiers: <http://www.professionalsoldiers.com/>

- Rees, M., & Hopkins, P. (2009). *Towards the Integration of Social Media With Traditional Information Systems*. Springer-Verlag Berlin Heidelberg.
- Ribiere, V. M., & Roman, J. A. (2006). Knowledge Flow. In D. Schwartz, *Encyclopedia of Knowledge Management* (pp. 336–343). Idea Group Inc.
- Riley, M. T. (1991). *The Air Naval Gunfire Liaison Company: An Untapped Resource For The Low Intensity Conflict Environment*. Retrieved August 20, 2010, from Global Security: globalsecurity.org
- Russell, B. (2009). Flipping the Switch. *Marine Corps Gazette* , 93 (1), 46–52.
- sailorbob.com. (n.d.). Retrieved September 1, 2010, from Sailorbob.com: <http://www.sailorbob.com/phpBB2/index.php>
- Severns, C. J. (2010, May 19). *AirWarriors*. Retrieved August 18, 2010, from *AirWarriors*: <http://www.airwarriors.com/forum/forum.php>
- Shariq, S. Z., & Vendelo, M. T. (2006). Tacit Knowledge Sharing. In D. Schwartz, *Encyclopedia of Knowledge Management* (pp. 833-839). Idea Group Inc.
- Shenk, D. (1997). *Data Smog: Surviving the Information Glut*. New York: HarperCollins.
- Sikes, C. S., Cherry, A. K., Durall, W. E., Hargrove, M. R., & Tingman, K. R. (1996). *Brilliant Warrior: Information Technology Integration in Education and Training*.
- Small Wars Journal. (2009, May 28). Retrieved August 18, 2010, from Small Wars Journal : <http://smallwarsjournal.com/blog/2009/05/goodbye-companycommandcom/>
- Snowden, D. (2005). *From Atomism to Networks in Social Systems* (Vol. 12). (P. A. Smith, Ed.) MCB IP Limited.
- Spender, J. (1998). Pluralist Epistemology and the knowledge Based Theory of the Firm. *Organization* , 5 (2), 233–256.
- Starks, T. (2010, August 2). *Cybersecurity: Learning to Share*. *CQ Weekly* , pp. 1–9.
- Stewart, S. (2009). *Computer-Mediated Social Networking for Mentoring of Health Professionals*. Dunedin: Springer-Verlag Berlin Heidelberg.
- Stewart, T. A. (1999). *Intellectual Capital: The New Wealth of Organizations*. New York: Doubleday.
- Thomas, J. C., Kellogg, W. A., & Erickson, T. (2001). The Knowledge Management Puzzle. *Human and Social Factors in Knowledge Management* , 40, 863–884.

- Toshiba America Business Solutions Inc. (2009, August 24). Press Releases. Retrieved August 15, 2010, from Social Media Portal:
<http://www.socialmediaportal.com/Search/Default.aspx?Tag=Toshiba+eXCHANGE>
- Tuomi, I. (1999). Data is More Than Knowledge. *Journal of Management Information Systems* , 16 (3), 107–121.
- U.S. Army. (2010). Battle Command Knowledge System. Retrieved August 15, 2010, from Battle Command Knowledge System:
<http://usacac.army.mil/cac2/bcks/index.asp>
- U.S. Army. (2008). FM 6-01.1 Knowledge Management Section. Washington D.C: Headquarters, Department of the Army.
- Velker, L. (1999, January 1). Xerox: From Internal Solution to KM Product. *KM World* , pp. 1–3.
- von Hippel, E. (1994). "Sticky Information" and the Locus of Problem Solving: Implications for Innovation. *Management Science* , 40 (4), 429–439.
- White House. (2009, June). Open Government Initiative. Retrieved September 1, 2010, from The White House.gov:
<http://www.whitehouse.gov/open/innovations/spacebook>
- Wickramasinghe, N. (2006). Knowledge Creation. In D. Schwartz, *Encyclopedia of Knowledge Management* (pp. 326–335). Idea Group Inc.
- Winter, M. (2010). *Second Life Education in New Zealand: Evaluation Research Final Report*. New Zealand: CORE Education.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
Ft. Belvoir, Virginia
2. Dudley Knox Library
Naval Postgraduate School
Monterey, California
3. Marine Corps Representative
Naval Postgraduate School
Monterey, California
4. Director, Training and Education, MCCDC, Code C46
Quantico, Virginia
5. Director, Marine Corps Research Center, MCCDC, Code C40RC
Quantico, Virginia
6. Marine Corps Tactical Systems Support Activity (Attn: Operations Officer)
Camp Pendleton, California
7. Dan C. Boger
Naval Postgraduate School
Monterey, California
8. Glenn Cook
Naval Postgraduate School
Monterey, California
9. Karl Pfeiffer
Naval Postgraduate School
Monterey, California
10. William G. Polania
Stafford, Virginia