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# THESIS

**USING SOCIAL MEDIA TOOLS TO ENHANCE TACIT KNOWLEDGE SHARING WITHIN THE USMC**

by

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September 2013

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**13. ABSTRACT (maximum 200 words)**

Social media usage has exploded over the past several years. Individuals are using social media tools to stay constantly connected to friends, family and co-workers. Companies have learned to leverage these same technologies both externally and internally. These emerging social technologies, applications and platforms are an excellent way for geographically separated people to connect, communicate and share knowledge in novel ways. The United States Marine Corps (USMC) continues to communicate primarily through telephone, email and reports. The valuable resource of tacit knowledge contained within veterans of operations spanning from distributed counterinsurgencies to complex humanitarian assistance efforts is usually shared via face-to-face interaction and informal networks. Academic literature and industry adoption indicate that social media tools are now familiar and mature enough to provide an additional or even substitute conduit for this type of rich tacit knowledge sharing. How can social media tools be used to improve USMC tacit knowledge sharing? This research explores the extant use of Web 2.0 enabled social tools for the purpose of tacit knowledge sharing. A case study of a USMC unit identifies knowledge sharing pathologies, and presents use cases for the application of social tools to address these pathologies.


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# USING SOCIAL MEDIA TOOLS TO ENHANCE TACIT KNOWLEDGE SHARING WITHIN THE USMC

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# ABSTRACT

Social media usage has exploded over the past several years. Individuals are using social media tools to stay constantly connected to friends, family and co-workers. Companies have learned to leverage these same technologies both externally and internally. These emerging social technologies, applications and platforms are an excellent way for geographically separated people to connect, communicate and share knowledge in novel ways. The United States Marine Corps (USMC) continues to communicate primarily through telephone, email and reports. The valuable resource of tacit knowledge contained within veterans of operations spanning from distributed counterinsurgencies to complex humanitarian assistance efforts is usually shared via face-to-face interaction and informal networks. Academic literature and industry adoption indicate that social media tools are now familiar and mature enough to provide an additional or even substitute conduit for this type of rich tacit knowledge sharing. How can social media tools be used to improve USMC tacit knowledge sharing? This research explores the extant use of Web 2.0 enabled social tools for the purpose of tacit knowledge sharing. A case study of a USMC unit identifies knowledge sharing pathologies, and presents use cases for the application of social tools to address these pathologies.

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# LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACE | Aviation Combat Element |
| AFB | Air Force Base |
| AOR | Area of Operations |
| BCOC | Basic Communications Officer Course |
| CAC | Common Access Card |
| CAS | Close Air Support |
| CLC | Combat Logistics Company |
| CO | Commanding Officer |
| CSC | Command and Staff College |
| DCO | Defense Connect Online |
| DIKW | Data, Information, Knowledge and Wisdom |
| DISA | Defense Information Systems Agency |
| DoD | U.S. Department of Defense |
| ESN | Enterprise Social Network |
| ESSP | Emergent Social Software Platform |
| EWS | Expeditionary Warfare School |
| FHA | Foreign Humanitarian Assistance |
| FOUO | For Official Use Only |
| GCE | Ground Combat Element |
| HADR | Humanitarian Assistance and Disaster Relief |
| ICT | Information Communication Tools |
| IT | Information Technology |
| KM | Knowledge Management |
| KMS | Knowledge Management System(s) |
| LCE | Logistics Combat Element |
| MAG | Marine Aircraft Group |
| MAU | Monthly Average Users |
| MAW | Marine Aircraft Wing |
| MCAS | Marine Corps Air Station |
| MOS | Military Occupational Specialty |

| | |
|---|---|
| MCCDC | Marine Corps Combat Development Command |
| MCCLL | Marine Corps Center for Lessons Learned |
| MCEN | Marine Corps Enterprise Network |
| MCIENT | Marine Corps Information Enterprise |
| MCWL | Marine Corps Warfighting Laboratory |
| MEB | Marine Expeditionary Brigade |
| MEF | Marine Expeditionary Force |
| MEU | Marine Expeditionary Unit |
| MWSS | Marine Wing Support Squadron |
| NEO | Non-combatant Evacuation Operation |
| OCS | Officer Candidate School |
| OJT | On the Job Training |
| PCS | Permanent Change of Station |
| PKM | Personal Knowledge Management |
| PME | Professional Military Education |
| RBV | Resource-based View |
| RSS | Really Simple Syndication |
| SECI | Socialization, Externalization, Combination and Internalization Learning Model |
| SNA | Social Network Analysis |
| SNS | Social Network Stimulation |
| SNS | Social Networking Site |
| SOP | Standard Operating Procedure |
| STOM | Ship-to-Objective Maneuver |
| TBS | The Basic School |
| TECOM | Training and Education Command |
| UDP | Unit Deployment Program |
| USAF | United States Air Force |
| USMC | United States Marine Corps |
| USN | United States Navy |
| VTC | Video Teleconference |

| | |
|---|---|
| XML | Extensible Markup Language |
| XO | Executive Officer |

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# I. INTRODUCTION

## A. BACKGROUND

> I want a *Knowledge-based Force* that leverages seamless enterprise capabilities across the spectrum of conflict in order to enhance decision making, achieve *knowledge superiority*, and gain tactical, operational, and strategic advantage over our Nation's adversaries. [emphasis added]
>
> —Brigadier General Kevin J. Nally, USMC (Headquarters U.S. Marine Corps, 2010a)

> The only irreplaceable capital an organization possesses is the knowledge and ability of its people. The productivity of that capital depends on how effectively people share their competence with those who can use it.
>
> —Andrew Carnegie

Social media usage by individuals, companies, and government entities has exploded in the past several years and this trend is expected to continue. Individuals are using social media tools and platforms, enabled by Web 2.0 technologies, to achieve and maintain connections to acquaintances, friends, family, and co-workers. Companies have learned to leverage this social media trend for their external marketing efforts and, more recently, intra-organization communication, collaboration, and knowledge sharing. Government agencies have also begun using social media tools to improve transparency and enable communication with a wider range of stakeholders. These emerging social technologies appear efficient for geographically separated people to connect, interact, collaborate, and exchange knowledge in fast and simple ways. Meanwhile, the USMC and other armed services continue to communicate primarily through telephone, email, and other strictly channel based communication technologies, each with varying levels of utility and efficiency. These existing communication processes and tools, although helpful, reinforce the rigid hierarchies of existing military organizational structures and limit knowledge sharing. One premise of this study is that the emergent communities of practice and informal social networks enabled through the widespread application of enterprise social tools could enhance collaboration and knowledge flow within the USMC.

The unique professional cadre of the USMC thrives on common training, operational experience, and small unit innovation. A significant portion of organizational knowledge embedded within this esteemed cadre is grown and maintained primarily through face-to-face interaction among Marines and shared training experience. The rich tacit knowledge contained within veterans of operations spanning from distributed counterinsurgencies to complex humanitarian and disaster relief (HADR) efforts are usually shared via storytelling (often times over a beer). Mainstream social media tools are now familiar to the masses and mature enough to provide an additional, or even substitute, conduit for collaboration and rich tacit knowledge sharing within an organization.

The last decade has generated much research on organizational knowledge and its management. The military has been the subject of some of this research. Specifically, the United States Marine Corps (USMC) has been identified as lacking a knowledge management (KM) framework by which successful, service-wide KM efforts can be instituted and orchestrated (Johnson, 2010). Relatively few Marines have recognized this organizational deficiency. As of April 16, 2013, a USMC KM Community of Practice (CoP) was formally established in order to spearhead and orchestrate future KM efforts across the USMC enterprise (Deputy Commandant for Combat Development and Integration, 2013). These USMC KM advocates and practitioners have recently made strides toward the improved operationalization of KM within the Marine Corps. The Marine Corps Information Enterprise Strategy (MCIENT) dictates the requirement for a robust information enterprise intended to transform the USMC into a knowledge-based force (Headquarters U.S. Marine Corps, 2010b). Many senior USMC leaders now indicate that they recognize the value of KM within the USMC. While numerous IT systems have been successful in managing and distributing explicit knowledge, the generation and transfer of tacit knowledge is heavily people focused (Nissen, 2006; Ikujiro Nonaka & Takeuchi, 1995; von Krogh, Nonaka, & Rechsteiner, 2012). The recent maturation and mainstream ubiquity of various social networking tools have the potential to improve both explicit and tacit knowledge sharing within commercial, government and military organizations.

Much work done within an organization is accomplished through a web of informal social networks (Cross & Prusak, 2002). In order to achieve success in this modern complex world, organizations must be able to use knowledge that is diffused across the organization (Moore, 2012). In large organizations people maintain situational awareness of the organization through both the formal and informal relationships they maintain. As the organization's size grows, the small intimate circle of workflow driven relationships becomes less valuable as an information source for happenings across the wider organization (Cross & Prusak, 2002). Once people become disconnected from other operations across the organization, both individual and organizational performance could suffer due to a shortage of organizational context (Cross & Parker, 2004). How then can relationships be maintained across an enterprise as large and geographically distributed as the USMC?

Across the USMC, from the east coast to the west, across the Pacific in Japan, and now Australia, the Middle East, Europe, and onboard various floating Marine Expeditionary Units (MEU) are Marines—Marines who share common military occupational specialties (MOS), assignments, tasks and duties. Currently, these Marines have no efficient way to discover expertise or share knowledge across functional roles, ranks, or peer groups inside the USMC enterprise.

Consider the following paragraph as an illustration of one potential deficiency in organizational knowledge sharing. Two USMC officers with the same MOS, holding the same position in similar commands are separated by an ocean or continent. These two officers will, usually, never communicate their experiences or share their tacit knowledge with each other directly, however mutually beneficial such interaction may be. This is not the case because these officers do not wish to share their knowledge, in most cases the complete opposite is true, but there is currently no conduit within the USMC for these to two officers to discover each other as relevant sources of knowledge or expertise. Yes, they could email, but perhaps this only occurs after the serendipitous discovery of an email address on another unit's SharePoint site or webpage. The ubiquitous USMC global address list (GAL) in MS Outlook is great for finding email addresses, but this is only useful if one knows in advance the full name and rank of the person they wish to

find. There is no easy way for a communications officer of one unit to search for other USMC communications officers for the purpose of connecting to share knowledge within their CoP. There is currently no widely used USMC platform by which knowledge can be published to the enterprise to enable knowledge seekers to search and discover experts or knowledge.

Knowledge transfer through the email communication is generally one to one or one to many; the initiator asks a specific question to the recipient(s) (assuming one discovered the other's email address) to which the recipient(s) replies with an answer, advice or direction to other resources (e.g., people, documents, website). Any third party not originally included in this email chain will not benefit from this communication or potential knowledge exchange activity; they will have no awareness of the communication even occurring. In our theoretical example, consider a third communications officer in a similar billet; would he not also benefit from the knowledge exchanged vie email between the first two? Channel based communication technology such as email serves a critical communication function within the hierarchical structure of most modern militaries and organizations. It is a form of communication perfectly suited for private dialogue. For those many instances where privacy is no concern, those who are not included in the email chain miss out on useful or even critical information and knowledge; they miss out while valuable nuggets of information remain forever trapped inside the mailbox of the senders and receivers.

The default privacy of email is indeed needed for certain communications (e.g., leader to subordinate, private communication). For information and knowledge beneficial to a community, email no longer makes sense as a primary method of transmission. Often those who are not included on the To: or CC: address lines of an email are never included in the conversation—they never even know they missed the conversation. Even still, others might even be having the *same* conversation (redundancy), and reaching a convergent or divergent solution to the same problem while ignorant of the other parallel communications.

Modern social technologies and platforms may be capable of addressing many of the shortfalls explained here. Social tools enhance the effects of existing social networks

allowing for larger and more useful interactions among employees within and across organizations. The value of informal networks within organizations has been well documented and investigated (Cross & Parker, 2004); intuition implies that modern Web 2.0 tools and social tools can enhance both formal and informal networks within the USMC. This study attempts to reduce the ambiguity surrounding this intuition by reviewing current research regarding the application of Web 2.0 and social tools for knowledge sharing.

As of 2010, the USMC was found to be significantly behind its armed service peers in the area of organizational knowledge management maturity (Johnson, 2010). In order to correct this deficiency, Johnson suggests the creation of an organization-wide KM framework, including a supporting KM strategy for the USMC. Specifically, Johnson recommends that the USMC focus on the following areas: 1) KM vision, 2) KM strategy, 3) KM activities, 4) promote knowledge sharing, 5) organize KM processes around strategy (Johnson, 2010). Johnson describes several examples of KM activities from other services. Johnson does not operationalize any particular set of tools for use by the USMC. Modern social tools might be used on an enterprise scale as an important piece of a larger USMC KM strategy suggested by Johnson. This study seeks to explore the benefits of such technologies and their potential application within the USMC.

Polania investigated the use of social networking technologies and their role in both tacit and explicit knowledge flows (2010). Polania conducted a case study of a single USMC ANGLICO unit and constructed several examples of the successful usage of social tools for the purposes of collaboration and knowledge transfer. Polania proposed several useful generalizations for the application of social tools to the USMC as a whole (2010). Since Polania's 2010 research, numerous academic and practitioner reports regarding the organizational application of social tools have been published. These documents and reports have emerged in sync with a growing and maturing array of social software, services and applications. This study will build upon Polania's work by expanding the scope of his study to research related to Web 2.0 and social tools available at the time of this writing—nearly three years later. This study builds primarily upon

Polania and Johnson's work by synthesizing current research about Web 2.0 and social tools and their influence on both explicit and tacit knowledge sharing.

## B. RESEARCH STRUCTURE

### 1. Problem Statement

The problem is dynamic, geographically distributed, and hierarchical bureaucratic operations hinder individual and unit tacit knowledge transfer within the USMC. This is a problem because individual and unit tacit knowledge, built through experience, is not as useful or timely once translated into codified explicit knowledge (Nissen, 2006; Swan, Newell, Scarbrough, & Hislop, 1999). This explicit knowledge is typically stored in the form of after action reports, channel based e-mail communication, non-dynamic intranet portals, turnover binders and other standard military documentation. Many systems in use by the USMC today are excellent for managing, storing, distributing explicit knowledge (e.g., MS Sharepoint, network shared drives), but the efficient management and transfer of tacit knowledge may require a different approach. The current and future geographic dispersion of USMC units, functional area experts, virtual project teams and joint operational planners reduces the chance for serendipitous face-to-face interaction and limits the creation and cultivation of informal social networks; these informal networks are vitally important to the transfer of tacit knowledge and experience (Swan et al., 1999).

### 2. Purpose

The purpose of this study is to explore the extant and potential use of Web 2.0 and social tools as tacit knowledge flow enablers and develop recommendations for the application of such concepts to existing USMC organizational learning apparatus. This is important because better tacit knowledge flows improve the organizational efficacy, agility and adaptability of the USMC. These improvements will be critical to the future of the USMC as a service "forged to be lean, agile, and adaptable as individuals and as an institution" (United States Marine Corps [USMC], 2011).

### 3. Research Question

- How can social media tools be used to improve USMC tacit knowledge sharing?

## C. POTENTIAL BENEFITS

This research has potential to inform USMC decision makers as they investigate the possible implementation of future USMC enterprise social or collaborative solutions. Many existing tools and processes are capable of sharing explicit knowledge, but a different approach is necessary for the sharing of tacit knowledge. Various discussions are ongoing within the USMC KM CoP concerning enterprise social tools or collaborative networks. This research can assist these discussions by analyzing current Web 2.0 and social tools, identifying their benefits in an enterprise environment, and presenting specific recommendations for their application as knowledge sharing enablers.

## D. THESIS ORGANIZATION

### 1. Chapter II: Literature Review

This literature review focuses on a review of foundational concepts supporting the knowledge management field, Web 2.0, social tools, and organizational learning. Modern use of enterprise social or collaboration software has roots or connections to these research areas. This section will provide an overview of these topics and tie them together in a way that supports the balance of this study.

### 2. Chapter III: Research Design and Case Study Method

This chapter describes the particular application of the case study method to this study. Case study components are described in relation to the subject unit of analysis, and limitations and biases are addressed. This case study is a holistic (single unit of analysis) Type I case study (single case) (Yin, 2009) of the knowledge flows within Marine Aircraft Group 12.

### 3. Chapter IV: Case Study

This chapter provides an overview of the USMC and its organizational learning apparatus followed by a case study of knowledge flows within Marine Aircraft Group 12. Pathologies surrounding both explicit and tacit knowledge sharing are identified, and use cases for Web 2.0 and social tools are suggested as possible solutions to these pathologies.

### 4. Chapter V: Conclusions and Recommendations

This chapter includes a summary of this research. Research conclusions, literature contributions, implications, and recommendations are presented in light of this study's findings. Additionally, recommendations for future research are identified and explained.

# II. LITERATURE REVIEW

## A. KNOWLEDGE

Many consider the modern U.S. economy to be shifting from its industrial past to a knowledge-focused future (Drucker, 1969; Friedman, 2005; Grant, 1996; Housel & Bell, 2001; McAfee, 2009). Drucker is credited with coining the term *Knowledge Economy*, which is often used to describe the modern economic importance of knowledge (Phelps, Heidl, & Wadhwa, 2012). This shift in focus exalts the knowledge worker to a critical position within many modern firms. This shift toward a knowledge-based economy is occurring in varying degrees across both developed and developing economies. In this post-industrial age, how well firms and organizations manage the knowledge required for producing outputs or providing services will determine the extent and sustainability of their success (Grant, 1996). Observing the emerging knowledge economy, Thomas Stewart claims "knowledge has become the preeminent economic resource—more important than raw material; more important, often, than money" (Stewart, 1997, p. 6). The following section will summarize existing literature regarding knowledge, knowledge management, and knowledge management systems. The social aspects of knowledge sharing, covered later in this section, are critical to this study. Web 2.0, and the social technologies and applications it enables, boosts user participation, contribution, and networking that can support and encourage knowledge sharing between and among individuals (Allen, 2008; McAfee, 2009; Wan & Zhao, 2007). Prior to the exploration of these Web 2.0 technologies and social tools as knowledge sharing mechanisms, the foundations of knowledge and a brief overview of knowledge management must first be presented.

### 1. The Nature of Knowledge

The purpose of this study is not to initiate a debate regarding the fundamental nature of knowledge and its exact definition; however, a short overview of knowledge is useful. Academically, knowledge is frequently found within a hierarchy or pyramid consisting of data, information, knowledge, and wisdom (DIKW) (Jennex, 2009). This

foundational DIKW hierarchy is commonly attributed to Ackoff (Ackoff, 1989; Jennex, 2009). Many conceptual adaptations of this DIKW hierarchy have been used to illustrate personal and organizational knowledge in relation to data and information. Often within the KM literature, the DIKW hierarchy is simplified to data, information, and knowledge. The idea, generally, is that an abundance of data (facts) enables the formation of information (data in context); knowledge is then created when information becomes actionable or enables action (Nissen, 2006). As illustrated in Figure 1, Nissen portrays the relationship between data, information, and knowledge by placing them within a hierarchy bounded on a scale of actionability and abundance (Nissen, 2006). Various authors relate knowledge directly to action or the ability to perform action (Nissen, 2006; Ikujiro Nonaka & Takeuchi, 1995). According to Nissen, "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)" (Nissen, 2006, p. 28).

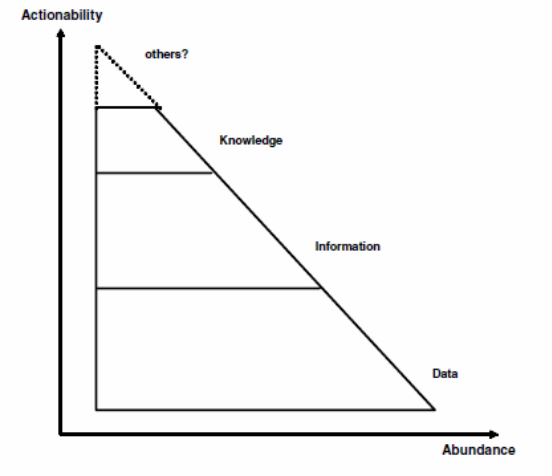


Figure 1. Knowledge Hierarchy (From Nissen, 2006)

Without the knowledge to perform a task, successful action is not possible. On the other hand, data informs information and information converges within the mind of an individual to create knowledge. Tuomi argues that information and data cannot be interpreted without some prerequisite knowledge (1999). Tuomi suggests prior knowledge is required in order to separate data and information from noise. In an effort to

resolve this chicken or egg dilemma, Nissen suggests we consider the *directionality* of the knowledge flow (Nissen, 2006). In Figure 2, Nissen presents a producer and consumer view of knowledge flows; this model could also be considered a sender and receiver model. The producer must have some preexisting knowledge in order to properly generate the information and data to be transmitted via signals to a receiver. The receiver can then receive signals and construct knowledge from the data and information transmitted via signals. Many factors determine whether or not the intended knowledge to be transmitted is received error-free by the receiver; the sender and receiver could have vastly different knowledge foundations. For example, if a graduate school professor attempts to share his knowledge of a complex calculus proof, the success of the transfer would rely upon the knowledge foundation of the receiver; a college student may have the prerequisite knowledge to form the appropriate context needed to make sense of the transmission, and a middle-school student would not. Tuomi posits, and Nissen acknowledges, that some level of existing knowledge is required for the receiver to properly decipher the signals into information or knowledge (Nissen, 2006; Tuomi, 1999).

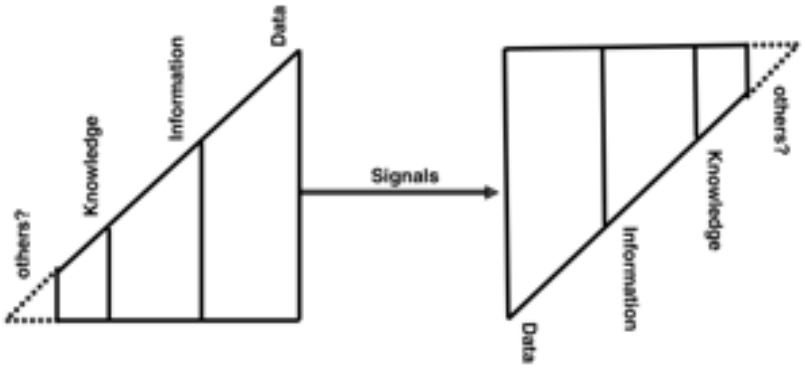


Figure 2. Knowledge Flow Directionality (From Nissen, 2006)

Jennex claims the traditional DIKW hierarchy, with or without wisdom included, is useful only for the introduction of these concepts to those uninitiated to the world of KM (Jennex, 2009). Jennex proposes some enhancements to the DIKW hierarchy in order to more closely account for reality. This model is more appropriate as a foundation

for this study as it illustrates learning, organizational learning, sense making, and social network influence. Jennex uses a broad definition of social media to include the wide variety of methods for sharing data, information, and knowledge between individuals (Jennex, 2009); in this study a much more focused definition of social networks will be established in a later section. This model indicates both individual and organizational learning represented by the vertical lines. The solid lines are the KM processes supporting organizational learning. According to Jennex, "Organizational Learning is defined as a quantifiable improvement in activities, increased available knowledge for decision-making, or sustainable competitive advantage" (2009, p. 4). These lines converge to the knowledge required to perform organizational tasks and enable action. The dashed vertical lines represent individual learning or personal knowledge management (PKM). Oftentimes individual learning will be aligned with the knowledge goals of the organization; however, they do not always converge with organizational knowledge requirements (Jennex, 2009).

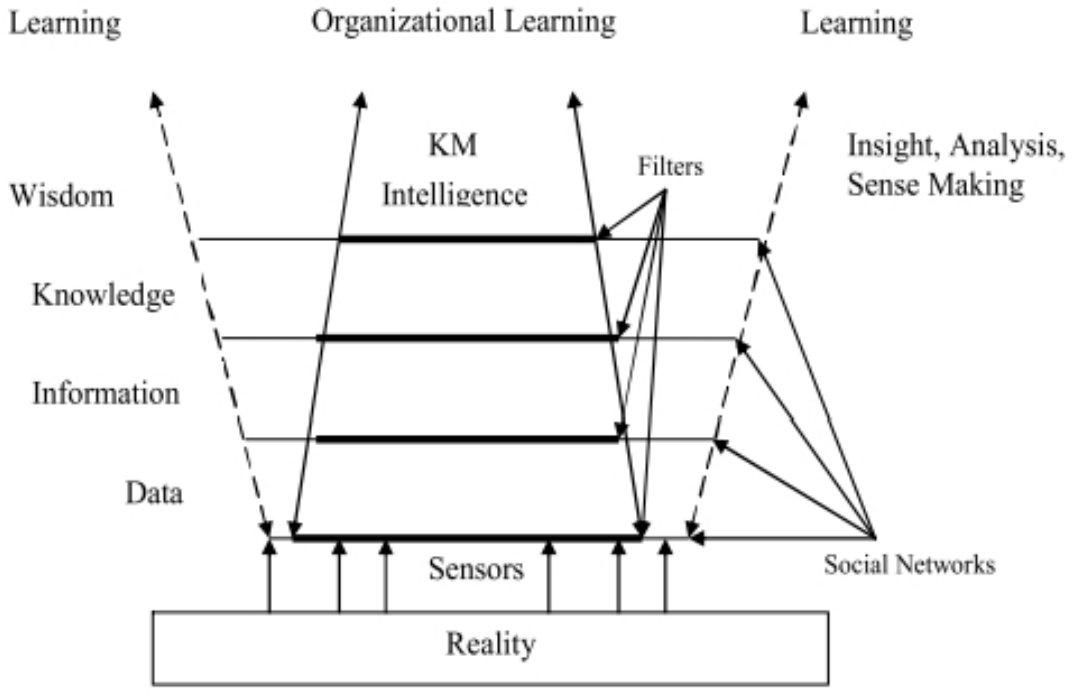


Figure 3. Revised Knowledge Pyramid (From Jennex, 2009)

There are many competing as well as complementary views of the nature of knowledge supported by several related epistemologies (Alavi & Leidner, 2001; Duguid, 2004; Hicks, Dattero, & Galup, 2006; von Krogh et al., 2012). According to Alavi and Leidner, most existing literature concerning knowledge is generally divided into six conceptual perspectives: (1) knowledge vis-á-vis data and information, (2) state of mind, (3) object, (4) process, (5) access to information, and (6) capability (2001). For the purpose of this study we will focus on knowledge as a part of the traditional hierarchy of data, information, knowledge as well as knowledge as an object and process.

## 2. Types of Knowledge

The identification of the types of knowledge used in organizational activities is important for the achievement and sustainment of advantage (Silvi & Cuganesan, 2006). All knowledge is not the same; Nonaka places knowledge on spectrum between explicit and tacit (Ikujiro Nonaka & Takeuchi, 1995). These classifications of knowledge are widely used within KM literature, albeit they are sometimes referred to as objective or subjective (respectively). The categories of the explicit and tacit knowledge have been constructed as a conceptual convenience, and in reality knowledge will have varying elements of both types (Leonard & Sensiper, 1998). Some even argue that the division between explicit and tacit knowledge is no longer necessary.

> 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 recognize 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, p. 3)

Despite some conflicting claims regarding the utility of the distinction between explicit and tacit knowledge, it remains useful for this study. It is particularly useful because the majority of KM programs within the USMC have been focused on explicit knowledge (Johnson, 2010). Table 1 summarizes the contrast of characteristics, from KM literature, between tacit and explicit knowledge (Panahi, Watson, & Partridge, 2012). The following section will describe the characteristics of both explicit and tacit knowledge.

| Tacit Knowledge | Explicit knowledge |
|---|---|
| - Resides in human minds<br>- Highly individual and personal<br>- Learnt through experiences, skills, observation, intuitive feeling, mental modes, beliefs, and values<br>- Unstructured, difficult to see, codify, estimate, investigate, formalize, write down, capture and communicate accurately<br>- Unconscious knowledge (Both known and unknown to the holder)<br>- Job specific, context-specific<br>- Experience based, 'knowledge-in-action'<br>- Transferred through conversation and narrative (story-telling, discussions, etc.)<br>- Know-how<br>- Experts knowledge | - Articulated, structured and documented<br>- Learnt through instruction, recitation, or repetition<br>- Easy to recognize, codify, formalize, store, share, communicate, and use<br>- Can be found in books, journals, databases, etc.<br>- Consciously accessible<br>- Know-that, know what<br>- Academic knowledge |

Table 1. Properties of Tacit and Explicit Knowledge (From Panahi et al., 2012)

Explicit knowledge is easily managed, distributed and consumed; it is objective and easily transferred. Explicit knowledge can exist in the form of recipes, books, documents, procedures, and other mediums of information exchange (Nissen, 2006; Ikujiro Nonaka & Takeuchi, 1995). According to Nonaka, Von Krogh, and Voelpel, "Knowledge that can be uttered, formulated in sentences, captured in drawings and writing, is explicit" (2006, p. 1182). These pieces of explicit knowledge enable action through description, instruction or example (Nissen, 2006). Many modern IT and KM systems perform the function of storing, cataloging, and distributing large chunks of explicit knowledge, with ever-increasing success as technology advances. Consider books, Microsoft's SharePoint, enterprise network storage (e.g., shared drives), digital storage or even the World Wide Web as examples of these tools, applications, or platforms that perform this function. Technology has increased our access to information, and many believe we now exist in an era of information overload (Cotton, 2005). The mountains of data and information now available are useful only if one has the requisite knowledge to act upon such information, or if it has been constructed in such a way that enables action. Some explicit knowledge can be used to teach a person how to interpret information and data that was previously believed to be non-useful. For example, a

student can use any school textbook or manual (explicit knowledge) to learn about an idea, process, or task. Nissen presents the example of learning to fly an aircraft: a student pilot can easily read instructions for how to properly fly an airplane, but this student cannot safely fly the plane without generating the requisite tacit knowledge (e.g., direct instructor mentoring, hands-on supervised instruction). These basic forms of learning, made possible by explicit knowledge, can enable action, but it is difficult to replicate the valuable personal experience (tacit knowledge) associated with doing or performing the task at hand over time.

Polanyi established the concept of tacit knowledge and emphasized the social interaction necessary for its transfer (1966). The basic premise behind tacit knowledge is that people tend to know much more than they can actually explain or communicate (Nissen, 2006; Polanyi, 1966; Sveiby, 1997). The experience gained or learned over a career or lifetime is contained within an individual as tacit knowledge. Obviously, tacit knowledge is valuable. Tacit knowledge is highly subjective because it is both personal and experience-based. Why else would experience remain one of the significant contributors to credibility in the modern world? Tacit knowledge becomes even more critical as the complexity of an organization's operating environment increases (Polanyi, 1966). The difficulty in transferring tacit knowledge is one large reason people remain so critical to the operation of any organization, despite significant advances in automation, technology, and computing. If rich tacit knowledge were easily transferred or stored in an IT system, organizations would have no need to invest so much in human resources.

The literature regarding tacit knowledge generally falls into one of two camps: those who believe knowledge is binary (either tacit or explicit) and those who believe there are degrees of tacitness or explicitness (Panahi, Watson, & Partridge, 2013). Ambrosini and Bowman's description of the degrees of tacitness is useful for the operationalization of tacit knowledge in the context of this study (Ambrosini & Bowman, 2001). Lower degrees of tacitness can be more easily converted into explicit form or transferred to others via knowledge sharing. Higher degrees of tacitness are more difficult or impossible to transfer due to the strong (sometimes unconscious) contextual existence within a person's mind. Figure 4 illustrates Ambrosini and Bowman's degrees of

tacitness. It is important to note that despite an abundance of theoretical research, there seems to be a lack of empirical evidence operationalizing the concept of tacit knowledge (Panahi et al., 2013). Despite this observation, the theoretical construct of tacit knowledge is adequate for this study.

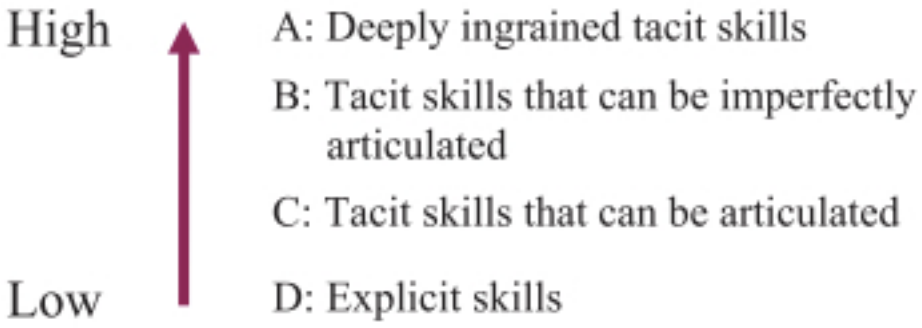


Figure 4. Degree of Tacitness (From Ambrosini & Bowman, 2001)

For obvious reasons, both explicit and tacit knowledge are valuable resources for individuals and organizations alike. The relationship and interplay between these two types of knowledge is useful for understanding how the transfer of knowledge happens and learning occurs (Leonard & Sensiper, 1998). Nonaka and Takeuchi's seminal 1995 study establishes a learning model consisting of four stages: socialization, externalization, combination, and internalization (SECI). This theoretical collection of processes is frequently referenced as the SECI model in the both organizational learning and KM literature. Socialization is the mechanism by which tacit knowledge is shared between individuals. Typically this is achieved through face-to-face interaction and rich interpersonal dialogue. Socialization is a tacit to tacit transfer. Externalization is the process that attempts to convert or articulate tacit knowledge into explicit form; this translation is subject to high attenuation because "we can know more than we can tell" (Polanyi, 1966) and tacit knowledge loses some of its value or usefulness during the conversion process (Nissen, 2006). Externalization is a tacit-to-explicit transfer. Combination is the process of combining pieces of explicit knowledge in useful or novel ways (e.g., knowing what and how to apply existing explicit knowledge). Combination is explicit-to-explicit. Internalization is assimilating pieces of explicit knowledge into

personal tacit knowledge and experience. Internalization is explicit-to-tacit. This SECI learning process, also considered a knowledge conversion process, explains the value-adding knowledge-creating interaction between personal knowledge and group knowledge (Nonaka et al., 2006). It is important to note that social interaction is a requirement emphasized by three of the four processes—socialization, externalization, and combination (Chua, 2002).

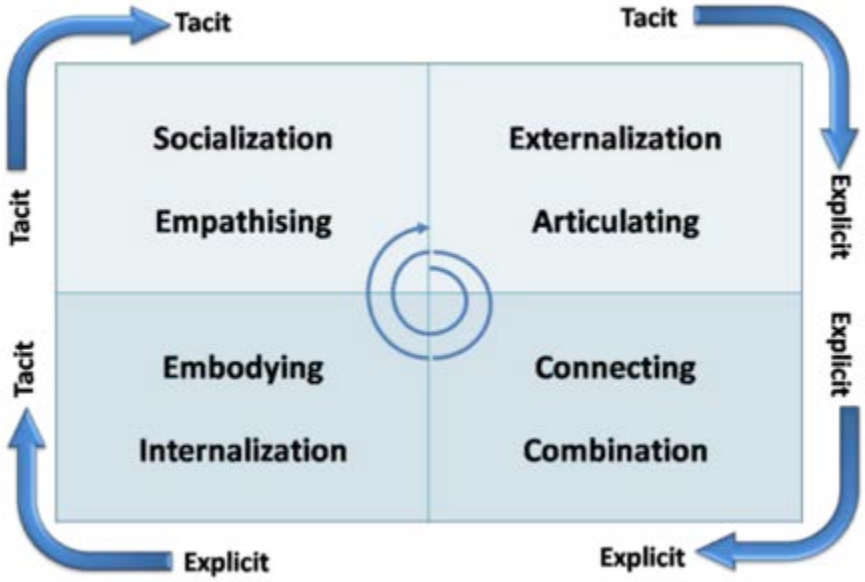


Figure 5. SECI Model of Organizational Learning (From Ikujiro Nonaka & Takeuchi, 1995)

Modern KM programs and KMS, discussed in more detail later, seek to facilitate and improve the SECI processes within organizations (Gordeyeva, 2010). Traditionally, these systems have been highly successful in the management of explicit knowledge (Alavi & Leidner, 2001; Hislop, 2002; Nissen, 2006). Now that the types of knowledge have been discussed, the following section will explore current theory on the dynamics of knowledge.

### 3. Knowledge Dynamics

Knowledge, as other resources, has many properties relating to its life cycle and movement. It must be created either physically (explicit) or mentally (tacit) before it can

be manipulated or shared. In Figure 6, Nissen proposes a knowledge lifecycle consisting of creation, organization, formalization, sharing, application, and refinement (Nissen, 2006).

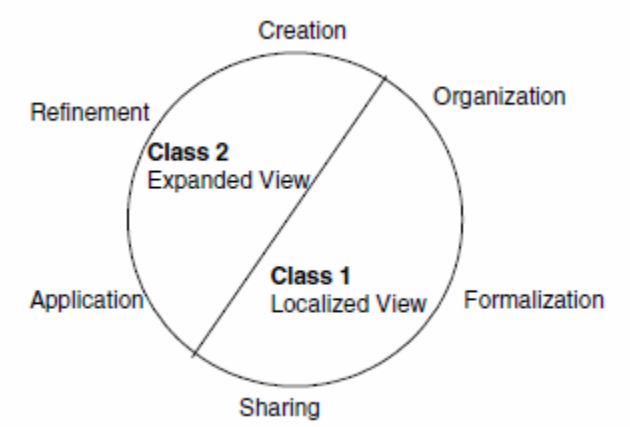


Figure 6. Knowledge Lifecycle (From Nissen, 2006)

Nissen's model fits within the constructs of knowledge as resource, and knowledge as a resource to be managed. The widely circulated and referenced SECI model (Ikujiro Nonaka & Takeuchi, 1995) represents organizational knowledge flows, and heavily emphasizes the role of social interaction within that process (Chua, 2002). Nissen enhances the SECI model of knowledge flows by modeling each of the flow patterns (socialization, externalization, combination, internalization) upon a three-dimensional axis. Nissen's knowledge flow model (Figure 7) illustrates the differences between flow time, reach (e.g., individual, group, organizational), knowledge lifecycle stage, and the degree of tacitness. This model is useful because it illustrates the different characteristics of the knowledge flow processes within the SECI model. This model is important to this study because it will be referenced later to illustrate the knowledge sharing capabilities of certain Web 2.0 and social media tools.

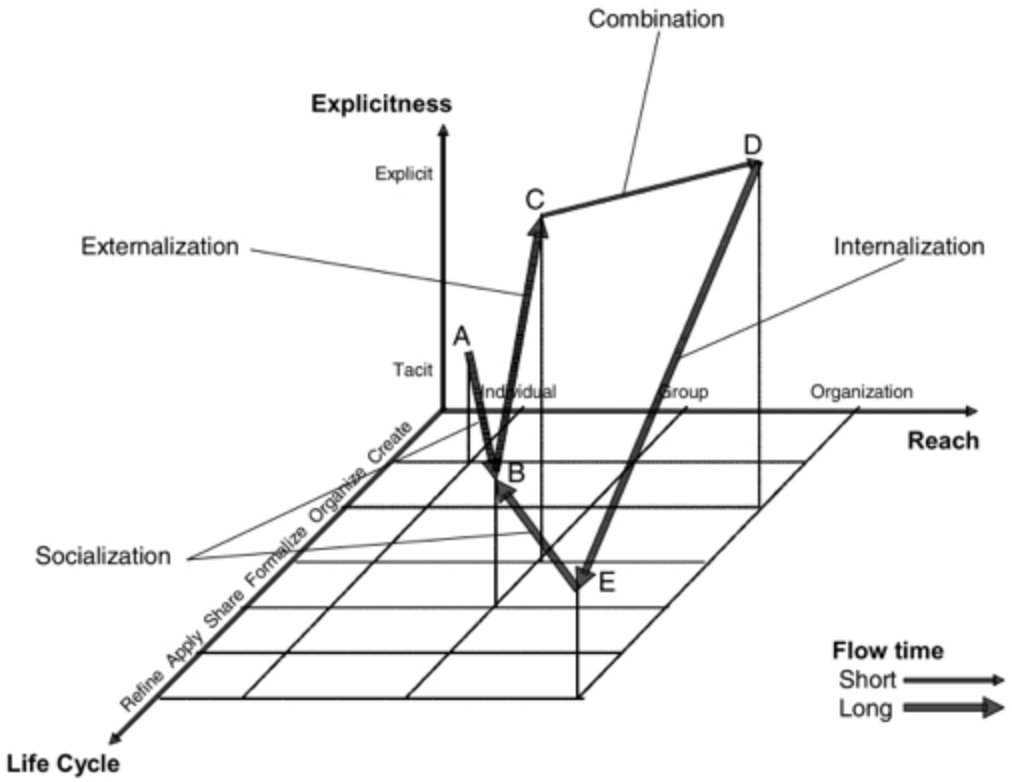


Figure 7. Knowledge Flow Visualization (From Nissen, 2006)

Taylor proposes a categorization of tacit and explicit knowledge based upon the degree to which it can be articulated (Figure 8). Taylor synthesizes current knowledge literature and assigns transfer mechanisms across a range of tacit and explicit knowledge types: nonepistle, sagacious, semantic, explicit, encultured, embedded, and encoded. In addition to the differences in tacitness and ease of articulation between Taylor's knowledge types, different transfer mechanisms are suggested. Each of these transfer mechanism could be plotted on Nissen's knowledge flow visualization with varying degrees of flow time, reach, and life cycle characteristics. For example, the transfer mechanisms for the most non-articulable individual tacit knowledge (e.g., apprenticeship, observation, mentorship) would have the longest flow time, and shortest reach characteristics (individual-to-individual).

| Type of knowledge | Extent of articulation | Transfer mechanisms |
|---|---|---|
| Individual tacit | Nonepistle: Inarticulable | Demonstration, observation, apprenticing, actual practice, mentoring |
| | Sagacious: Partially articulable | Metaphor, analogy, storytelling, critical incident studies, behavior modeling |
| | Semantic: Articulable with prompting | Questioning to elicit or 'surface' the underlying explicit knowledge base |
| Individual explicit | Explicit: Readily articulated | Formal learning procedures, e.g. schools, reading, formal training, etc. |
| Collective tacit | Encultured: Partially articulable but context dependent | "Socialization", observation, informal behavior modeling. Also direct explanation of the rule in a particular context. |
| | Embedded: Articulated or partially articulated in formal and informal procedures and routines | Informal observation; on-the-job training of "the way we do things round here"; group causal mapping. |
| Collective explicit | Encoded: Readily articulated, usually in writing | Formal learning procedures |

Figure 8. Transfer Mechanisms for Dimensions of Knowledge (From Taylor, 2009)

Numerous factors have been discovered that influence knowledge sharing among and between individuals, such as trust, context, and willingness to share (Holste & Fields, 2010). Sharing tacit knowledge is sometimes perceived as a risk by some because they believe they may lose any competitive advantage that particular knowledge enabled (Leonard & Sensiper, 1998).

### 4. Knowledge Summary

In summary, tacit knowledge is a critical resource necessary for operating in any complex environment. However, this type of knowledge is difficult to share (Matschke, Moskaliuk, & Cress, 2012) and even more difficult to manage (Shirazi, Mortazavi, & Azad, 2011).

> However, while the organization explicit knowledge can be managed through procedural and technological changes, it is the management of tacit knowledge that poses the greatest challenge and benefit to successful KM implementation, as it requires a significant cultural, structural and leadership style changes. (Shirazi et al., 2011, p. 169)

Explicit knowledge is relatively accessible and well managed in today's IT-centric environment. Tacit knowledge, due to its personal and subjective nature, is difficult to manage on an organizational scale. It is believed, by several authors, that the capabilities that social tools provide can enhance tacit knowledge sharing (Gordeyeva,

2010; McAfee, 2006; McAfee, 2009; Panahi et al., 2012, 2013); this concept will be explored in more detail later in this chapter.

## B. ORGANIZATIONAL LEARNING AND KNOWLEDGE MANAGEMENT

The ability for an organization to make sense of its environment, react to stimuli, and generate new knowledge falls under the wide conceptual umbrella of organizational learning. Knowledge management is often considered a specific practitioner field within the more nebulous concept of organizational learning (Davenport & Prusak, 2000); however, there are many opinions regarding the relationship between these two concepts. Many widely cited KM authors such as Garvin, Nonaka, and Senge are also tightly woven into the organizational learning literature (Rangnekar, 2010).

In his iconic book *The Fifth Discipline*, Senge leverages complexity theory to model the *learning organization*. Some consider this line of thinking to be a fad, while others believe many of Senge's principles can be successfully applied within modern organizations. Senge echoes many KM scholars with the sentiment that many organizations place too much emphasis on IT for their organizational learning or KM efforts (Senge, 1990). Davenport and Prusak claim that organizational learning is a good starting point for [organizational] knowledge management, but it is typically more abstract and ephemeral than more pragmatic KM concepts (Davenport & Prusak, 2000).

Garvin identifies several characteristics of learning organizations in his 1993 work:

- Systematic problem solving
- Experimentation with new approaches
- Learning from their own experience
- Learning from the experience and best practices of others
- Transferring knowledge quickly and effectively throughout the organization

Garvin posits that organizations can have an active role in constructing their own learning environment (Garvin, 1993). Jennex provides a good summary definition of organizational learning "…as a quantifiable improvement in activities, increased

available knowledge for decision-making, or sustainable competitive advantage" (Jennex, 2009, p. 4). Knowledge management plays a role in organizational learning even if the extent of that role is debatable in academic circles.

### 1. Resource-Based View of the Firm

According to the resource-based view (RBV) of the firm, knowledge is necessary for the application of all firm resources (e.g., raw materials, human capital, equipment) (Bloodgood & Salisbury, 2001). Grant asserts that the primary role of the firm is to leverage the knowledge within its individuals to achieve the production of goods and services (Grant, 1996). Integration of knowledge across the firm can be a complex and challenging endeavor, well worthy of management's attention (Grant, 1996). The resident knowledge within an organization is most often found within its people. Although more difficult to quantify, albeit not impossible, knowledge is key to success in today's competitive marketplace (Halawi, Mccarthy, & Aronson, 2006; Housel & Bell, 2001). Knowledge must now be deliberately managed just as other firm resources (e.g., plant, property, equipment). The proper application and management of knowledge as a resource becomes more crucial as innovation, value derivation, and complexity continue to shape our dynamic modern marketplace (Housel & Bell, 2001). Figure 9 illustrates the need for more dynamic knowledge management processes as business environment complexity increases (Jarche, 2011). Dierickx and Cool describe knowledge as internally accumulated non-tradable goods. These goods (e.g., knowledge) enable the operation of any organization and in turn determine the efficacy of such operations (Dierickx & Cool, 1989).

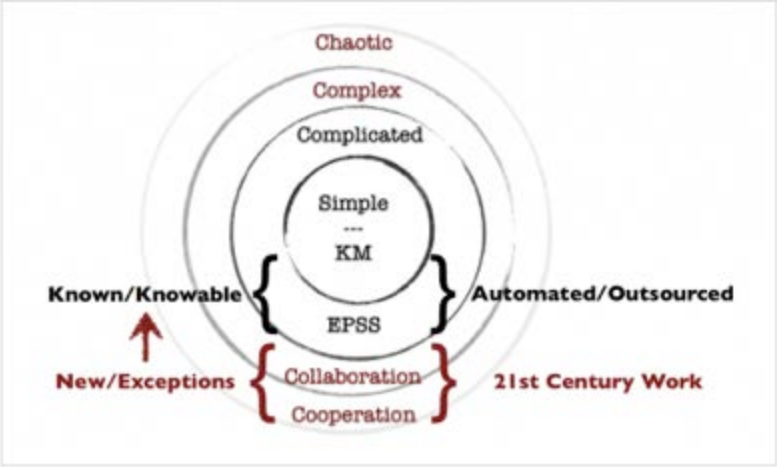


Figure 9. Complexity versus Knowledge Used Concentric Model (From Jarche, 2011)

Knowledge, like other resources, can be stored and used when required. Stocks of knowledge have been shown to be a source of competitive advantage and innovation (DeCarolis & Deeds, 1999), and these stocks of knowledge can exist across the spectrum of knowledge (e.g., explicit, tacit). Explicit knowledge stocks within an organization could be classified as tangible intellectual property (e.g., patent information, secret formulas, reports). These explicit stocks of knowledge have generated competitive advantage in the past, but modern advances in technology associated with the information age diminish the possibilities of sustained advantage through purely explicit knowledge. In today's technology rich environment, much explicit knowledge is easily copied, reverse-engineered, or even stolen. More frequently today, organizations attribute competitive advantage to intellectual capital, and the innovation that it enables (DeCarolis & Deeds, 1999). Intellectual capital is synonymous, in most cases, with tacit knowledge. How does an organization manage their intellectual capital or tacit knowledge?

The value of knowledge has been well documented (Grant, 1996; Nissen, 2006; Stewart, 1997; Sveiby, 1997). During the past two decades, the ever-growing value of knowledge has generated the academic and practitioner field known as knowledge management (Phelps et al., 2012). The tools, methods, and tactics of knowledge management across industries can vary wildly, but most modern organizations realize the importance of managing this critical resource. Many organizations may manage

knowledge without granting those processes a dedicated title (e.g., knowledge management); they may manage knowledge through various dispersed business processes, such as human resources management, research and development, operations management, and other internal functions or traditional business roles. Whether they realize it or not, knowledge enables the creation of their product or the performance of their services. The following section will summarize knowledge as a resource, in the context of organizational knowledge management. According to Levin and Cross, "Organizations that can make full use of their collective expertise and knowledge are likely to be more innovative, efficient, and effective in the marketplace" (2004, p. 1477).

The knowledge management field has emerged and continued to evolve over the last three decades. Numerous technical, procedural, and cultural solutions are enacted for the sake of KM. These efforts become increasingly necessary as the importance of knowledge and knowledge work continues to expand. The successful management of knowledge should be a critical objective for any modern organization. KM is defined by Davenport and Prusak as "the systematic attempt to create, gather, distribute and use knowledge" (Davenport & Prusak, 2000). Knowledge management systems (KMS) attempt to establish systematic processes by which the knowledge life cycle can be cultivated, improved and leveraged within an organization. Traditional KMS used by many modern organizations have successfully leveraged information and communication technology (ICT) for the management of explicit knowledge (Panahi et al., 2012). Over the past few decades, most KMS have been painstakingly designed to support a top-down vision of a knowledge architecture best suited to an organization (McAfee, 2009). This method of the top-down a priori architecture establishes a rigid framework that is difficult to the change in response to today's increasingly dynamic operating environments (McAfee, 2009). Many of these systems successfully capture, store, and distribute explicit knowledge across an organization (McAfee, 2009; Nissen, 2006). During the mid- to late-1990s, systems collectively known as groupware would serve as the communications and information portals within an organization—these systems were oftentimes considered KM or KMS projects (McAfee, 2009).

Figure 10 lists various perspectives on knowledge, discussed earlier, and their associated implications for KM and KMS. Alavi and Leidner's KM and KMS implications indicate unique considerations for the application of KM processes and KMS IT systems. The focus and capabilities of many modern KM and KMS can be identified within Alavi and Leidner's list of implications. Most KM programs and KMS tend to stem from one or two of these knowledge epistemologies (Alavi & Leidner, 2001). The particular foundational epistemologies are determined by the objectives of the organization and the purpose underlying their efforts to improve organizational knowledge.

| Perspectives | | Implications for Knowledge Management (KM) | Implications for Knowledge Management Systems (KMS) |
|---|---|---|---|
| Knowledge vis-à-vis data and information | Data is facts, raw numbers. Information is processed/ interpreted data. Knowledge is personalized information. | KM focuses on exposing individuals to potentially useful information and facilitating assimilation of information | KMS will not appear radically different from existing IS, but will be extended toward helping in user assimilation of information |
| State of mind | Knowledge is the state of knowing and understanding. | KM involves enhancing individual's learning and understanding through provision of information | Role of IT is to provide access to sources of knowledge rather than knowledge itself |
| Object | Knowledge is an object to be stored and manipulated. | Key KM issue is building and managing knowledge stocks | Role of IT involves gathering, storing, and transferring knowledge |
| Process | Knowledge is a process of applying expertise. | KM focus is on knowledge flows and the process of creation, sharing, and distributing knowledge | Role of IT is to provide link among sources of knowledge to create wider breadth and depth of knowledge flows |
| Access to information | Knowledge is a condition of access to information. | KM focus is organized access to and retrieval of content | Role of IT is to provide effective search and retrieval mechanisms for locating relevant information |
| Capability | Knowledge is the potential to influence action. | KM is about building core competencies and understanding strategic know-how | Role of IT is to enhance intellectual capital by supporting development of individual and organizational competencies |

Figure 10. Knowledge Perspectives and their Implications (From Alavi & Leidner, 2001)

Each of these perceptions of knowledge are useful in different ways for certain applications (Hemsley & Mason, 2012). Different KMS will focus on supporting knowledge according to one or several of these epistemological assumptions of the nature of knowledge (Alavi & Leidner, 2001; Hemsley & Mason, 2012).

> Most views of KM recognize that it has both social and technological dimensions which need to be integrated, and that KM has broad aims involving organizational culture, transparency, and agility of processes, and the development of infrastructure that is harmonious with individual needs and organizational context. (Nelson & Hsu, 2008, p. 2072)

## 2. Communities of Practice

Communities of Practice (CoP) are defined by Wenger and Snyder as "…groups of people informally bound together by shared expertise and passion for a joint enterprise" (2000, p. 139). CoPs are organizational forms that typically emerge for the purpose of sharing knowledge and expertise (Wenger & Snyder, 2000); typically they are informal collections of individuals in a certain field or functional area (e.g., sales, IT, marketing) who communicate in order to seek and give advice related to their areas of expertise (Wenger & Snyder, 2000).

Many organizations have encouraged or championed the creation of CoPs among their employees or stakeholders while expecting collaboration or improvements to just emerge (Cross & Parker, 2004). Cross and Parker warn that it is not enough to merely create these CoPs, but organizations must also analyze the social networks that surround, support, and enable such CoPs (2004). Numerous examples of grassroots CoPs within the U.S. Military illustrate the emergent collection of geographically separated individuals for the purpose of sharing both explicit and tacit knowledge through online dialogue (Polania, 2010). Some well-known examples of these are AirWarriors.com and CompanyCommand.com. Social tools can greatly enhance the development of such CoPs within many organizations. As will be discussed later, Web 2.0 enabled tools such as social networking sites (SNS) are excellent platforms to support the emergence of various CoPs within an organization.

## 3. Personal Knowledge Management

In the knowledge economy success is often contingent upon what you have the potential to learn to do in the future, not on what you can do now. This knowledge culture breeds an emphasis on the generalist instead of the expert; however, experts do still serve an important purpose, and will continue to serve this purpose. Someone who knows a little about a lot of things is valuable for the context with which they can frame problems and generate solutions. This trend in generalist appreciation converging with increasing amounts of data and information presents a unique problem to average workers—a requirement to know about a lot of things, growing amounts of information, and limited

mental storage capacity or processing power. This problem has spawned an interest in personal knowledge management (PKM). PKM is the process by which an individual manages his or her personal knowledge in such a way that it is accessible when needed. Modern social tools enabled through Web 2.0 grant wonderful opportunities for the future of PKM (Razmerita, Kirchner, & Sudzina, 2009). A collection of social tools and platforms now allow individuals to manage their knowledge, interactions, and even relationships online (Razmerita et al., 2009). Jarche, a KM and organizational behavior blogger, emphasizes PKM as a critical piece to any organization's KM architecture (Figure 11) (Jarche, 2013).

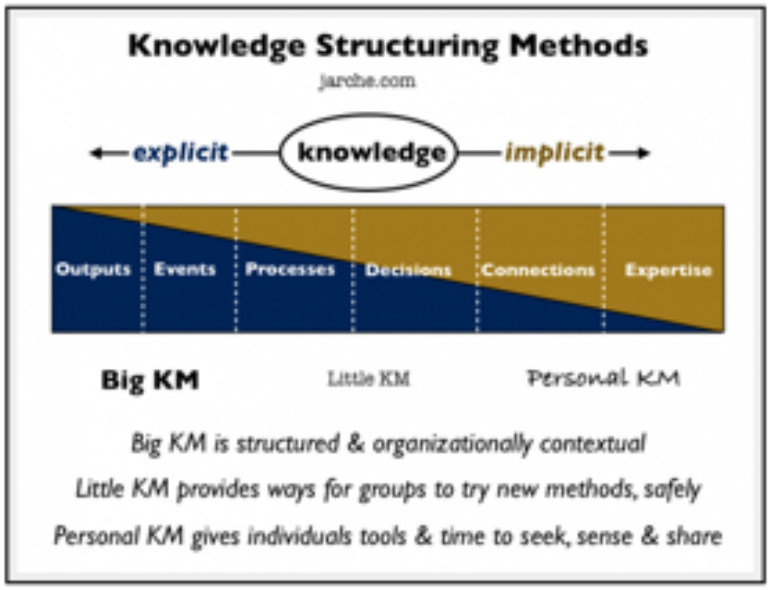


Figure 11. Knowledge Structuring Methods (From Jarche, 2013)

PKM is one of the building blocks of organizational KM. Individuals create, build, and prune their PKM networks and processes that contribute to the larger organizational KM ecosystem. Each person's PKM practices will be different (Jarche, 2012a); some will be better at PKM than others. Social tools can enhance PKM across an enterprise by enabling or enhancing many of the actions listed under the visibility line in Jarche's adaptation of Berg's collaboration pyramid (Figure 12).

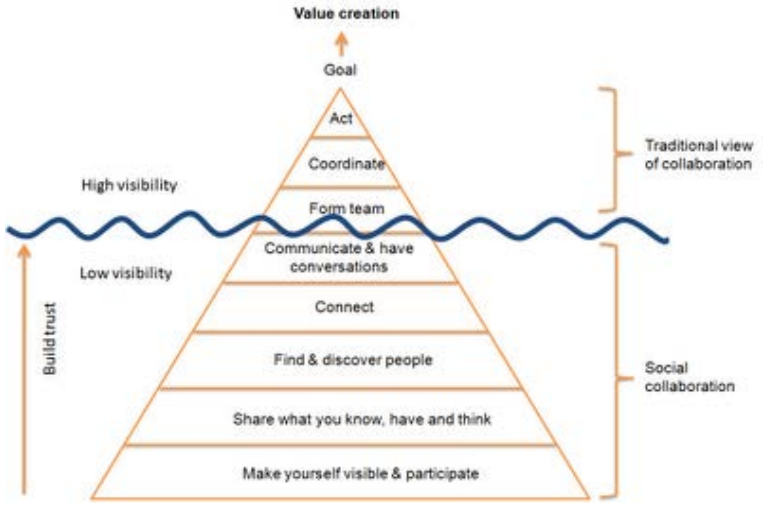


Figure 12. The Collaboration Pyramid or Iceberg (From Berg, 2012; Jarche, 2012a)

It is important to note that social tools not only enable greater tacit knowledge sharing, but also greater PKM. These tools can be used to create an individual's external knowledge system. The ability for a user to blog about an experience, update a status, or build a personal knowledge network can broaden the scope and quality of knowledge an individual can wield, and lowers barriers for personal knowledge sharing.

### 4. KM Success Factors

Davenport and Prusak present the following factors, they believe, lead to a successful organizational KM program (2000):

- A knowledge-oriented culture
- Technical and organizational infrastructure
- Senior management support
- A link to economics or industry value
- A modicum of process orientation
- Clarity of vision and language
- Nontrivial motivational aids
- Some level of knowledge structure
- Multiple channels for knowledge transfer

The purpose of this research is not to explore successful KM programs or projects, but rather to illustrate the use of particular tools within a larger organizational KM framework. Davenport and Prusak present one set of KM success factors, but many other sets exist within KM literature. Important to note here is that this study aims to investigate Web 2.0 and social tools as additional knowledge network channels. Channel capacity for knowledge discovery and knowledge sharing varies wildly between different media (e.g., face-to-face, email, instant messenger, video-teleconference, SNS); a greater number of options is beneficial as individuals can choose a medium best suited to any particular situation (Davenport & Prusak, 2000). If Web 2.0 and social tools provide an additional channel for knowledge sharing and transfer, the efficacy of organizational KM can be improved.

Hansen, Nohria, and Tierney simplify organizational KM strategies by dividing them into two categories: codification and personalization (1999). A codification KM strategy aims to maximize the use of IT and KMS to store explicit knowledge for rapid dissemination, distribution, and ease of access (Hansen et al., 1999). A personalization KM strategy, on the other hand, emphasizes relationships between those who need knowledge and the experts that have knowledge—a focus on expert location and knowledge transfer via professional networks of individuals (Hansen et al., 1999). Formal and informal networks are how a large portion of work is accomplished within an organization (Cross & Parker, 2004), and the social interaction within these networks enables the creation and distribution of tacit knowledge (I. Nonaka et al., 2006; Ikujiro Nonaka & Takeuchi, 1995). The current (and future) crop of Web 2.0 and social tools seems poised to best support a personalization strategy of KM within an organization. These social tools and their particular characteristics will be explained in further detail later in this chapter.

### 5. Barriers to Organizational KM Success

According to Davenport, De Long, and Beers, “If the cultural soil isn’t fertile for a knowledge project, no amount of technology, knowledge content, or good project management practices will make the effort successful” (1998, p. 53). Interpersonal trust

has also been linked to KM success (Levin & Cross, 2004). Due to the hierarchy typical of most military organizations, natural barriers to knowledge sharing exist merely due to the inequality in status among individuals (Leonard & Sensiper, 1998); the geographic distances between the scattered staff members can also present a barrier to knowledge sharing (Leonard & Sensiper, 1998). Table 2 summarizes some of the current shortfalls of many organizational KM initiatives.

| | |
|---|---|
| **Structure** | • Excessive focus on technology but, less focus on social aspects of knowledge management<br>• Small companies don't want look at long-term and don't want to invest in additional cost<br>• Transaction based cost structures that fails to identify ROI on knowledge management initiatives |
| **Culture** | • Lack of trust to share knowledge<br>• Fear of loss of management controls<br>• Resistance to share<br>• Lack of a collaborative environment |
| **Technology** | • Sophisticated and costly products<br>• Specifications and requirements set in a top-down manner<br>• Knowledge is often decontextualized – individuals using the knowledge can't apply correctly<br>• Inability in encoding tacit knowledge |

Table 2. Summary of KM Issues (From Rangnekar, 2010)

KMS of the past have failed to adequately capture or distribute tacit knowledge. One reason is tacit knowledge and experience exists within people; it cannot be easily digitized into easily sharable forms like explicit knowledge. Numerous issues commonly plague KM programs within modern organizations (Table 2) (Rangnekar, 2010). Emerging social tools may alleviate some of these issues, such as lack of social KM focus, lack of trust, fear of lost management control, high sophistication, or complex usability.

## C. WEB 2.0 AND THE EMERGENCE OF SOCIAL TOOLS

### 1. Transition from Web 1.0 to Web 2.0

> [Web 2.0 is] the business revolution in the computer industry caused by the move to the Internet as a platform, and an attempt to understand the

> rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them. (O'Reilly, 2006)

The Internet boom of the 1990s was indicative of what we now call Web 1.0. Web 1.0 was the early mainstream Internet known for e-commerce and the static web-presence of the many companies and resources; Web 1.0 has also been called the Read-Only Web. Generally, websites in the Web 1.0 era were engineered, designed, developed, and maintained (to include the information contained on the site) by professional web-developers or content experts; websites contained mostly static information updated (when necessary) by those anointed as website administrators. Web 2.0 is the label assigned to the World Wide Web transition from static sites to platforms designed to enable and encourage user contribution and interaction; Web 2.0 has also been referred to as the Read-Write Web. The stark difference between the Internet websites of the early 1990s and the early 2000s is a significant indicator of the capability jump between Web 1.0 and Web 2.0. The term Web 2.0 was originally coined by Tim O'Reilly as he, in hindsight, observed and categorized website capabilities over the last two decades. Patterns of capabilities, shifting website focus, and content generation differences began to emerge between websites of different time periods.

Although the exact definition varies, Web 2.0 is generally considered the set of web-based technologies that serve as the foundation of modern social tools and software (Zyl, 2009). Web 2.0 technology enables many common web applications such as blogs, wikis, social bookmarking, tagging, really simple syndication (RSS), SNS, and many real-time collaboration tools (Zyl, 2009). Many common Web 2.0 concepts and tools are illustrated in Figure 13. Web 2.0 is the backbone of many social tools designed to distribute content throughout virtual communities (McKinsey Global Institute, 2012). Due to the early mainstream popularity of SNS such as MySpace and Facebook, the term "social media" often implies playful non-work activities to many organizational leaders (McAfee, 2009), but as this study will show social technologies are no longer merely used for personal leisure. Figure 14 illustrates some conceptual layers of Web 2.0. Advances in various technologies have converged to enable many of the Web 2.0 features commonplace on today's Internet; among these advancements are hardware speed,

computing power, XML, and others (Kim, Hall, & Gates, 2009). Web 2.0 shifted the content directionality of the Internet from a purely producer-centric model to a more bi-directional model allowing individual participation and generation of online content en masse (Kim et al., 2009). An indicator of this trend is the growing proportions of upload traffic to download traffic; in the early 1990s many Internet users were only concerned with their download speeds. Today, the average Internet user uploads just as much content as they download: pictures to SNS, personal blog posts, personal cloud storage, and real-time video are just a few examples (McAfee, 2006).


Figure 13. Web 2.0 Concept Cloud (From “Web 2.0,” n.d.)

| (User/Market) Driver Layer |
| --- |
| User/Market demand, Needs of Social Networks, Network Effects from User Participation, Content Sharing Needs |
| Application Layer |
| Social Network Service (e.g., Facebook, MySpace), Sharing (e.g., YouTube, Flickr, Bit Torrent), (Micro)Blogs (e.g. Twitter, Yammer), RSS, Mashups, Tagging and bookmarking (e.g., del.icio.us), Collaborating (e.g., Wiki's), Rating and Recommendation systems, Others (e.g., Window Live, Google Adsense, Skype, Web widgets), and others |
| Principle Layer |
| Harnessing Collective Intelligence, Network externality, Peer production, Authorship, Participation, Collaboration, Social Networking, Rich User Experience, Open technology, and others. |
| Technology Layer |
| Semantic Web, Interactivity Responsiveness, Web Services, lightweight programming, AJAX, XML, Rich Internet Application (RIA) tools, Flash, Google Gears, Growth in Computing Power (h/w, s/w, networking, etc), and others. |

Figure 14. Conceptual Framework for Web 2.0 (From Gordeyeva, 2010; Kim et al., 2009)

Many of the most common social platforms today (e.g., Facebook, YouTube, Twitter) are web applications, built with Web 2.0 technologies, which adhere to the Web 2.0 principles of participation, collaboration, and social networking. These applications and platforms harness network effects to achieve value by leveraging the massive scale of the modern Internet. There are many examples of Web 2.0 tools and applications today. Some of the most relevant and promising social tools for organizational use have been collected under the umbrella Enterprise 2.0 (McAfee, 2009), and will be discussed later in this section.

### 2. Social Media and Social Networking

According to Kietzmann, Hermkens, McCarthy, and Silvestre, “Social media employ mobile and web-based technologies to create highly interactive platforms via which individuals and communities share, co-create, discuss, and modify user-generated content” (2011, p. 241). We have all noticed the rise to power of social media giants such as Facebook, MySpace, YouTube, Twitter, Google+ and others. Social media, social networking sites (SNS), and other Web 2.0-enabled platforms have recently emerged as dominant fixtures of our online social lives. SNS allow personal and professional connections and networks to be created, maintained, and cultivated in a nearly boundaryless online global network.

Kietzmann et al. submits a useful honeycomb framework of social media functionality (Figure 15) (2011). Each prominent modern social media or SNS site places different emphasis on a collection of various functionalities; some emphasize sharing, while others champion identity and conversation. These platforms of social, individual, and community communication have had a large impact on the modern world as we know it (Kietzmann et al., 2011), and will continue to do so in the near future.

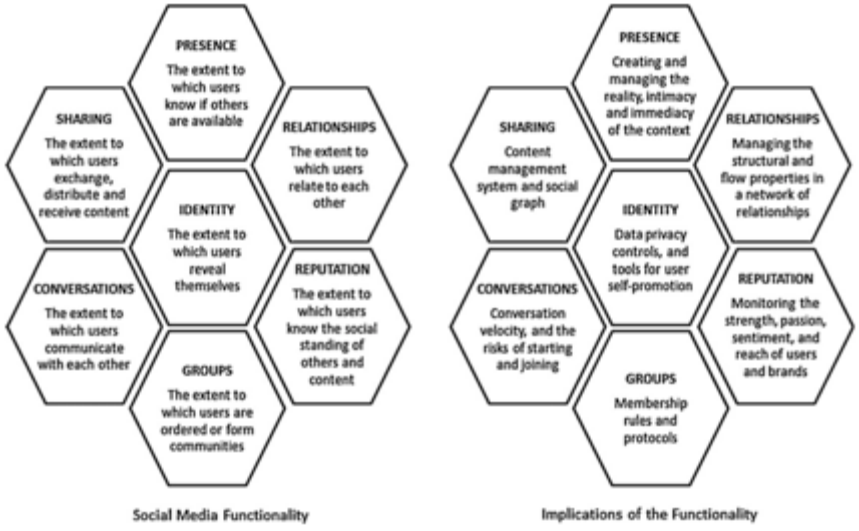


Figure 15. The Honeycomb of Social Media (From Kietzmann et al., 2011).

## D. ENTERPRISE 2.0

The convergence of a growing digitally literate workforce and the maturing landscape of social tools and software creates unique opportunities and risks for modern organizations (Zyl, 2009). A recent McKinsey Global Institute report (2012) describes the power of social tools:

> Social technologies enable social behaviors to take place online, endowing these interactions with the scale, speed, and disruptive economics of the Internet. Social interaction is a powerful way of efficiently organizing knowledge, culture, and economic and political power. Freed from the limitations of the physical world, people are able to use social technologies to connect across geographies and time zones and to multiply their influence beyond the numbers of people they could otherwise reach. (McKinsey Global Institute, 2012)

McKinsey Global Institute establishes three very useful characteristics of social tools: (1) they are enabled by IT, (2) they provide "distributed rights to create, add, and/or modify content and communications," and (3) they "enable distributed access to consume content and communications" (2012, p. 13). This distribution of communication, interaction, and content works well for connecting geographically separated individuals and groups around ideas, projects, or shared goals.

While many SNS are used personally by millions of people across the globe, they are less frequently used within the boundaries of an enterprise in a professional capacity. Recently, the frequency of enterprise adoption for such social applications and platforms has increased. Some have said that the value of social tools within the enterprise is maturing at a steady rate (Archambault & Grudin, 2012). More and more companies have implemented some form of social tools within their enterprise over the last few years, and the trend continues to rise as indicated by recent corporate research (McKinsey Global Institute, 2012). In addition to the obvious benefits of social media for externally focused value creation (e.g., marketing, customer relationship management, crowdsourcing), value can also be achieved through the use of social tools inside an enterprise by way of improvements to communication and collaboration (McKinsey Global Institute, 2012).

According to Matschke et al., Web 2.0 and the social networking tools it enables present an excellent conduit for the sharing of knowledge within an organization (Matschke et al., 2012). According to Hemsley and Mason, social media tools and Web 2.0 have "changed the knowledge ecosystems that organizations face" (2012, p. 3928). An increasing number of businesses are investing in social tools in order to cultivate collaboration and knowledge sharing within their organizations (Schneckenberg, 2009). Numerous studies have recently emerged that have either conceptualized or analyzed the connection between social tools and traditional organizational knowledge management (Levy, 2009). Conflicting academic and practitioner opinions regarding the contribution of social tools to KM indicate some ambiguity on the matter, likely due to the recent maturation of social tools and limited research; some of these opinions will be addressed later in this study. At the very least, Web 2.0 and social tools represent enhancements to existing communication and collaboration tools, and communication has been shown to

be a critical ingredient for knowledge sharing (Gordeyeva, 2010). Enough authors claim that social technology represents the salvation of organizational KM to warrant exploration in this study (McAfee, 2006, 2009; Paroutis & Saleh, 2009; Snowden, 2005; Wagner & Bolloju, 2005).

Andrew McAfee coins the term *Enterprise 2.0* as the collection of corporate Web 2.0 tools used to "make visible the practices and outputs of their knowledge workers" (2006, p. 23). McAfee identifies six components or principles of Enterprise 2.0 technology—SLATES: Search, Links, Authoring, Tags, Extensions, and Signals.

### 1. Search

Any valuable information or knowledge must be findable if it is to be useful to knowledge workers. There must be simple structure in place favoring keyword searches in favor of more rigid tables of contents (McAfee, 2006).

### 2. Links

Links between sites, pages, and resources are foundational to the Internet. It was Google that began to algorithmically harvest information about these links in order to create one of the most useful Internet search engines. By tabulating and calculating how many links reference a variety of different resources, one can build a good understanding of which resource is more popular or most useful. Proprietary algorithms do these calculations for the large search engines, but how often are the popularity or quality of organizational resources found on a corporate intranet investigated in a similar manner? It is important to let the many (users) versus the few (admins) determine what is important (McAfee, 2006).

### 3. Authoring

One of the primary Web 2.0 principles, content creation, can be seen in such tools as blogs and wikis. Everyone may not be an expert, but most people have something to contribute to a resource or body of knowledge—whether that is large contribution, revision, edit, or small factoid (McAfee, 2006). Over time, community authoring, or

content contribution, has been shown to converge toward quality material given enough contributors (McAfee, 2006).

### 4. Tags

Tags allow the categorization of content by keywords from a pre-defined taxonomy architecture or emergent group-defined folksonomy. In many ways, a folksonomy will indicate what resources or content is actually useful, and will self-correct as the group continues to assign and modify tags. One of the primary values of tags is the ability to see how others tag certain content; this creates an indication of value that benefits the group (McAfee, 2006). According to McAfee, "As a result [of community and tagging], patterns and processes in knowledge work would become more visible." (2006, p. 25).

### 5. Extensions

Extensions to tags and existing content enabled such tools as recommendation engines. Consider popular websites like Amazon.com and Stumbleupon.com, which generate value through recommending products or websites you may like based upon your tags, browsing patterns, or other meta data (McAfee, 2006)

### 6. Signal

Lastly, signals represent how new content is advertised to consumers. In a large dynamic network, it would overwhelm a user to continuously check for new or updated content—the time it would take to check every site, page, or document repository is impractical. Signaling technologies such as micro-blogging, email, or RSS can be used to notify a subscriber of content changes (McAfee, 2006).

Other authors have added some different components to the Enterprise 2.0 mix. Jarche adapts Kietzmann's honeycomb of social media (Figure 15) to an Enterprise 2.0 version (Figure 16) (2012b; 2011). Jarche adds networking, finding people, task coordination, meetings, and communicating to McAffee's SLATES principles. Despite some conceptual overlap between the two models, Jarche hints at some of the more practical aspects of Enterprise 2.0 by his inclusion of task coordination, finding people,

and meetings. These components seem to be traditional, practical, and necessary functions of existing corporate ICT (e.g., MS Outlook, directories), but the emphasis here is on Enterprise 2.0 as a collection of integrated Web 2.0 applications in an enterprise context. The inclusion of these workflow and networking components imply the need to integrate Enterprise 2.0 into everyday workflow. The honeycomb of components proposed by Jarche also includes a useful distinction between cooperation and collaboration (2012c). Jarche explains and illustrates the oftentimes subtle difference between collaboration and cooperation (Figure 17; Figure 18). Collaboration is more structured, goal oriented, and team based; each team members is working to achieve the same goal (e.g., project, task, mission). Cooperation is the informal serendipitous assistance that may or may not be required by members of a team to accomplish a goal or task; usually informal, unrecognized cooperative processes occur in the background of many collaborative processes—they go unnoticed, but are critical to success nonetheless. Networking enables cooperation. One example of networking and cooperation is knowing where and how to contact an expert that can help you (cooperate) with information or knowledge you require for a particular project; this expert shares knowledge or information with you even though he does not have a personal stake in your project or goal.


Figure 16. Adapted Honeycomb Facets of Enterprise 2.0 (From Jarche, 2012b).

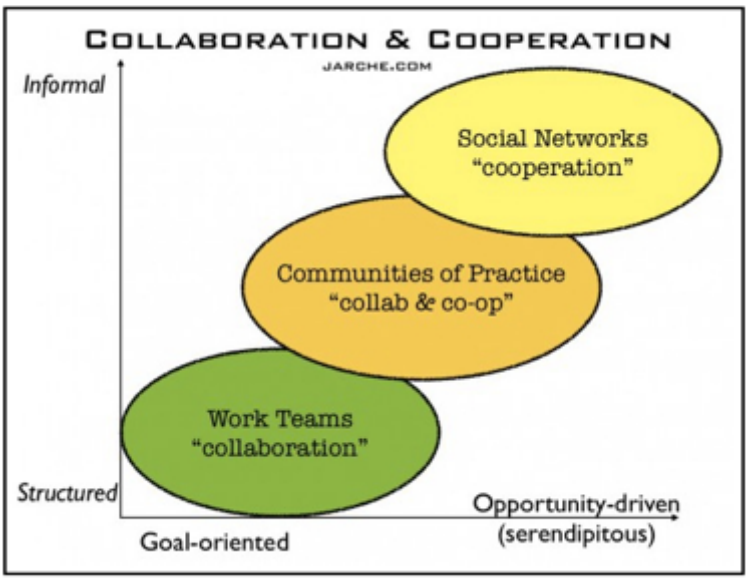


Figure 17. Collaboration and Cooperation (From Jarche, 2012c)

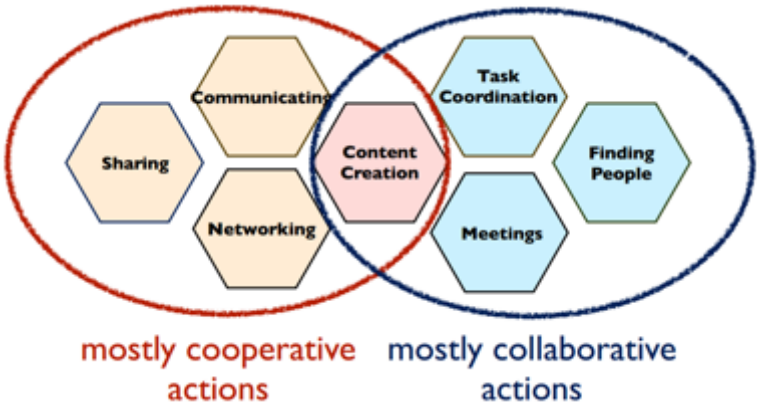


Figure 18. Cooperative versus Collaborative Actions of Enterprise 2.0 (From Jarche, 2012b).

Enterprise 2.0 brings the ease of use and familiarity of social media tools to the organizational environment (Boeije & Kolfschoten, 2009; McAfee, 2006). Figure 19 acknowledges some of the most common Enterprise 2.0 tools and their typical function or Enterprise 2.0 component (Gordeyeva, 2010).

| Enterprise 2.0 Tool | Description | Function |
|---|---|---|
| Weblog, Microblog | Web-based communication medium, that is determined by the following characteristics: chronology (of posts), actuality (of event described or opinions), interaction (comment function); relations (links to other blogs, people) | Authoring, Sharing, partially Networking |
| Wiki | Collection of websites, that can be edited by every user | Authoring, Sharing, Collaboration |
| Tagging | Collective indexing or tagging of existing context to ease the indexing of content | Sharing, Scoring |
| Social Networking | Maintenance and building of contacts | Networking |

Figure 19. Enterprise 2.0 Tools (From Gordeyeva, 2010)

## 7. Emergent Social Software Platforms

Thomas Davenport, a well-known KM researcher, has admitted that the robust KM and KMS programs of the past few decades have fallen short of their ultimate goal: to *easily* capture and share knowledge (Davenport, 2005). Some of Davenport's own surveys concluded that corporate e-mail remained the predominant form of organizational communication within an enterprise, despite numerous intranets, KM portals, groupware, and other tools (McAfee, 2009). McAffee labels the various Web 2.0 tools commonly used by businesses within the concept of emergent social software platforms (ESSP). Extant, commercially available Enterprise 2.0 software packages typically include numerous distinct Web 2.0 capabilities in one package (e.g., wikis, blogs, micro-blogs, instant messenger, tagging). For the purpose of this study Enterprise 2.0 and ESSP will be used interchangeably.

Enterprise 2.0 represents the business application of Web 2.0 technology. Numerous Enterprise 2.0 products are available on the market today. Some of these products include Yammer, Jive, Google+, Salesforce.com Chatter, and many more; Appendix A provides a listing of leading industry Enterprise Social Network (ESN) providers from a 2011 Forrester market research study (Koplowitz, 2011). A recent Altimeter report discloses data from recent surveys of Enterprise Social Network

software vendors, ESN users, and corporate decisionmakers (Li, 2012); Appendix B consists of excerpts from this Altimeter report.

### 8. Organizational Implications

Many proponents of Enterprise 2.0 and other Web 2.0 tools have often implicitly assumed or postulated that the application of these tools would have a profound effect on the structure of the using organization. For example, it is commonly believed that hierarchical structured organizations would be morphed into flatter organizations through the use of open social tools (Riemer & Richter, 2010). In a 2010 case study, Riemer and Richter counter this common assumption by highlighting a micro-blogging platform that actually reinforced existing organizational structure and workflows (2010). One could assume resistance to ESSP by leadership in highly structured organizations (such as the DoD) due to fears of the potential significant structural changes these tools could herald. The general academic and practitioner consensus does seem to support such fears. Riemer and Richter's study plays a role in quelling some of the structural change fears while highlighting the benefits of a micro-blogging platform for collaboration and knowledge work. Although some studies have investigated the effect of organizational structure on Enterprise 2.0 adoption and usage, research regarding the effect of Enterprise 2.0 on organizational structure is growing, but not conclusive at this time.

### 9. Enterprise 2.0 Summary

> Arguably, the major constituent of organizational knowledge is the contribution of its staff, for individuals are not silos of knowledge, rather their connectivity to other staff constitutes a considerable component of organizational know-how, in so far as ‘‘the whole is greater than the sum of its parts.’’ (Venkitachalam & Busch, 2012)

The emergent nature of organizational knowledge, as presented by Venkitachalam and Busch, provides an excellent jumping off point toward the "connectivity" between individuals within an organization. If this connectivity or social networking between individuals can be improved or enhanced, does this have an effect on organizational knowledge? Proponents of Enterprise 2.0 claim it is the next wave in networking and knowledge management (Gordeyeva, 2010; Levy, 2009; McAfee, 2006, 2009; Panahi et

al., 2013; Swan et al., 1999). This section has provided a brief overview of Enterprise 2.0, and some of its components. The following section will discuss individual Web 2.0 and Enterprise 2.0 applications and their knowledge-sharing potential.

## E. SOCIAL KNOWLEDGE MANAGEMENT

The most important piece of knowledge management is the people—they are the ones who create new knowledge, transfer knowledge to others, and apply knowledge in their everyday duties (Kogut & Zander, 1992; Nissen, 2006; Nonaka & Takeuchi, 1995). Case studies conducted by Swan, et al., illustrate the common failure of organizations to couple traditional IT-based KMS to the necessary social networking required for innovation and learning (1999). Rich tacit knowledge is possessed by people, not machines or KMS; social software and platforms stand to make a huge contribution to KM by enabling knowledge sharing between individuals that was simply not possible or feasible with previous KMS. This new ability to connect individuals across multiple tie strengths, geographic regions, functional areas, and organizations for the purpose of expert location, knowledge location, and knowledge sharing is a tremendous improvement to the previously static architectures for explicit knowledge management. The following section will explain the fundamental concepts behind Web 2.0 and social tools, their application to the enterprise, and their potential for sharing knowledge—particularly tacit knowledge.

The emergence of social tools, because of their ease of use and network focus, seems to be a logical extension of existing KM programs (Nelson & Hsu, 2008). Numerous studies have been conducted attempting to link social technology with KM or knowledge sharing (Panahi et al., 2013). Modern social tools can add value to many of the success factors of organizational KM, discussed earlier. The following section will describe how social tools achieve network effects and enable knowledge flows through collective intelligence. Numerous examples of research in this area will be presented. Rigorous debate continues regarding the extent by which ICT can enable tacit knowledge sharing (Panahi et al., 2013), but social tools do enable knowledge location and discovery through the formal and informal networks they enable—research is much clearer on the

subject of informal network-enabled knowledge flows (Gordeyeva, 2010; I. Nonaka et al., 2006; Ikujiro Nonaka & Takeuchi, 1995). The most common social tools will be investigated in light of existing literature regarding their potential role in knowledge sharing.

Levy (Figure 20) constructs a matrix matching Web 2.0 principles with commonly accepted KM principles (2009). The alignment between these sets of principles indicates, at least at the conceptual level, much potential for mutual benefit. There are some differences (e.g., top-down control common in KM, less formal Web 2.0), but generally the principles of Web 2.0 align well to many commonly accepted KM principles (Levy, 2009).

| *WEB 2.0 principle* | *Knowledge management matching principle* |
|---|---|
| 1. WEB as a platform | Technology as a platform<br>The knowledge management world is based on four complementary components: culture, process, technology and content. None is independent. In their book, *Working Knowledge*, Davenport and Prusak emphasize this principle: "It is important to keep in mind their (technology- m.l.) limitations … effective knowledge management cannot take place without extensive behavioral, cultural and organizational change" (Davenport and Prusak, 2000). They state that if an organization invests more than third of a knowledge management project in technology, it stops being a knowledge management project and turns into an IT project (Davenport and Prusak, 2000) |
| 2. Services development | WEB services.<br>WEB services, is the most popular way for sharing data and information, context related, in portal window-lets and in the portal professional desktop<br>In the knowledge management world, ones does not care (for ideological reasons) where the information is stored, rather how it is used by us in various knowledge applications. The portal is a broker, via which services present the data, information and knowledge |
| 3. Active participation of users | Active participation of users.<br>Knowledge management deals with sharing the knowledge and preserving it. The knowledge is based on users, and without them, such activities cannot take place. Active participation of users is a necessity<br>Nevertheless, in knowledge management, the users' participation is encouraged by a central team usually convincing people to add content; in many cases, they will even settle with users only using knowledge (built by several key users). Sharing is controlled. In some cases, content added is moderated before published<br>In WEB 2.0, by comparison, activities are decentralized and people add voluntarily |
| 4. The service improves automatically, the more it is used | Partly correct in knowledge management<br>Of course, if people participate more, there is more content, and richer content, adding value to service offered to the user. But, this cannot be compared to the situation of WEB 2.0 applications. In WEB 2.0 the software itself is based on automatic improvement the more it is used |
| 5. Collective intelligence (the long tail) | Knowledge management is based on the collective knowledge of its users. Nonaka and Takeuchi in their book, *The Knowledge Creating Company*, described the success of the Japanese companies in developing knowledge, based on the Japanese sharing culture which builds the collective organizational new knowledge (Nonaka and Takeuchi, 1995)<br>A major difference between the two has to do with dealing with the LONG TAIL concept. WEB 2.0 sanctifies it, knowledge management ignores it. Knowledge management solutions are based, in many cases, on a mass of 20 percent of the users (content experts), contributing 80 percent of the knowledge |
| 6. Content as the core | Content is one of the four components on which knowledge management stands: culture, processes, technology and content. It does not stand for itself, yet it is part of the core, and no knowledge management solution can take place without a rich content segment<br>A decade ago, when knowledge management was initiated, it was not yet understood that content drives knowledge management. Books and articles written in the 1990s did not emphasize on content. Over time the importance of content was recognized. Organizing content, filtering and processing it, became a central issue, bringing search engines and navigation issues to front stage |
| 7. The perpetual beta | At first glance the concept of perpetual beta may seem irrelevant to knowledge management<br>Knowledge management does not deal with technology, but knowledge management uses technology. Working with a perpetual beta, can serve knowledge management a great deal. One of the knowledge management challenges has to do with understanding this potential. Organizations can design communities of practice, portals and knowledge sites with care and thought, yet only after launch and use, do people realize what more can be added in. Potential is learnt via use. Changes are required frequently, adjusting the technology to the people using it as they and their needs mature. The perpetual beta is certainly a great enabler |
| 8. Rich user experience development via small modules | Irrelevant to knowledge management |

Figure 20. Web 2.0 Principles versus KM Principles (From Levy, 2009)

On a functional level, Levy (2009) compares common Web 2.0 tools to existing KM equivalents (Figure 21). Many Web 2.0 tools exist within current KM applications, but their ease of use and relation to other applications may be questionable.

| *WEB 2.0 component* | *Attribute* | *Relevant attribute in knowledge management* | *Gaps* |
|---|---|---|---|
| WIKI | Structured content pages | Web content management (WCM) tools. These tools are part of the knowledge management toolbox and are used for rich content sites (also inside the organization). Known software tools include among others CMS, Stellent and Interwoven. | WIKI:<br>is known for its user friendly UI;<br>is flexible, both content and structure wise (can be also a disadvantage);<br>includes a high level of connectivity between items (also in free text);<br>deals with homogeny sites (yet this can be settled using TWIKI which integrates several WIKI's together) |
| Blog | Personal diary, including access to the diary as a whole (not only standalone pages for each date). Enables fast access to new pages, with easy access to history | Can be implemented using a variety of knowledge management tools, whether Enterprise Content Management (ECM) tools or portal style tools<br>The solution provided by Blogs reminds one of another knowledge management tool (physical, not virtual): Storytelling | The innovation of WEB 2.0 depicted in Blogs, is not mainly the idea, but in the way it is implemented: Very simple, very accessible, and therefore, very appealing. Therefore, it is easy to understand that the idea itself can be copied, using various Knowledge Management tools; the question is which will give the same easy, fun like feeling<br>Another special aspect of the Blog is the community evolved – the Blogosphere. This community, acts as a guild, give priority in reading one anothers' Blogs among other WEB items. The Blogosphere also yields special placement in search results and RSS's |
| RSS | Alerts regarding new content items and changes among existing ones, by categories | Alerts are a known and well used mechanism in Enterprise Content Management tools as well as in Portals. Search engines enable running fixed searched, giving the same results as alerts<br>Another tool informing users about alerts is a common web-let of "what's new" in almost every organizational and professional portal | The gap is mainly in two aspects:<br>The way the information is packaged. Instead of receiving alerts separately from every information resource, information is packaged together<br>The user does not have to point to all sources. Requesting information and knowledge is defined via its categories |
| Tagging (folksonomy) | Everyone can subjectively tag his or her own information | Tags are provided in several tools:<br>In portals – via navigation menus;<br>In search engines – via filtering attributes;<br>In ECM tools – by both of the above<br>Yet, all these are built as part of taxonomy, either organizational or departmental, trying to be objective (inside the group) as far as possible | In WEB 2.0 each page can be tagged more than once, and not only by the author<br>In WEB 2.0 the tagging is subjective as opposed to knowledge management, where it is objective<br>In WEB 2.0 there are no pre-defined lists of attributes and values defining the "allowed" tags |
| Social computing | Building social communities over the net | Communities of practice | Most communities on WEB 2.0 are based on personal hobbies and fields of interest. Examples include del.ico.us (bookmarks), yotube (video films) and Flickr (photos)<br>Communities of practice, comparing, are focused on professional issues. In many cases they are complemented by face-to-face gathering, which is rare on WEB 2.0<br>Both environments give supplementing tools such as sharing files and discussions, all by categories |

Figure 21. Comparison of Web 2.0 and KM Tools and Attributes (From Levy, 2009)

## 1. Networks

> A fast-growing body of research shows that characteristics of social relationships and the networks they constitute influence the efficacy and efficiency by which individuals and collectives create knowledge by affecting their ability to access, transfer, absorb, and apply knowledge. (Phelps et al., 2012, p. 1117)

What you know is directly associated with who you know (Cross, Parker, Prusak, & Borgatti, 2001; Cross & Prusak, 2002). The field of social network analysis studies the dynamics of these relationships. O'Reilly's definition of Web 2.0 highlights network effects; the following section will summarize the general concepts of networks. Many modern social tools, SNS in particular, provide useful communication, collaboration, and cooperation features, but the true power of these applications and platforms exist within the networks they enable. Metcalfe's Law states that the value of a network changes as a proportion of the changes in the number of connected nodes. A well-known example to illustrate this concept is the fax machine: a single fax machine is not very useful, nor valuable. Who would you fax to? With each additional fax machine brought online, the value of the original fax machine increases due to the greater network of potential recipients. It is this concept that underlies many of the benefits of social tools.

The social networking analysis (SNA) body of knowledge provides several definitions used for characterization of networks and networks dynamics. These definitions and concepts will prove useful for later description of social tools and the networks they enable, sustain, and support. Research relating knowledge sharing to particular SNA concepts will be discussed below.

### *a. Centrality and Network Position*

Centrality is generally defined within SNA literature as the degree of connectedness between an individual node and other nodes on the network. More central people have more connections to other people in the network (Nelson & Hsu, 2008). Boundary spanners, sometimes referred to as connectors (Cross & Parker, 2004) or bridging connectors (Nelson & Hsu, 2008), are individuals who connect two or more smaller clusters within a network (e.g., different departments, groups). Boundary

spanning connections increase the possible diversity of ideas, information, and knowledge available within the network (Phelps et al., 2012). The types of connections individuals share is said to be structural equivalence. For example, two individuals in the same office would share many of the same connections with others and would be said to be structurally similar in SNA terms (Nelson & Hsu, 2008)

According to Phelps et al., "Many studies across all levels have found that a central network position, defined either in terms of the number of direct contacts or both direct and indirect contacts, has a positive influence on knowledge creation, transfer, and adoption" (2012, p. 1138). In regard to flows within a social network, central connectors are people with higher centrality. This can be good or bad; they could be an "unsung hero" doing too much work, or the bottleneck where most network traffic flows through them (Cross & Parker, 2004)

Boundary spanners connect different clusters of the network together. Typically, these individuals are conduits between particular departments or groups (Cross & Parker, 2004). Information brokers connect groups through informal secondary connections (e.g., weak ties, friends of friends). These individuals perform the vital role of merging groups together; without the information brokers, the entire network would splinter into less-connected sub-groups (Cross & Parker, 2004). Peripheral people are individuals with the lowest levels of centrality; they often have only one or two connections. These people can be new members (unintentionally peripheral) or expert specialists (intentionally peripheral). Figure 22 and Figure 23 represent some of these SNA concepts.

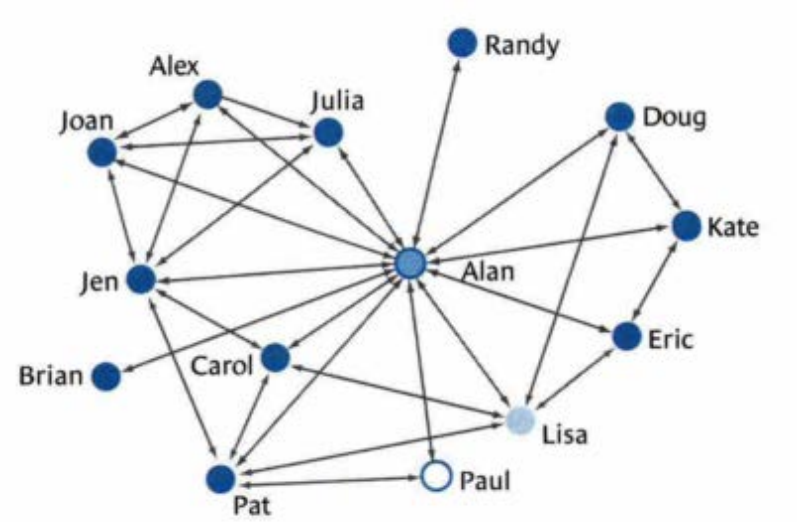


Figure 22. Network Example (From Cross & Prusak, 2002)

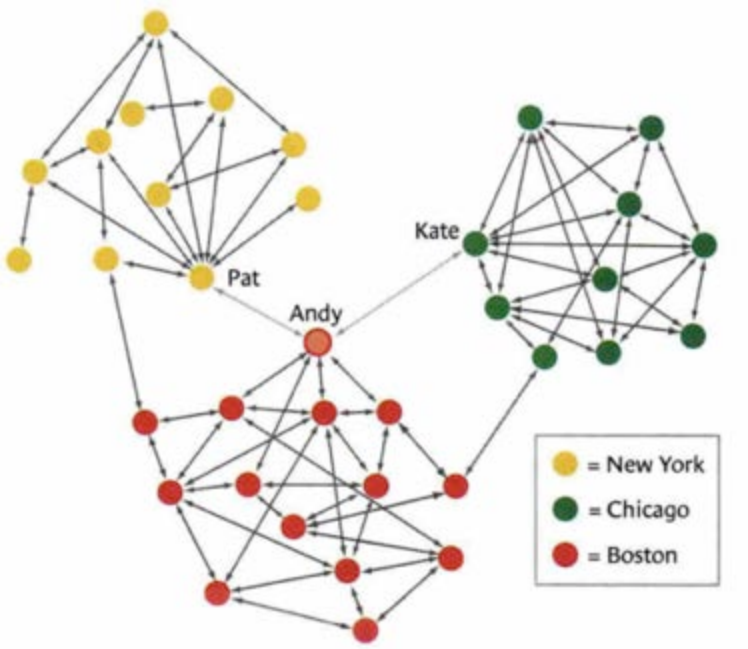


Figure 23. Boundary Spanning Example (From Cross & Prusak, 2002)

### *b. Density*

Density is defined by the number of connections a node has in relation to the total number of possible connections within the network. Structural holes between groups (e.g., lack of a connector) or high density could be beneficial depending upon the

situation. In some instances, high density would not be desirable as too many connections may block out any useful information (information overload). Structural holes enable connectors to bridge network clusters together, bringing novel information and knowledge into the network from other parts of the network; this would not be possible without the existence structural holes (Phelps et al., 2012).

### *c. Tie Strength*

Granovetter defines tie strength as "…a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie" (1973). Weak ties tend to connect disparate groups, while strong ties tend to be found within groups of similar connections (Granovetter, 1973). Weak social ties tend to expand an individual's informal network, and thus increase the potential resources they can leverage via that network. Some resources that could be made available through these informal networks are knowledge, connections, assistance, advice, or support (Ellison, Steinfield, & Lampe, 2007). SNS are particularly well-suited to cultivating and expanding weak-tie social networks due to their ease of use, improved level of trust and limited cost associated with their usage (e.g., time, effort) (Ellison et al., 2007; Gordeyeva, 2010; Levin & Cross, 2004).

### *d. Knowledge Networks*

According to Kogut and Zander, "Part of the knowledge of a group is simply knowing the information who knows what" (1992, p. 389). Knowledge networks are an extension of social networks; they overlay knowledge sources on top of existing networks and connections. In social science fields, knowledge networks are also referred to as transactive memory systems (Peltokorpi, 2004). Transactive memory systems and knowledge networks enable individuals to leverage the expertise and knowledge of others in their network for a multitude of reasons (e.g., problem solving, information, advice, knowledge). According to Peltokorpi, "…[Improved efficacy] is possible because individual cognition is connected to external memories by directories, which enables people to rely on one another to contribute missing details that cue their own retrieval"

(2004, p. 447). Cross and Parker submit the following factors affecting personal network knowledge sharing (2004).

- Relative hierarchical position
- Relative organizational position
- Physical proximity
- Structure interactions
- Time invested in maintaining relationships
- Length of time known

Social tools can improve the creation and sustainment of knowledge networks through their effects upon Cross and Parker's factors. For example, SNS and ESN platforms may enable connections that would not have been created otherwise, thus increasing the length of time these individuals know one another. Additionally, the rich interaction and awareness achieved between individuals on a social platform can overcome some physical proximity requirements for knowledge sharing. The cost of the using social tools (e.g., time, effort), as discussed earlier, is lower than many other traditional communication and interaction tools used to maintain relationships (e.g., phone, email, face-to-face meetings) (Gordeyeva, 2010). In today's social media environment, maintaining relationships no longer requires regular phone calls or email correspondence, but rather the simple interactions (e.g., "likes," comments) and mutual awareness of activity (e.g., status updates, micro-blogs) enabled by social platforms.

Cross and Parker also highlight the distinction between both organizational and hierarchical position for knowledge sharing (2004). A balance between connections among higher level, peer level, and lower level nodes in a hierarchical organization can be most beneficial for overall information and knowledge sharing (Cross & Parker, 2004). Connections to members in each distinct hierarchy group have certain benefits: connections to higher nodes enables access to decisions and resources, connections to peers enables assistance with current projects or workload, connections to lower nodes enables access expertise or technical details (Cross & Parker, 2004).

> Basically, whereas the strong ties through interpersonal communication enable to transfer tacit knowledge, organizations need to have weak ties through electronic communication for scanning purposes. These forms of communication enable organizations to obtain complex knowledge networks that link several overlapping transactive memories within and beyond organizational boundaries. (Peltokorpi, 2004, p. 461)

Informal voluntary networks play a critical role in learning, awareness, and knowledge sharing (Cross & Parker, 2004; Snowden, 2005). Despite the importance of these informal networks, the formation of such networks should not be mandated, scripted, or prescribed (Snowden, 2005). They should be allowed to evolve naturally, and be given the appropriate incubation environment. McAfee attributes the failure or ineffectiveness of many previous KMS programs to the top-down structural direction (McAfee, 2009), and similar approaches to informal network cultivation can also be counterproductive. A complete Laissez-faire approach to implementing informal networks is also incorrect; the cultivation of preconditions or design of platforms for emergent informal networks should be goals management (Snowden, 2005). Web 2.0 and ESN platforms provide a framework for informal knowledge networks to spawn and grow in the vacuum of preconceived architectural controls. Snowden labels the act of setting the preconditions for voluntary informal networks or communities as social network stimulation (SNS) (Snowden, 2005). It is important for organizations to recognize the potential of social tools and ESN platforms for SNS and knowledge network growth.

### 2. New Web 2.0 Enabled Learning Model

Nonaka and Takeuchi highlight social interaction as a requirement for learning and knowledge sharing (Chatti, Klamma, Jarke, & Naeve, n.d.; Ikujiro Nonaka & Takeuchi, 1995). The maturation of Web 2.0 tools and the social networking platforms they enable represents excellent opportunities for organizations to employ these tools to enhance their knowledge sharing and learning processes (Chatti et al., n.d.). Chatti et al. update Nonaka and Takeuchi's SECI model by aligning different Web 2.0 tools to the SECI process they most closely support (Figure 24). Empirical evidence within the literature directly supporting individual elements of this updated SECI model are in their

infancy (Gordeyeva, 2010; Panahi et al., 2013). However, the attributes of the different Web 2.0 technologies seem to support the knowledge flows of the SECI processes quite naturally (Chatti et al., n.d.; Gordeyeva, 2010).


Figure 24. SECI Model Based Learning Process with Web 2.0 Tools (From Chatti et al., 2007; Wan & Zhao, 2007)

### 3. Web 2.0 Enabled Tacit Knowledge Sharing

There are many difficulties in sharing tacit knowledge through ICT (Haldin-Herrgard, 2000). There is also a lack of empirical research to support the benefits of ICT for tacit knowledge sharing (Haldin-Herrgard, 2000; Panahi et al., 2013); however, many researchers claim that ICT, emerging Web 2.0, and social tools in particular, can support and enable tacit knowledge sharing better than previous generations of tools (Gordeyeva, 2010; Panahi et al., 2012, 2013). Panahi, et al., construct a useful theoretical model linking social media space to tacit knowledge sharing (Figure 25) (Panahi et al., 2012); this model illustrates the various and most common capabilities of social tools and their

theoretical contribution to knowledge sharing. Similar in concept is Huang, Choi, and Horowitz's illustration of Web 2.0's contribution to innovation and knowledge transfer (Figure 26) (2010); this figure highlights Web 2.0 as the foundations of informal network formation.

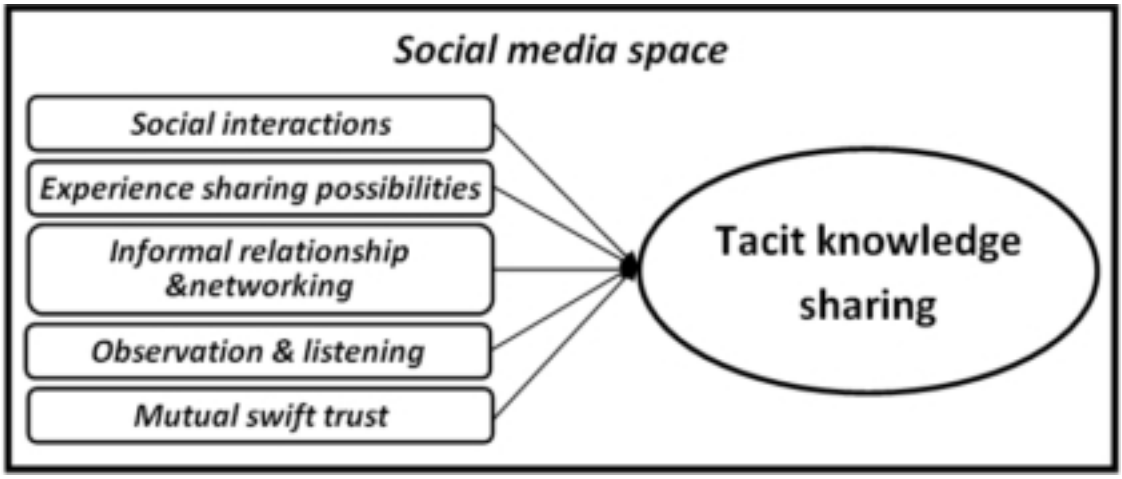


Figure 25. Conceptual Model of Tacit Knowledge Sharing (From Panahi et al., 2012)

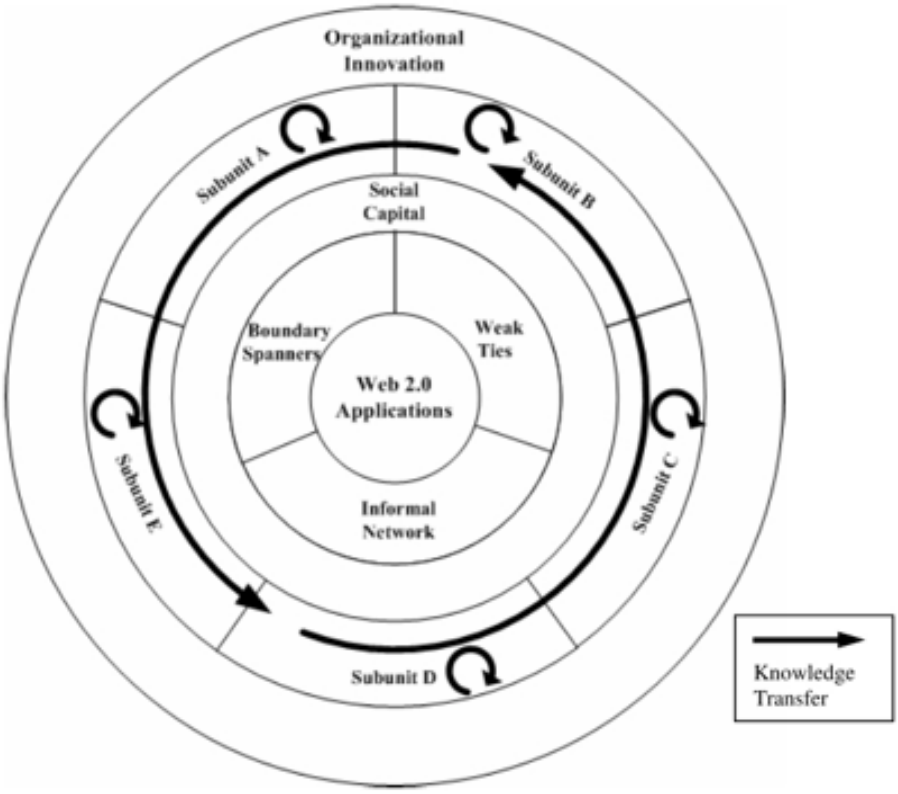


Figure 26. Organizational Use of Web 2.0 to Drive Innovation and Knowledge Transfer (From Huang, Choi, & Horowitz, 2010)

## 4. Tacit Knowledge Sharing via Social Tools: Extant Research

In a literature review on tacit knowledge sharing via Web 2.0 applications, Panahi proposes the following ways social tools support tacit knowledge sharing: (1) creating and improving informal communication and networks among experts, (2) creating mechanisms for harnessing collective intelligence, (3) enabling collaborative and cooperative knowledge, (4) enabling easier publication of personal knowledge, (5) reducing the cost of sharing knowledge (e.g., time, effort) (2013). The following section will briefly describe common social tools and discuss their contribution to tacit knowledge sharing in light of current research.

### *a. Blogs*

A blog, short for weblog, is an online personal journal with articles or stories posted in chronological order. Generally, the author writes articles based upon an

experience, interest area, or other topic. Links and references to original, supporting, or related online content are generally included throughout an article. Rich multimedia (e.g., pictures, video) can be embedded within blogs to demonstrate practical application or improve the clarity of ideas (Panahi et al., 2013). Readers of the blog can usually comment on the article; these comments can generate active ongoing dialogue between readers and the author. Comments can take the form of reader opinions, disagreement, counterarguments, amplifying personal experience or any number of contributions. The author (and sometimes readers) can tag articles with commonly used topical subjects for personal reference and community categorization. Blogs are persistent online content repositories that can be viewed by anyone on the same network; the public persistence of blog posts create a venue for knowledge sharing by the author, and the commenting systems allow dialogue to occur over time. This form of simple online publishing was one of the early representations of Web 2.0 technology—blogging platforms provided a simple way for authors to publish content online with little or no website design or administration experience. The ease of use of blogs lowered the barriers to entry for online publishing, and opened the floodgates to bloggers eager to create content for the masses. The enormous collection of blogs currently on the World Wide Web has been come to be known as the "Blogosphere" (Levy, 2009).

Corporate blog use has also increased over the past several years. Companies have come to use blogs for marketing, product support, public relations, and the publication of other externally focused content. In more recent trends, senior executives, team leaders, experts, and employees use blogs within the enterprise as a way to convey policy guidance, publish strategic updates, discuss problems communally, and share best practices. Research on corporate blog use conducted by Huh et al. concluded that corporate blogs (1) provide a conduit for collaboration and feedback, (2) create a place for sharing expertise and tacit knowledge, (3) share stories, (4) create deeper social connections and trust, (5) aggregate external information sources by experts (Huh et al., 2007). Communication across diverse functional areas and business sections is often stimulated by blogs and their active online dialogue (Huh et al., 2007). According to Huang et al., the cross departmental weak ties "… aid in expediting the flow and reach of

diverse knowledge" (2010). Jackson, Yates and Orlikowski concluded that corporate blogs allow for the creation of informal social networks and communities among blog authors and their followers (2007).

In research of a blog usage in a global IT firm, heavy blog users (authors, commenters) acknowledged the most benefit from the blogs is in the form of social networking, information, problem solving, corporate knowledge, and others (Jackson et al., 2007). One survey respondent claimed, "My network is SO MUCH BIGGER now. People know me from my blogging. I am more tied into people I would only know very surface level otherwise." (Jackson et al., 2007, p. 6) Weak ties are created between readers, commenters, and the authors. Blogs make the identification of experts easier, and thus extend the potential reach of their tacit knowledge (Huang et al., 2010; Huh et al., 2007). Blogs are platforms for individuals to share their experience via storytelling, both of which are key factors for the externalization of tacit knowledge (Panahi et al., 2013)

Many blogs are integrated with RSS, which can provide signals (from the SLATES framework) notifying readers of newly published content; this signaling creates efficiency for the blog readers as they only need to navigate to the blog to read content that interests them instead of navigating to check for new content constantly (Levy, 2009).

Consider an organization using email as a primary method of communication and dialogue. Email is a well-accepted, and sometimes abused, method of transmitting information between individuals and groups; the problem is information contained within the email is only visible to the sender and specified addressees. In many instances, the information or dialogue locked within an email chain would benefit many more people than those included in the email (McAfee, 2006). A blog represents an alternate communication medium that provides for a much larger audience. According to McAfee, "They [blogs] make an episode of knowledge work widely and permanently visible" (2006).

### *b. Microblogs*

Microblogs are platforms or applications that enable short messages posted by individuals to provide opinions, informative links, status updates, and more. Typically restricted to a short number of total characters (e.g., Twitter 140 character limit), these microblogs cannot contain the same information density as a traditional long-form blog, but these abbreviated messages work extremely well for generating shared awareness within a network or community (Ehrlich & Shami, 2010). The wild success of Twitter (www.twitter.com) has demonstrated the public mainstream application of such a tool. A key difference between public Twitter accounts and any Enterprise 2.0 equivalents is the their particular focus of transmission; Twitter users generally post based on what they are doing whereas enterprise users post about what they are working on (Riemer & Richter, 2010).

Microblogging platforms usually implement numerous community linking and tagging features. Common features used by Twitter are duplicated by many Enterprise microblogging platforms. Hashtags are commonly included within the body of the post; hashtags are a pound symbol followed by tag (e.g., #example, #tag, #puppies). Posts within the community can be searched and organized by hashtag for quick results for a certain topic. Individual users of the microblogging platform can be included explicitly in a post by including their username after the @ symbol (e.g., @jim.smith, @bob140); posts tagged with a certain username will display in the feed of the author as well as the tagged individual's feed. Posts can be re-posted (re-tweeted for Twitter) and attributed to the original author; this feature allows for a post to span numerous groups or networks quickly from being re-posted by boundary spanners within the network or community.

Reimer and Richter's 2009 case study concluded that enterprise micro-blogging platforms support collaboration, communication, and coordination (Gordeyeva, 2010; 2010). Obviously, it is not possible to convert rich tacit knowledge into explicit form in 140 characters or less, but the near real-time interaction, shared awareness, communication, collaboration, and cooperation enabled by microblog posts can improve social ties. Social ties are critical for tacit knowledge sharing (Chatti et al., n.d.; Ikujiro

Nonaka & Takeuchi, 1995; Panahi et al., 2013). Of course, these benefits are subject to Metcalfe's law; the value of the microblogging community will increase with the number of active users.

### *c. Tagging*

Tagging is the association of a keyword to online content. This content could be a blog post, micro-blog post, picture, webpage, status update, or any number of online artifacts. Basically, it is a way to categorize content. Briefly discussed in an earlier section, traditional KMS enacted a top-down a priori categorization scheme intended to organize data within the system; this pre-determined categorization is called a taxonomy (McAfee, 2006). Tagging in the Web 2.0 environment is handled differently; instead of top-down, tags are generated bottom-up through the community. The personal tags each individual assigns to an artifact is combined with other tags to form the folksonomy; this socially constructed categorization is called a folksonomy (Gordeyeva, 2010; McAfee, 2009). Numerous websites allow user or author tagging as a communal form of organizing content (e.g., Flickr, Twitter, Delicious, Last.fm, Blogger, Wordpress).

When integrated into a social network, tags become powerful tools for quickly finding relevant and current content; tags are curated by the masses. A search string or hyperlink to a particular tag will generate results based upon the (typically) most recent content that has been assigned that tag. On Twitter, this functionality is often used to follow posts (tweets) in real time, regarding a certain event, topic, or idea by searching for a particular hashtag.

Tagging supports tacit knowledge sharing by establishing a mechanism for discovery of common interests. Panahi, paraphrasing Chatti et al., says, "Although social tagging plays an indexing role in structured knowledge sharing, it can also help tacit knowledge sharing by connecting people with common interests and harnessing individuals' collective intelligence as they allocate, organize, and share personalized tags with each other" (Chatti et al., n.d.; Panahi et al., 2013). Tags can assist individuals as they annotate and organize pieces of content (Gordeyeva, 2010). An individual can also

identify experts by following particular tags, which can lead to further interaction and tacit knowledge sharing as a result of a new social relationship (Parker, 2011).

Other forms of tagging are content rating and ranking mechanisms. Surrogates or indicators of tacit knowledge can be used to represent some tacit knowledge. For example, rating systems can be used within document repositories of a community of practice to indicate which documents are most valuable. After reading these documents individuals, relying upon their tacit knowledge, will know which documents are valuable, but may not be able to explain this determination in explicit terms (Stenmark, 2000). The ratings or values now associated to each document represent the aggregate tacit knowledge used in the assignment of the mark (e.g., 1-5 stars, points). Tacit knowledge, although not transferred entirely or directly, is indirectly transmitted to consumers who can view the various ratings of the documents in explicit form (Stenmark, 2000). Many modern social networking sites and enterprise social tools provide ranking, review, and value allocation tools. These may be in the form of thumbs up, likes, ratings, grades, stars, tags, or other forms of subjective measurement. The subjective measurement of the value of these objects represents the tacit knowledge of the reviewers, and thus assists in the identification of experts within a network.

#### *d. Wikis*

Wikis have been known to support both externalization and internalization of knowledge (Cress & Kimmerle, 2008; Panahi et al., 2012). Wikis are, usually, created collaboratively among groups of individuals. Each individual externalizes their tacit knowledge into explicit form through updates to a wiki page. Various wiki platforms also include social functions in the form of profiles (discussed later). Wikis are one of the strongest examples of collective intelligence (Chatti et al., n.d.; Gordeyeva, 2010; McAfee, 2006). The most well-known wiki, Wikipedia, has continued to converge toward accuracy and reliability due to the Web 2.0 principles of network affects and collective intelligence (McAfee, 2009).

### *e. Social Networking Sites (SNS)*

Perhaps the most popular and widespread examples of Web 2.0 are Social Networking Sites. Sites such as Facebook, Google+, LinkedIn, Orkut, Pinterest, and countless others are examples of this genre of Web 2.0 application. Facebook alone claims over 1.15 billion monthly average users (MAU) (Facebook, 2013). Social networking, as a function, exists in some form or fashion within many of the Web 2.0 tools described already; many other Web 2.0 applications make use of profiles and mechanisms to enable social networking (Chatti et al., n.d.). SNS, however, are specific platforms for the purpose of creating, sustaining and growing a personal or professional social network (Levy, 2009). Primary features of current SNS supporting tacit knowledge flows include enabling voluntary communities (Chatti et al., n.d.; Hildrum, 2009; Parker, 2011), enhancing informal networking (Cross & Parker, 2004), enabling communication and dialogue (von Krogh et al., 2012), sharing updates, and real-time chat. These features have all been shown to support tacit knowledge sharing (Chatti et al., n.d.; Ellison et al., 2007; Gordeyeva, 2010; Panahi et al., 2013; Skeels & Grudin, 2009).

Early research into ICT and tacit knowledge sharing was generally unfruitful due to the limited trust provided through ICT interaction; trust being a critical requirement for tacit knowledge flows (Marwick, 2001). Most current iterations of SNS enable trust to be built over time between members of the network (Gordeyeva, 2010; Levin & Cross, 2004).

In the enterprise context, internal business focused SNS platforms (or ESNs) (e.g., Yammer, Jive, Salesforce's Chatter, Confluence) are being deployed behind the firewall in order to achieve efficiencies in communication, collaboration, and knowledge sharing (Bughin & Chui, 2012; McKinsey Global Institute, 2012). Enterprise Social Networks (ESN), also known as ESSPs (McAfee, 2006), enable expert location, technical discussion, and informal networking in an organizational environment (Gordeyeva, 2010). According to Matschke et al., "…By the use of Web 2.0 concepts like Wikis and social networking, knowledge exchange is much more collaborative, allows for a further collaborative development of knowledge and establishes a knowledge

building community" (2012, p. 169). Riemer, Scifleet, and Reddig recently conducted a case study focused on the enterprise application of the popular ESN product, Yammer (2012).

> Yammer in Deloitte Australia provides a typical example of what has been described as a personalization approach to knowledge management, where the "focus is on dialogue between individuals, not knowledge objects in a database" (Hansen et al., 1999). Moreover, it is a typical example of a second wave enterprise social media service, where the focus is on conversation, rather than work organization or shared work on formal content (like reports). Yammer has been appropriated and found its place within Deloitte Australia as 1) an information-sharing channel, 2) a space for crowdsourcing ideas, 3) a place for finding expertise and solving problems and, most importantly, 4) a conversation medium for context and relationship building. (Riemer, Scifleet, et al., 2012, p. 13)

It is important to note that SNS and ESN continue to evolve and develop. Many SNS and ESN now include various collections of Web 2.0 features such as blogs, wikis, shared documents, and other collaboration focused tools (Riemer, Scifleet, et al., 2012). Much of the benefit of modern ESN platforms exists in the combination of multiple Web 2.0 tools in an easy to use configuration. The various tacit knowledge sharing qualities of many Web 2.0 and social tools are now aggregated within many ESN platforms, making ESNs valuable tools for modern organizations. As mentioned earlier, research on ESN usage across many corporations indicates an increasing trend in this arena for improved collaboration and knowledge sharing (McKinsey Global Institute, 2012).

### *f. Profiles*

Profiles are one of the principal characteristics of many Web 2.0 applications. The creation of profiles within various sites and applications allows for network creation among content contributors and consumers alike. The existence of these profiles injects varying amounts of trust (depending on the service) between users and encourages the formation of relationships (Gordeyeva, 2010). Profiles can be filled with everything from basic contact info and pictures to previous contributions and links to other SNS profiles. This information paints an online picture of a user that can help

identify them as an expert in certain communities or indicate their role in other networks. These profiles build awareness within a community about activities and contributions. Web 2.0 tools provide a platform for user contribution (McAfee, 2006); connecting to a real person's user profile through a microblog post, wiki contribution, comment, or blog "provides a context for further connections, communication and collaboration" (Gordeyeva, 2010). Richter, et al., claim that knowing the context surrounding another user, from a profile, increases trust and willingness to share (2010).

> Social computing is not about selecting a tool based on pre-determined criteria, it is about allowing multiple tools to co-evolve with each other, people and environments so that new patterns of stable interaction form, and destabilize as needed to reform in new and contextually appropriate ways. (Snowden, 2007)

### 5. Social Tool Adoption, Participation and Cultural Implication Research

Riemer, Overfield, Scifleet, and Richter conducted research within a consulting firm and their adoption of a free online version of the Yammer ESN platform (2012). Based on findings from that study, they present the SNEP model, Social Network Emergence Process, which illustrates the process of adoption based on usage and conversation frequency within the company on their online Yammer network. Yammer, like many other current ESN offerings (e.g., Jive) provides a free trial network for users based upon their corporate email domains. According to the Reimer et al. study, many individuals try Yammer (or other platforms) to explore the capability and gain an understanding about the potential benefits of the ESN platform to their organization. This free trial is limited in capability, but provides enough access for users to get a feel for the platform. Coincidentally, there is a USMC trial Yammer network active right now.

Studies have demonstrated the importance, and sometimes necessity, of face-to-face interaction for tacit knowledge sharing (Swan et al., 1999). Some existing social intranets, seeking to improve social behavior within organizations, merely end up reinforcing existing social silos through the creation of digital fences (Swan et al., 1999). Due to this observation, it is imperative that social software be matched with appropriate

changes to organizational culture and existing workflows in order to create the opportunity for the informal interactions necessary for knowledge sharing (Swan et al., 1999).

Hildrum posits tacit knowledge can be shared successfully online through e-communities, but this sharing is most effective between experienced employees (Hildrum, 2009). Accordingly, it may be necessary to focus Web 2.0 and social media KM tools on certain demographics within an organization. For example, the USMC may target only staff NCOs or officers for their social tools as they serve as the primary planners and coordinators within the USMC.

Social norms and trust are considered two major prerequisites for building social capital (Cohen & Prusak, 2001). In the past, the vast openness of the Internet has proven a difficult arena to build social capital (Cohen & Prusak, 2001). Fortunately, emerging social tools enable more trust than was possible under Web 1.0 constructs alone (Levin & Cross, 2004). Commercial SNS, such as Facebook, creates an environment for trust to be established between connected social groups (e.g., friends of friends, school or work networks). This is a subset of the larger Internet, moderated by real-life connections (e.g., friends, family, acquaintances). Outside these SNS networks, trust is more difficult to generate between strangers online, but Web 2.0 tools and social platforms provide conduits for interaction and online identity that can breed trust over time. The improvements in interpersonal trust achieved through Web 2.0 and social tools have been shown to positively affect knowledge sharing (Gordeyeva, 2010; Levin & Cross, 2004; Zhao, Rosson, Matthews, & Moran, 2011).

Shneckenberg's case studies demonstrate organizational factors that may influence the effectiveness of social media tools. Schneckenberg claims that the degree of success companies can expect with Web 2.0 tools will rely largely on the existing environment of openness and collaboration within an organization (2009). Organizations that do not encourage knowledge sharing and open cooperation find it much harder to employ social networking tools.

Numerous studies have investigated the motivational factors for employee contribution to ESNs and wikis, blogs, and micro blogging platforms. Brzozowski, Sandholm, and Hogg investigated empirical evidence regarding the effect of feedback and coworker (subordinate and superior) participation on corporate blogging behavior among employees of several firms (2009). They discovered that feedback, in the form of post comments and interaction, had a positive correlation to an employee's likeliness to continue contributing blog content in the future (Brzozowski et al., 2009). Participation of coworkers had a peer pressure effect on starting or continuing employee participation (Brzozowski et al., 2009). This research indicates a certain critical mass necessary for successful social tool adoption and growing participation; this critical mass would be a large enough base of readers to interact with content generated by authors. Without adequate consumer feedback and interaction, authors may stop contributing content altogether.

Paroutis and Saleh, in their 2009 study, make the following recommendations for implementing Web 2.0 tools for KM: leadership involvement, training, and reward system. Senior leadership must highlight and champion tool capabilities, benefits, and their role in supporting organizational objectives. Additionally, soft rewards (e.g., contribution recognition, commenting, interaction) seem to be the best motivators for user participation (Paroutis & Saleh, 2009).

In a theoretical and empirical study, Vuori and Okkonen investigate the motivational factors affecting knowledge sharing through enterprise social tools (2012). Their study includes both intrinsic and extrinsic motivational factors for sharing knowledge via enterprise social media platforms. They conclude that the same motivational factors of knowledge sharing in general (Davenport & Prusak, 2000) can be applied to social tool enabled knowledge sharing with the following additions: (1) reciprocity, (2) ease of workflow, and (3) ease of use of the tool (Vuori & Okkonen, 2012). According to their study, the two strongest motivational factors to sharing knowledge through social tools is a desire to "help the organization achieve its goals" and to help colleagues (Vuori & Okkonen, 2012, p. 592)

## 6. Barriers to Successful Social Knowledge Management

### *a. Contribution of Content*

The law of large numbers helps explain the usefulness of the modern Internet and its increasing amounts of participant generated content. Most of the Internet's Web 2.0 content is created by a very small percentage of users; because the number of users on the Internet is enormous, the amount of content contributors is proportionally large (Levy, 2009; McAfee, 2009). Enterprise adaptations of current Internet trends and platforms are disadvantaged because even the largest organizations cannot match the scale of the Internet (Levy, 2009; McAfee, 2009). Therefore, organizations employing enterprise social tools must achieve higher contribution rates (than Internet Web 2.0 tools) for their platforms in order to achieve similar value (McAfee, 2009). Achieving this higher rate of contribution may be a large challenge for many organizations, including the USMC or other DoD services.

Gordeyeva illustrates other potential issues related to job evaluations, contribution risk, job alignment and other factors influencing contribution:

> However, all described above effects are still proven to be true only for the open Internet environment which is different from the organizational settings and intranet rules. It is free of risks of work evaluations, job security, it is the platform for many million collaborators where everybody can contribute to the field of their personal interest and not what is necessary for the organizational development and learning. (Gordeyeva, 2010)

### *b. Rigid Hierarchy*

Research concerning user and employee participation within Enterprise 2.0 systems is in early stages (Riedl & Betz, 2012). Riedl and Betz, based on a 2009 case study of a financial services firm, posit the existence of several organizational barriers for enterprise 2.0 adoption, such as organizational culture, organizational structure, and technology. They conclude that hierarchical organizational structures could hinder Enterprise 2.0 projects (Riedl & Betz, 2012). Other research focused on the influence of organizational structure on tacit knowledge sharing indicates that rigid hierarchy does not traditionally support or encourage tacit knowledge sharing as well as other organizational

forms (Suppiah & Sandhu, 2011). This conclusion, along with similar findings, is important to consider in discussions of tacit knowledge sharing within the DoD—a martial example of rigid hierarchy. Suppiah and Sandhu do suggest that the aversion to tacit knowledge sharing could be overcome or mitigated through the application of cross-functional teams or social networks (2011). Can ESNs help overcome hierarchical dispositions to the tacit knowledge sharing? Or are the shackles of the rigid organizational structure too pervasive?

### 7. Social Tools and Knowledge Sharing Summary

The previous section summarized much of the current literature regarding IT and social tools' role in tacit knowledge sharing. While the debate continues about whether or not IT can actually enable tacit knowledge transfers (Panahi et al., 2013), there seems to be enough academic consensus regarding social tools and their role in directly supporting tacit knowledge transfer to justify their implementation within organizational KM strategy. Many of the knowledge transfer mechanisms described in this chapter can be enhanced or improved by social tools by lowering the cost (e.g., time, effort) for knowledge holders to transfer or share knowledge (Gordeyeva, 2010). According to Riemer and Richter, "The true nature and potential of such technologies does only manifest when people make sense of and incorporate them in their day-to-day work routines" (2010, p. 9). Regardless of the tool or set of tools chosen, they must be integrated into the organization's workflows and routines.

According to Hildrum, "...informal networks of people with the capacity and the zeal to further develop an organization's capabilities already exist" (2009, p. 215). Organizations must identify these groups and enable them to grow and evolve into valuable CoPs (Wenger & Snyder, 2000); modern social tools can assist in this endeavor. Whether they are officially recognized or not, the informal networks will emerge—why not provide the tools to encourage their growth and development?

Regardless of the current body of academic knowledge on knowledge flows enabled by social tools, a recent McKinsey Global survey indicates an increasing trend in the adoption of social technologies (Bughin & Chui, 2012). McKinsey Global's multi-

year survey of over three thousand executives collected the top five measurable benefits of social technology adoption. These benefits were broadly categorized as follows: internal, customer and external (Bughin & Chui, 2012). “Increasing speed to access knowledge” and “increasing speed to access internal experts” were among the five measurable benefits within the internal category—71 percent and 48 percent of executives placed these two benefits in their top five, respectively (Bughin & Chui, 2012). Although the study does not indicate any epistemological background for the survey’s definition of “knowledge” or “expert,” one can infer that these executives achieved some form knowledge sharing benefit within their organizations, and that companies are investing in social tools—at least partly—to achieve gains in knowledge management. If nothing else, this survey reinforces the idea that social networking tools can benefit organizational knowledge flows. However, future research is needed to further explore the particular types of knowledge supported and the dynamics of these flows.

The question will be: are the right platforms and tools, sponsored by the organization, in place? Grassroots movements are valuable—this has been illustrated by such cases as CompanyCommand.com (Polania, 2010), AirWarriors.com, and others. If the proper tools and platforms are available within the enterprise, valuable informal social networks will undoubtedly emerge. The U.S. military is full of individuals devoted to improving their organization, and the USMC is perhaps one of the stronger examples of this trend; the USMC’s strong culture of innovation, process improvement, and mission accomplishment demands such zeal of its Marines. The recent establishment of a KM CoP and growing USMC participation in various CoPs across the U.S. Army’s Milsuite social network indicate a growing desire, within the USMC, to leverage modern social tools for the purpose of sharing knowledge and improving the efficacy of the USMC.

# III. RESEARCH DESIGN AND CASE STUDY METHOD

## A. CASE STUDY DESIGN

The primary research question of this thesis, "How can social media tools be used to improve USMC tacit knowledge sharing?" will be investigated through the explorative case study of existing knowledge flows within a single USMC unit. The scope of this case study will be limited to the knowledge flows that can be identified via documentation, direct observation, and participant observation collected over the course of a period from 2008 to 2011. This case study is a holistic (single unit of analysis) Type I case study (single case) (Yin, 2009). A Type I case study is appropriate here because this case is representative of many similar USMC units, and the interpersonal communications and interactions typical between currently serving Marines. While the specific events and interactions explored in this case may differ slightly from those of other USMC units, the organizational structure (e.g., number of staff officers, spectrum of rank, and position), standard operating procedures (e.g., planning operations, adjacent unit coordination, interaction with higher headquarters) and patterns of interactions are common across the USMC for similar and dissimilar units. Therefore, this case study is intended to contribute to the body of knowledge pertaining to USMC individual and organizational knowledge flows. Existing knowledge flows must first be identified before recommendations can be made for improvements. Evidence from this case study will become the foundation for recommended USMC social media tool use cases in Chapter IV.

The principal investigator was assigned to a Marine Aircraft Group (MAG), on primary staff, as the group communications officer from 2008 to 2011. His unique position granted daily involvement with all staff departments and all unit operations. The primary investigator, as a primary staff officer of uniquely long tenure, was frequently in a position to perform the duties of other staff officers (e.g., logistics, operations, supply) during unit planning or operation execution. This broad experience led to a novel understanding of the intricate organizational behaviors and routines within the unit. The investigator observed and participated, firsthand, in the rotation of three commanding

officers, six operations officers, and several other staff position turnovers. The investigator, due to his tenure, was in a position to observe how learning occurred within the unit over time, how tacit knowledge flowed between individuals and how that knowledge was managed.

Due to the heavy reliance on the investigator's past firsthand experience within the subject USMC unit, this case study will be historical in nature. Current non-unit specific USMC documents, publications, processes, and operating procedures will be included within the case to provide contemporary evidence of USMC knowledge flows; undoubtedly, some procedures and resources have changed since the investigator departed his unit nearly three years ago, but the case should reflect well on current organizations nonetheless.

### 1. Construct Validity

Construct validity concerns the application of operationalized measurements to minimize subjectivity within the case study (Yin, 2009). While the investigator's impressions and experience are important, operationalized concepts defined during the literature review (e.g., knowledge flows, tacit knowledge sharing) will be used during case study analysis. Multiple sources of evidence will be used during this study in order to increase inquiry convergence. Documents, observation, and participant observation will be used to collect case evidence. Documents will include historical and contemporary USMC doctrinal publications, unit reports, and other USMC specific documents.

### 2. Internal Validity

Numerous threats to internal validity exist for the case study research method due to the difficulty in establishing causal relationships between events (Yin, 2009). The causal links involved in tacit knowledge sharing are complex and difficult to measure, due in part to a lack of empirical evidence in existing literature (Venkitachalam & Busch, 2012) and the availability of converging evidence for this particular case. Therefore an explorative narrative, grounded in operationalized concepts, will be used to generate insights regarding how tacit knowledge sharing occurs within the subject USMC unit.

With additional evidence, future research could focus on more explanatory case studies to develop stronger causal inferences regarding tacit knowledge sharing. Recommendations for future research will be provided in Chapter V.

### 3. External Validity

External validity is concerned with "knowing whether a study's findings are generalizable beyond the immediate case study" (Yin, 2009, p. 43). Evidence from this case study will contribute to the broader theory of tacit knowledge flows within the USMC. This particular case study, currently, stands alone as a single case. Due to the high standardization of organizational structures, patterns of interaction, processes, and procedures within the USMC, findings from this study are applicable across the service. Shared organizational similarities among the USMC, other military services, and even many hierarchical organizations create further additional opportunities for the application of these findings. Future case studies can be conducted using this framework to further improve the external validity of this study over time. Recommendations for future research will be provided in Chapter V.

### 4. Reliability

Reliability concerns the repeatability of the same case study by another researcher achieving the same findings (Yin, 2009). The principal investigator, no longer serving in the subject unit, has no motivation to be nonobjective regarding case evidence or findings. Additionally, the investigator's current position as an experienced Marine officer improves reliability because it is reasonable to expect another Marine officer, of similar experience, to reach the same conclusions. Reliability of this study is highest if repeated within the USMC or other military organizations, but may not fare so well outside military organizations. The narrative case study report and analysis (Chapter IV) will serve as the blueprint for future replication (external validity) and repeatability (reliability) of this study.

## B. CASE STUDY COMPONENTS

### 1. Study Questions

To begin, this case study will focus on the question, "How does tacit knowledge sharing currently occur within USMC units?" This case study question is important because it will help identify the status quo, in regards to tacit knowledge sharing, within a USMC unit. Recommendations, based on existing literature, for improving these identified tacit knowledge sharing patterns with social media tools will be presented in a later section.

### 2. Propositions

Propositions are used to establish the boundaries and purpose of case study (Yin, 2009). This case study will explore how individual and group tacit knowledge typically flows within a Marine Aircraft Group (MAG); this case study will accomplish its purpose through the following propositions:

- Tacit knowledge is shared within USMC units using a variety of methods (e.g., storytelling, mentoring, interpersonal dialogue, computer aided communication).
- The most common methods of tacit knowledge sharing within a USMC unit require time, effort, proximity, and trust.
- Individual tacit knowledge sharing between USMC units and between USMC units and other organizations is enabled through both informal and formal social networking (e.g., knowing who are the experts in other units, expanding social networks via mutual contacts, inter-unit communication, hierarchical position).

### 3. Units of Analysis

The unit of analysis for this study will be the knowledge flows within a single Marine Aircraft Group (MAG). This unit of analysis will include internal knowledge flows (e.g., between members of the unit), and any knowledge flows between the MAG and external agencies (e.g., other USMC units, regional partners, joint counterparts). This unit of analysis is appropriate because it will inform an exploration of existing knowledge flows within a USMC unit. Case study evidence will be collected through documentation, direct observation and participant observation.

### 4. Logic Linking Data to Propositions

According to Yin, "the use of logic models consists of matching empirically observed events to theoretically predicted events" (Yin, 2009, p. 149). Logic models will be used to link case evidence (e.g., documents, observations) to the theory based case propositions. In this particular case study, knowledge theory presented in Chapter II will be used to inform the creation of logic models matching observations of Marines' knowledge or learning processes (e.g., seeking knowledge, sharing knowledge, broadcasting knowledge) to their associated theoretical knowledge flows.

## C. LIMITATIONS AND BIASES

The primary investigator for this research is an active duty officer in the United States Marine Corps. While the first-hand experience from a USMC officer's perspective contributes to the qualitative nature of this study—and it provides professional-level, insider expertise to help interpret the case observations—it also presents the potential for bias as the author has a personal and professional interest in the success of the USMC as a war-fighting organization. This bias has been mitigated to the extent possible through collection, investigation and correlation of both military and non-military research supporting various themes within this thesis (e.g., knowledge flows, tacit knowledge sharing, knowledge management); the conclusions and recommendations presented are grounded in current literature and extant research regarding the application of social tools within organizations; and the investigator is following a very well-accepted research method for qualitative case study. Other study limitations (e.g., single case, retrospective study, military organization) are noted and addressed above.

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# IV. CASE STUDY

## A. UNITED STATES MARINE CORPS OVERVIEW

The United States Marine Corps, established in 1775, is one of the most versatile fighting forces in the world. The proficiency and unique combination of ground combat, aviation, and logistics functions enables a truly expeditionary force-in-readiness. Known for its adaptability and innovation, the USMC will continue to perform in every clime and place wherever her country deems necessary. The global environment continues to change, and the *USMC Vision and Strategy 2025* states, "[we] will develop the necessary capability and capacity to effectively operate in the information environment. This is a critical warfighting requirement that must be integrated across the MAGTF..." (Headquarters U.S. Marine Corps, 2011, p. 36). Supporting this vision is the Marine Corps Information Enterprise (MCIENT) strategy that says "[we] will evolve our Corps into a Knowledge-based Force that achieves decision and execution superiority, leverages seamless communications for decisive advantage, and extends our Corps' warfighting preeminence into Cyberspace" (Headquarters U.S. Marine Corps, 2010a, p. 5). The Marine Corps must continue to leverage information and knowledge in order to maintain efficacy in the modern world.

This chapter provides a brief overview of the organizational structure and current organizational learning apparatus of the U.S. Marine Corps, followed by a case study of knowledge flows within Marine Aircraft Group 12 (MAG-12). It is important to note that the USMC has maintained its reputation as an adaptable and innovative force (Shultz, 2012). The Marine Corps' innovation is enabled and well supported by the organizational processes and mechanisms described below. However, this service-wide learning apparatus initiates organizational change at a slow and methodical pace. This case study will explore knowledge flows closer to the unit and individual Marine levels.

### 1. Organizational Structure

Perhaps the most notable aspect of the USMC is its ability to task-organize as a combined arms Marine Air-Ground Task Force (MAGTF). These MAGTFs vary in size,

capability, and scope depending on the mission at hand. Each MAGTF consists of a ground combat element (GCE), aviation combat element (ACE), and logistics combat element (formerly the combat service support element) (Figure 27) (Headquarters U.S. Marine Corps, 1998). The USMC is always ready to provide forcible entry or ship-to-objective maneuver (STOM) on foreign soil for a wide range of operations from foreign humanitarian assistance (FHA) and noncombat evacuations (NEO) to full spectrum combat. The MAGTF, due to its unique configuration, enables integrated combined arms military power and self-sustainability. A Marine Expeditionary Unit (MEU), the smallest persistent MAGTF, is capable of self-sustained operations in an austere environment for roughly thirty days. Marine Expeditionary Brigades (MEB) and Marine Expeditionary Forces (MEF) are the larger variants of the MAGTF concept. Figure 28 illustrates a theoretical MEF and its various component units. The integration between the elements of the MAGTF is facilitated through mutual familiarity between different functional areas, organizational learning, and consistent training.

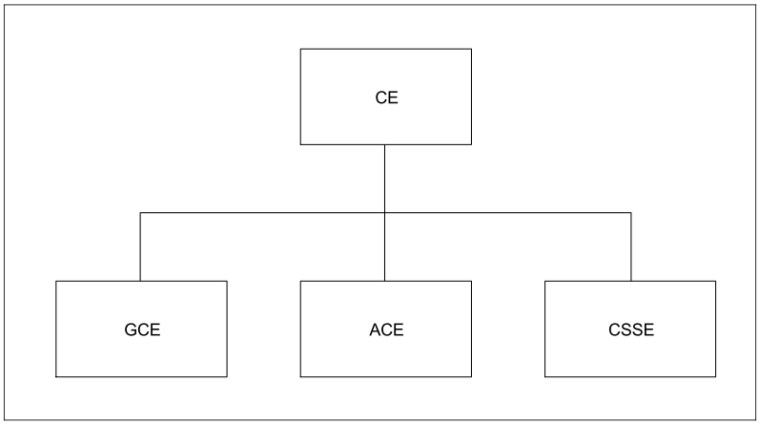


Figure 27. Notional USMC MAGTF (From USMC, 1998).

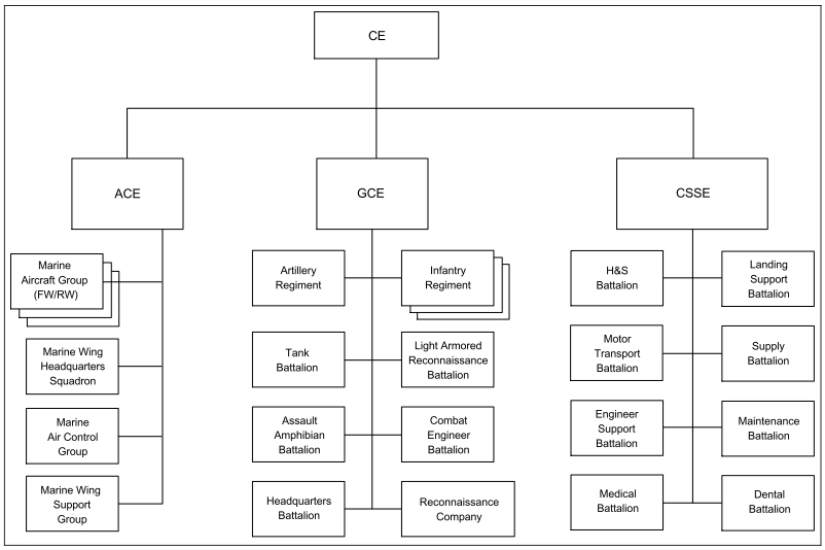


Figure 28. Notional MEF (From USMC, 1998).

The primary unit that constitutes the MAGTF's ACE is the Marine aircraft wing (MAW). Each MAW is constructed of various subordinate groups and squadrons (equivalent to battalions and companies within the GCE). Groups and squadrons come in several varieties including rotary-wing and fixed-wing flying units, aviation command and control units, and aviation support units. At the heart of the MAW, and the subject of this case study, are the flying Marine aircraft groups. A MAG traditionally comes in one of two types, fixed-wing or rotary-wing, but can be task organized to include a wider range of aircraft (e.g., rotary-wing, fixed-wing, drones, cargo) (Headquarters U.S. Marine Corps, 1998). Figure 29 represents the notional organizational structure of a fixed-wing MAG. The individual flying squadrons assigned to the various MAGs within a MAW perform many of the six functions of Marine aviation (Figure 30). The numerous non-flying MAW units perform a supporting role for these primary Marine aviation functions.

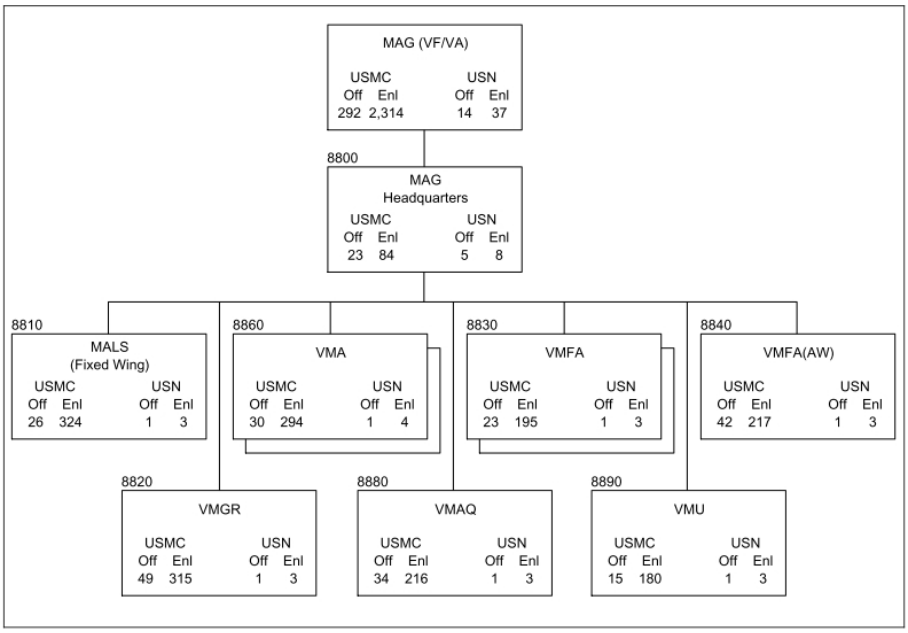


Figure 29. Notional USMC Fixed Wing MAG (From USMC, 1998).

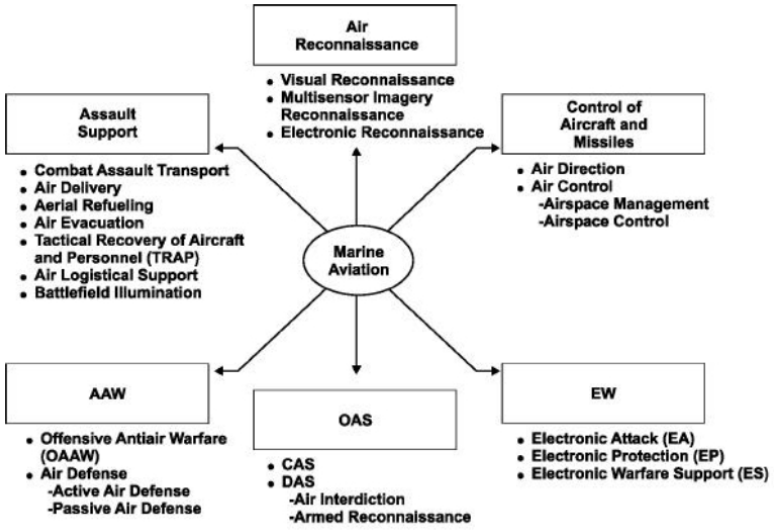


Figure 30. Six Functions of Marine Aviation (Headquarters U.S. Marine Corps, 2000)

### 2. Service Level Organizational Learning and Innovation

The Marine Corps, like most modern organizations, has institutionalized various mechanisms for organizational learning. Marine Corps Combat Development and Integration (CD&I) and Marine Corps Combat Development Command (MCCDC) are the USMC institutions responsible for "develop[ing] fully integrated Marine Corps

warfighting capabilities; including doctrine, organization, training and education, materiel, leadership, personnel, and facilities, to enable the Marine Corps to field combat-ready forces." (Marine Corps Combat Development Command, n.d.). Within the DoD the collection of doctrine, organization, training and education, materiel, leadership, personnel, and facilities is referred to as the DOTMLPF spectrum. At the service level, changes and updates made to Marine doctrine, training, and education are the result of organizational learning. Changes are made to USMC DOTMLPF in order to ensure the Marine Corps is prepared to address changing global threats, likely future missions, and emerging technology. Experience, lessons learned, and innovations from recent operations are some of the primary drivers of these organizational DOTMLPF changes.

The formalized and structured processes for training, education, and enculturation of Marines are the responsibility of the USMC's Training and Education Command (TECOM), a sub-element of MCCDC. Training and education are the organizational mechanism for transferring knowledge to both new and veteran Marines. Figure 31 represents the different focus areas of TECOM. Both tacit and explicit knowledge is transferred through the different TECOM programs, schools, and operations. TECOM employs methods ranging from traditional classroom instruction to complex combined arms live-fire and maneuver training (e.g., Mojave Viper, WTI). TECOM's mission statement is provided here:

> To develop, coordinate, resource, execute, and evaluate training and education concepts, policies, plans, and programs to ensure Marines are prepared to meet the challenges of present and future operational environments. (TECOM, n.d.)


Figure 31. TECOM Training Pieces (From MCCDC, 2013)

The USMC's warfighting laboratory (MCWL) "…rigorously explores and assesses Marine Corps service concepts" through experimentation and analysis to "…identify capability gaps and opportunities, in order to inform and for future force development." The MCWL is one particular command focused on external and internal knowledge search and innovation activities to improve the overall efficacy of the USMC. The MCWL's concept of operations is provided below:

> Enhance the current and determine the future Marine Corps strategic landscape by defining the Marine Corps' next warfighting concepts and capabilities via development and evaluation of innovative tactics, techniques, procedures, organizations, and technologies using an integral combination of concept based experimentation, technology assessments, wargaming, and analysis which will provide the strategic axis of advance for the Corps' entire enterprise. Serve as the USMC Executive Agent for Marine Corps Science and Technology (S&T), Counter Improved Explosive Devices (CIED), and as Marine Corps' liaison to the Joint Staff for Joint Concept Development and Experimentation. (Marine Corps Warfighting Laboratory, n.d.)

The Marine Corps Center for Lessons Learned (MCCLL) is focused on collecting, analyzing, and distributing exercise and operational lessons learned for the USMC. Traditionally captured and stored in explicit form, the MCCLL manages experience-based knowledge on a service-wide scale. Trends and innovations observed and received by the MCCLL are recommended to operational forces or injected into the service's DOTMLPF update mechanisms (e.g., MCCDC, TECOM). USMC commands are required to submit after action reports (AAR) for exercises or operations. The purpose of these AARs is to capture observations, tactics, techniques, procedures, best practices, and lessons learned. The MCCLL also sends collection teams to certain exercises or operations in order to observe and capture processes in real-time.

### 3. Information Management and Knowledge Management

Information management, according to the Marine Corps, directly supports the decision-making processes of unit commanders and their staffs. The purpose of information management, according to *MCWP 3-40.2 Information Management*, "…is to provide a timely flow of relevant information that enables the commander to anticipate

changing conditions and understand its impact on current and future operations" (Headquarters U.S. Marine Corps, 2002, p. 2). According to MCWP 3-40.2, each USMC unit must assign an information management officer and construct an information management plan. The increasing complexity of information technology and resulting information flows justify these requirements. Information management must strike a balance between a lack of information and information overload; neither extreme supports efficient decision-making. This particular publication attributes information as the primary ingredient necessary for decision-making. As some have pointed out, MCWP 3-40.2 does not adequately address the role of knowledge in the decision-making process (Johnson, 2010).

As discussed in Chapter II, knowledge combined with information enables action and ultimately, decision-making. Previous research completed in 2010 has identified that the USMC lacks a service-wide knowledge management strategy or framework (Johnson, 2010). Since that study, emerging USMC KM advocates have attempted to correct this deficiency. The KM staff of the USMC's CD&I office have spearheaded the formal establishment of a KM CoP consisting of voluntary KM advocates from across the Marine Corps (Appendix C) (Deputy Commandant for Combat Development and Integration, 2013). According to recently signed KM CoP charter, "As state and non-state actors complicate the global security environment by blurring traditional and irregular capabilities and tactics, the Marine Corps must explicitly build environments for creating and leveraging its information and knowledge" (Deputy Commandant for Combat Development and Integration, 2013). This group recognizes the value of both knowledge and information for decision-making. One of the USMC KM CoPs current and ongoing endeavors is an update to MCWP 3-40.2 to include previously missing concepts of knowledge and knowledge management. An official USMC definition of knowledge management is planned for inclusion in the upcoming revision of MCWP 3-40.2. Figure 32 is a portion of a recent USMC KM CoP kick-off briefing presented shortly after their charter was signed.

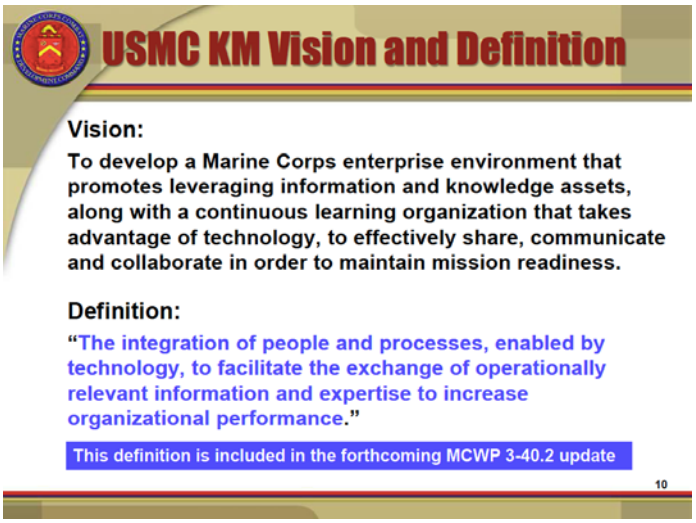


Figure 32. USMC KM CoP KM Vision and Definition

### 4. Institutionalized Social Networking

"It's a small Marine Corps" is a phrase common within the Marine Corps because of the frequency of shared connections and repeat working relationships among Marines throughout their careers. The commonly referenced six degrees of separation used to describe the linkages between people of the world could be reduced to two or three between Marines. Beginning in enlisted boot camp or officer candidate school (OCS), Marines build a network of other Marines through training, operational tours, and unit assignments. Marines know each other, or at least they know about each other. These connections are built through first-degree relationships (e.g., training, operational tours, unit assignments), or second-degree relationships (e.g., colleagues of colleagues, friends of friends). Due to its small size (relative to other U.S. armed services), unique esprit de corps, and common bond among Marines the USMC itself can be considered a social network.

Unique among the U.S. armed services, the USMC prides itself in its institutionalized warrior ethos and the service-wide basic infantry skills. All Marines learn introductory infantry tactics during basic training and they do it together, regardless of MOS. For example, every Marine officer begins his or her USMC career at The Basic School (TBS). Pilots, engineers, communicators, logisticians, and all other officer MOSs train together for roughly six months learning about the Marine Corps, Marine

officership, and how to be a provisional rifle platoon commander. This shared training is important because it creates a common body of knowledge for all Marine officers, initiates career-lasting social networks, and builds trust across different MOSs. The basic infantry training a Marine aviator receives during TBS adds value to his future role in close air support (CAS) or assault support missions. In fact, it is not uncommon for Marine officers to hear the familiar voice of a friend or acquaintance from TBS on the other end of a radio transmission in a combat zone. This voice could be Marine aviator performing CAS for a former TBS classmate pinned down by enemy fire.

The social network among Marine officers, started at TBS, continues throughout their careers and professional military education (PME). Marine Captains attend Expeditionary Warfare School (EWS) with numerous peers from all MOSs, many of whom they may already know from TBS or their first operational tour. This pattern continues for Marine Majors during their PME, Command and Staff College (CSC). The combination of different MOSs during PME is conducive to MOS- and experience-based tacit knowledge sharing among the student officers. Marine institutions such as TBS, EWS, or CSC initiate new connections or reinforce existing ones within the Marine officers' professional social networks. Similar institutions exist for the Marine enlisted ranks, such as Sergeants' Course, Career Course, Advanced Course, and others.

Today, the networks created during training or operational tours are frequently maintained via commercial channels such as Facebook or LinkedIn. Due to their public, unprotected nature, these popular social networking sites do not provide a good mechanism for professional military knowledge sharing. Personal updates and pictures of family are great, but most Marines do not—and should not—share detailed work-related information on these commercial platforms. As will be discussed later, work-related expertise, questions, and dialogue are traditionally carried via USMC enterprise email. Imagine the benefits of an appropriately secure (e.g., FOUO, unclassified, classified) ESN. With a professional ESN, Marine friends and colleagues could keep up with one another's current assignments, ongoing projects, and networks (e.g., who they know, who they interact with) more efficiently than with email or phone calls alone.

### 5. Summary

The Marine Corps emphasizes maneuver warfare, centralized command and decentralized execution, and mission-type orders. These concepts all acknowledge information and knowledge as critical pieces of the Marine decision-making process. According to Jennex, "Organizational Learning is defined as a quantifiable improvement in activities, increased available knowledge for decision-making, or sustainable competitive advantage" (2009). Table 3 associates many of the USMC's organizational learning institutions and processes with Garvin's five characteristics of a learning organization (Garvin, 1993). As discussed earlier, many of these institutions focus on the service-wide application of lessons learned and innovations and improvements across the DOTMLPF spectrum. Integration of lessons learned and the wholesale application of new tactics or procedures requires time to saturate the Marine Corps through changes in formal training and education. At the unit level, the informal social networks of experienced Marines represent a timelier and more dynamic source of relevant actionable knowledge.

| | |
|---|---|
| Systematic problem solving | MCPP |
| Experimentation with new approaches | MCCDC, MCWL |
| Learning from their own experience | MCCLL, TECOM, Social Networking |
| Learning from the experience and best practices of others | TECOM, PME, OAGs, Social Networking |
| Transferring knowledge quickly and effectively throughout the organization | TECOM, CoPs, OAGs, Social Networking |

Table 3. USMC Organizational Learning Apparatus

## B. MARINE AIRCRAFT GROUP 12

The following is a case study of the observed knowledge flows within Marine Aircraft Group 12 (MAG-12). The principle investigator served as the staff communications officer for MAG-12 from 2008 to 2011. Operational details, names, and other sensitive information have been omitted or replaced with alternates. The limited details that are presented here have been sourced from material approved for public release. The knowledge flows presented within this case study are primarily associated

with various interpersonal communications, interactions, and learning routines. They are not associated with any one particular operation or exercise, but are common among MAG-12 operations in general. The evidence for this case study was collected via observation and participant-observation of routine planning, coordination, and execution of various MAG-12 operations and exercises from the perspective of a primary staff officer.

### 1. Unit Overview and Organizational Structure

MAG-12 is the only permanently forward-deployed fixed-wing MAG in the USMC. It is currently based from Marine Corps Air Station (MCAS) Iwakuni located on the southern end of the island of Honshu, Japan's main island. MAG-12 is one of three MAGs currently assigned to the 1st Marine Aircraft Wing (1stMAW) (Figure 33), whose headquarters is located on the island of Okinawa. The unique geographic separation among 1stMAW units (Figure 34) presents numerous challenges to routine operational planning, coordination, and collaboration.

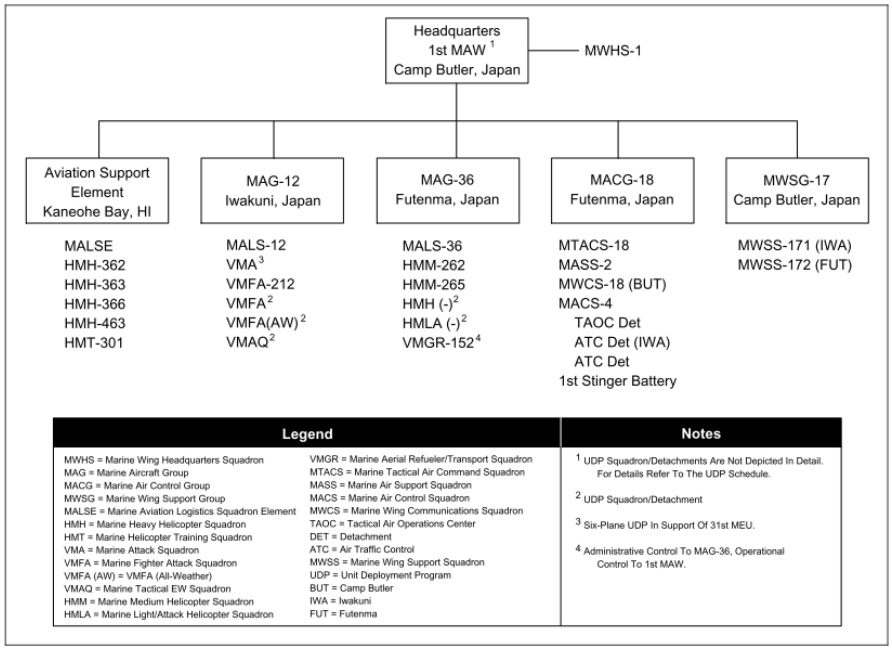


Figure 33. 1st Marine Aircraft Wing (From USMC, 1998).


Figure 34. 1stMAW Geographic Unit Locations (From 1stMAW, n.d.).

Along with other Marine or joint partners, MAG-12 and its subordinate squadrons conduct or participate in numerous exercises or operations throughout the PACOM area of responsibility (AOR) (Figure 35). These operations require MAG-12, members of its staff, or subordinate squadrons to routinely deploy to various U.S. military installations or foreign countries across PACOM; this is done in order to conduct theater security cooperation exercises, routine training, or other operations. Additionally, planning conferences for these various exercises occur throughout the PACOM AOR. The combination of exercises, operations, planning conferences, and other requirements dictates that many MAG-12 staff officers travel frequently. Trips to 1stMAW HQ in Okinawa; Kadena AFB in Okinawa; Osan Air Force Base (AFB) in the Republic of Korea; Anderson AFB in Guam; MCAS Kaneohe Bay in Hawaii; Bangkok, Thailand; Darwin, Australia; Singapore; Kuantan, Malaysia; and many more locations were common destinations for many MAG-12 personnel. Compared to the large USMC infrastructure in Okinawa, the number of Marine units and personnel was quite small in Iwakuni. Only two non-MAG-12 units were based onboard MCAS Iwakuni: Marine Wing Support Squadron (MWSS) 171 and Combat Logistics Company (CLC) 36. All higher headquarters elements for Iwakuni-based units were located in Okinawa.


Figure 35. PACOM Area of Responsibility (AOR) (From PACOM, n.d.).

Due to the complexity of the theater, much planning, coordination, and collaboration occurs among 1stMAW staff sections, subordinate units, and joint partners. These interactions occur both horizontally (adjacent units) and vertically (senior and subordinate commands). For example, the 1stMAW G-6 was the senior communications functional area representative for all 1stMAW communications personnel. Matters of communications support, planning, or intent were directed to all 1stMAW units by the 1stMAW G-6. The 1stMAW G-6 had the unending task of planning the allocation of scarce communications assets and personnel across PACOM in support of various 1stMAW operations. Due to the lack of robust communications support native to flying MAGs, MAG-12 required substantial external communications support for nearly all its major exercises. The MAG-12 communications officer was ultimately responsible to the MAG-12 commanding officer (CO) for conducting the planning and coordination necessary to achieve reliable communication services (e.g., phone, unclassified and classified networks, radios) for all operations. This responsibility almost always involved heavy collaboration and cooperation among 1stMAW G-6 and other communications support units (e.g., MWSS-171, MWCS-18). Similar relationships existed among all 1stMAW staff sections (e.g., G-1, G-2, G-3, G-4, G-5, G-6) and subordinate unit staff

sections (e.g., S-1, S-2, S-3, S-4, S-5, S-6). This type of organizational structure, specialization through staff functional area designation, is common among all branches of the U.S. armed services.

### 2. The "Ready Group"

> The mission of the Marine Aircraft Group 12 is to conduct anti-air warfare and offensive air support operations in support of Fleet Marine Forces from advanced base, expeditionary airfields or aircraft carriers and conduct such air operations as may be directed. ("About MAG-12," 2012)

Uniquely situated in mainland Japan, MAG-12 is always poised and ready to project fixed-wing aviation combat power throughout PACOM—thus the highly appropriate title, "The Ready Group." MAG-12 was a constant flurry of activity. Planning, coordination, and execution of numerous exercises and operations were continuous nearly year-round. For a staff officer, this high op-tempo required constant collaboration and cooperation with other staff members or units. Various modes of communication were used to accomplish these routine activities. Difficulties emerged when coordination with external entities or other USMC units was required. Many of the other units involved in these exercises or operations were geographically separated from MAG-12. This separation prevented most face-to-face interaction among disparate planners and staff members of partnering units. Travel for staff members was sometimes arranged to facilitate face-to-face meetings between key planners for various exercises and operations, but most coordination or knowledge sharing would occur via telephone or ICT. Toward the end of the investigator's assignment, virtual meeting software such as Adobe Connect was emerging as a complement to existing ICT. These virtual meetings would connect staff members across distributed locations via voice, real-time chat, and file sharing. Despite the introduction of these new tools, email remained the dominant form of digital communication.

In addition to the sheer operational volume, the bulk of MAG-12's flying squadrons were transient. At any given time, MAG-12 had at least three unit deployment program (UDP) squadrons on approximately six-month deployments to Japan from their home stations back in the U.S. The frequent transition and turnover of UDP squadrons

placed an increased premium on knowledge and knowledge sharing (compared to other MAGs). The MAG-12 staff was responsible for getting each UPD squadron up to speed and integrated into MAG-12 before, during, and after their arrival in Japan. The learning curve for these squadrons was steep. Fortunately, most squadrons had a few veteran Marines from previous UDP tours. Many squadron personnel were forced to learn the unique processes and procedures for operating in MAG-12, 1stMAW, and PACOM for the first time. In order to achieve a successful UDP deployment, the UDP squadrons relied heavily upon the knowledge and expertise within MAG-12 and its permanent subordinate units MALS-12, and VMFA (AW)-242.

### 3. Knowledge Sources

Within the MAG, various forms of learning and knowledge sharing were exercised. All members of the unit would begin their assignment in MAG-12 with some baseline level of knowledge. This baseline body of knowledge could be very basic (e.g., junior Marines, junior officers), or more complex (e.g., senior-ranking Marines and officers). Rank represents time in service and experience. Marines of higher rank have had more exposure to the USMC through service in different units over their career. Junior Marines and officers have not yet had the benefit of this experience. Regardless of rank or experience, a Marine constantly accumulates additional expertise through experience. The sources of knowledge and knowledge sharing mechanisms evident within MAG-12 will be presented here.

Marines within the unit will have some previous training or experience that will enable action to occur, but the unique context of the current unit and its operational environment is usually unknown to new arrivals. Consider the example of the investigator. As a Second Lieutenant fresh from The Basic School (TBS) and the Basic Communications Officer Course (BCOC), his knowledge of the organizational routines, processes, and context is minimal. From the start of his assignment learning must occur in order to enable action for the performance of his required duties. More senior staff officers such as the logistics officer (typically a Major) or operations officer (typically a Lieutenant Colonel) have greater amounts of experience due to their longer time in

service. Marines do not stay in one unit. They carry with them the experience of previous duty to their new units as they progress through their careers. The typical range of ranks within any particular unit, by virtue of their accumulated experience, represents a wide variety of tacit knowledge. Some of this variety is by organizational design (e.g., different unit assignments, different career progression). The USMC makes a conscious effort to create well-rounded MAGTF officers by rotating Marine officers through GCE, ACE, and CSSE billets. Regardless of how the tacit knowledge was originally obtained, each and every Marine's tacit knowledge is both valuable and necessary for the operation of any unit.

Serving as a primary staff officer within a MAG as a first tour junior is daunting. Little prior education or training regarding Marine aviation is provided during TBS or BCOC. Additionally, all USMC communications officers are trained from a syllabus concentrated on GCE focused communications support. Needless to say, the case investigator had much to learn about Marine aviation and his new position as the MAG-12 communications officer. With few exceptions (e.g., communications, logistics, ground supply), most of the MAG staff officers are Marine aviators. The learning curve for non-aviation specific officers serving within a MAG is much steeper by comparison with aviation MOSs. The principal investigator gathered knowledge from a variety of sources in order to perform his duties. He accumulated novel explicit and tacit knowledge, and learned his job over time. His responsibilities as the MAG-12 communications officer generated unique insight into the organization's use of all forms of communications, such as telephones, computers, radios and more. His position as a member of the commanding officer's (CO) primary staff required constant interaction with all other MAG staff officers and departments.

The following section will describe the various knowledge sources observed within MAG-12. These sources of knowledge were the primary resources for learning about organizational routines, processes, and considerations necessary to perform assigned duties and responsibilities within MAG-12. Later, the knowledge flows to and from these sources will be discussed through the lens of the knowledge dynamics presented in Chapter II. Each of these sources of knowledge was observed as potential

nodes within the knowledge networks of the MAG-12 staff officers. Each individual Marine would emphasize or rely upon certain sources over other. The range of observed knowledge sources within the MAG are described below.

### *a. Explicit Knowledge*

Explicit knowledge, as discussed in Chapter II, consists of knowledge that can be written down or expressed easily. The management and distribution of explicit knowledge is enabled and well supported through the use of modern ICT. The following examples of explicit knowledge were frequently used within MAG-12. Given the current application of IT systems, explicit knowledge was the most accessible form of knowledge within MAG-12. Many of the sources listed below could be found within folders on the unit's shared network drives, intranet SharePoint pages, email distributions, or physical binders and folders.

(1) AAR. After action reports from previous exercises were always a good starting point reference for planning an upcoming exercise or operation. MAG-12 participated in many exercises or operations that were conducted semi-annually, annually, or bi-annually. This meant that many exercises had associated archival information that included planning details, briefings, and AARs from previous iterations. The AARs within MAG-12 were available in various locations. Some staff sections would keep detailed section specific AARs for reference within their department. These AARs tended to be the most comprehensive. For example, a communications AAR would be constructed after an exercise or operation by whichever communications personnel directly supported the evolution (e.g., communication officer, S-6 NCO, Marine S-6 representative). This communications AAR would include details useful to the other communications personnel (e.g., technical setup of computers, radio configuration guidelines, unique system employment considerations), but not useful to many other staff sections. The operations department (S-3) would collect AAR inputs from each staff section after every exercise or operation. These inputs would then be boiled down into a less-detailed aggregate AAR. The S-3 would make final modifications to the AAR before routing it to the CO (for review and approval), higher headquarters and eventually the MCCLL.

Much information and knowledge was cut out of these AARs during this routing process. A future communications or logistics officer looking through archival S-3 AARs may only find marginally useful information regarding an exercise (as much of the technical detail had been removed for clarity). Many times, the detailed AAR originally completed by the staff section representative would be lost in turnover between personnel. Unfortunately, this would leave only the modified distilled version of the AAR maintained by S-3 for future reference.

(2) Trip Reports. Typically, MAG-12 S-3 would send at least one representative to various exercise or operation planning conferences. Usually this representative would be the S-3–assigned action officer for that particular operation. In a perfect world, multiple staff members (e.g., S-2, S-4, S-6) would be able to attend the conference or meeting in order to plan and coordinate in real time with their appropriate counterparts (e.g., USN, USAF, foreign military). This was not always possible due to fiscal constraints, scheduling, or conflicting responsibilities. The action officer would be responsible for drafting a trip report summarizing the salient items from the planning conference. The value of this report was directly tied to the amount of knowledge and experience the author had regarding the other staff sections' planning considerations. For example, if the action officer knew nothing about the communications planning considerations for an exercise in a certain location, he may not know what questions to ask during the conference. This would result in a less than useful trip report, in retrospect, for the communications officer to use as a reference while planning his portion of the exercise.

(3) Turnover Binders. One very common method of the sharing knowledge among Marines during a billet changeover is a turnover binder. A turnover binder is, traditionally, a physical or digital collection of documents designed to instruct the incoming Marine on the specifics of his new duties. Much time and effort is expended by the previous billet holder to convert his tacit knowledge into explicit knowledge in the form of these documents, materials, and instructions. This process is time-consuming and subject to attenuation. As mentioned in Chapter II, people know much more than they can tell or write down. Therefore, no matter how good a turnover

binder may be constructed, it will never replace the tacit knowledge held inside the head of the departing Marine. Turnover binders are commonplace for members executing permanent change of station orders (PCS), billet turnovers, or even for entire units as they transfer responsibility in a combat zone.

In MAG-12 turnover binders were heavily used between MAG-12 staff members (during PCS) and UDP squadron staff members (during UDP turnover). The knowledge value of these turnover materials was determined by the efforts and competency of the author. Some turnover binders were better than others at representing the knowledge necessary to perform the duties of certain billets.

(4) Point Papers. Occasionally a resident expert (e.g., Marine, staff officer) would be tasked with constructing a point paper petitioning for a change in policy, allocation of resources, or the attention of higher headquarters toward a certain issue. Tacit knowledge regarding the particular issue would be converted to explicit knowledge in the form of a single document.

(5) Email. Email correspondence was a catchall explicit knowledge source. Elements of any of the sources listed above could be written into an email or included as an attachment. Archival records of previously sent or received emails could be recalled when necessary. Compressed files including entire collections of historical emails would even be passed among Marines during their turnover.

***b. Tacit Knowledge***

(1) Training. Much of the Marine's baseline body of knowledge is achieved through formal training. The current body of knowledge required for Marines of particular MOSs is designed and implemented through formal organizational channels. At the service level, TECOM is the USMC entity responsible for all Marine schools. These formal schools or classes range from boot camp to officer candidate school, and resident to online or distance education. Every Marine, regardless of MOS, is trained in the basics of infantry tactics. "Every Marine a rifleman" and "Every Marine officer a provisional rifle platoon commander" are two common sayings that represent the core focus of basic training within the Marine Corps (enlisted and officer).

Most formal training is the product of institutionally formalized knowledge. Much of this formalized knowledge can be found, in explicit form, within USMC doctrine and publications. The development of such explicit knowledge is a deliberate and time-consuming process managed and directed by TECOM and MCCDC. To use the language of organizational learning, these formal schools instill organizational routines and best practices within new members. Some of these mechanisms for changing or updating these organizational processes and routines are embedded within numerous USMC agencies, such as the Marine Corps Warfighting Lab (MCWL), Marine Corps Center for Lessons Learned (MCCLL), and others. These are a few examples of structured organizational learning.

Training within MAG-12 headquarters generally consisted of miscellaneous annual training (e.g., information assurance, anti-terrorism), MOS specific training, and the occasional IT system training (e.g., MS SharePoint, Defense Connect Online, or the Defense Travel System). Marines who had time also enrolled in Professional Military Education (PME). Officers typically enrolled in the distance education versions of Expeditionary Warfare School (EWS) and Command and Staff College (CSC). These course seminars were usually held one or two evenings per week, and consisted of a cross-discipline classroom of officers from different units on the base.

Many of the exercises and operations conducted by MAG-12 were training focused. The operation of MAG-12 in an austere environment (which occurred a few times per year) required an exercise in planning and coordination across all staff functions. The overarching purpose for these types of exercises is to practice the skills necessary to successfully fight the MAG in any environment across the AOR. These exercises were a form of training that built the tacit knowledge of the participants over time.

(2) First-hand Experience. There truly is no substitute for experience. After participating in several exercises a MAG-12 staff officer knows what issues typically emerge, what questions to ask next time, and what considerations are necessary for future evolutions. Many exercises or operations were similar in overall mission, but the specifics of operating in certain locations or circumstances were often

unique. After an exercise, the accumulated experience was brought back to the unit as tacit knowledge within the mind of a Marine. It may be translated into explicit form later by way of an AAR or email, but the most salient details remained embedded within the Marine or staff officer who participated in the exercise or operation.

(3) People. Perhaps the most valuable sources of knowledge within MAG-12 were the Marines themselves. Their personal experience and tacit knowledge, when accessible, was the preferred source of knowledge for many of the staff officers. Why spend valuable time digging through AARs, emails, or other explicit knowledge when you could walk down the hall and talk to an expert? If proximity prevented a face-to-face meeting then a phone call would enable dialogue, and as a last resort email correspondence would suffice. Face-to-face interaction was highly valued within the MAG. The most effective staff officers preferred face-to-face office visits versus other forms of communication. It was observed that less effective staff officers would default to email as a primary communication technique, for reasons outside the scope of this study (e.g., personality, social pressure, cultural motivators). Regardless of the chosen communication medium, this MAG's op-tempo required constant coordination and collaboration among staff officers, other Marines, and external agencies (e.g., joint partners, other USMC units).

Each and every Marine, although basically trained in infantry tactics, has an additional military occupational specialty (MOS). This MOS dictates the jobs to which a particular Marine can be assigned. This form of specialization is commonplace within most of the U.S. armed services. Generally, a communications officer is the resident expert on all communication system and IT. The logistics officer or a member of the logistics section should be the resident expert on the movement of personnel and equipment. In addition to the expected expertise of Marines with certain MOSs, unique contextual tacit knowledge is developed within all Marines through the experience gained during the performance of their duties. Some staff officers or Marines within the MAG, or any unit for that matter, may develop a reputation for expertise in certain areas or as a generalist. For example, the experience gained through participation in numerous MAG exercises and operations builds the tacit knowledge of individual staff

officers and Marines. This individual tacit knowledge is not something that was generated through any formal military education or class, but merely the collection of experience over time.

The tacit knowledge held by various members of the unit is the reason people are so valuable. Tacit knowledge, being difficult to transfer, requires ongoing communication, interaction, and trust to be shared between individuals. Trust is developed between Marines who interact regularly and build a mutual understanding of each other's competency and value to the organization. According to the literature, this trust is one of the critical prerequisites for tacit knowledge sharing (Holste & Fields, 2010; Levin & Cross, 2004). Marines who are good at their job, reliable, and always accomplish their tasks or missions achieve a higher level of trust and credibility with other members of the unit (e.g., superiors, peers, subordinates).

The tacit knowledge of Marines can be used to identify and recommend certain explicit knowledge. For example, a Marine can spend hours searching through documents hosted on SharePoint, stored in filing cabinets, or hidden in the unit's shared network drive. That Marine could request assistance from another Marine who may know what explicit knowledge is relevant or important, where it is located, and how to access it. The request for assistance to another Marine takes far less time than a continued blind search, but only if the Marine solicited has the necessary tacit knowledge regarding the topic in question. This example illustrates the role of a tacit knowledge regarding knowledge location and discovery. Experience regarding where and how to access certain types of information or knowledge is built over time in the same fashion as job-related experience. Organizational routines and common information management practices dictate how digital explicit knowledge is stored, organized, and updated. Slightly more abstract is the knowledge about where to find other non-explicit forms of knowledge. On several occasions, contact information for a particular expert or group was shared between Marines: "Go see John, he's the unit's expert on computer systems." This expert identification and referral occurs frequently. This knowledge referral process is an indication of the knowledge networks within a command.

### 4. Communication Routines and Knowledge Sharing

The patterns of interaction and communication routines within an organization influence information and knowledge sharing. “Planning does not occur in a vacuum,” is a common Marine phrase used to highlight the necessity of collaboration and coordination between staff members, units, or agencies. Modern workflows generally involve teamwork, collaboration, and coordination to some extent. The methods and tools for communication used inside and outside MAG-12 will be discussed here.

#### *a. Face-to-Face*

Undoubtedly the most efficient and valuable form of communication is face-to-face. Body language, verbal tonality, facial expressions, and other non-verbal signals are passed between people while they communicate in person. Face-to-face meetings and discussion were the preferred method of communication within MAG-12, but only when possible. Individual Marines’ schedules, travel, workload, and office proximity can all restrict the amount of time available for face-to-face interaction.

The MAG-12 battle rhythm dictated several weekly meetings, such as the XO’s department head meeting, CO’s department head meeting, daily operations meetings, and exercise and operations planning meetings (usually several per week). Meetings were most useful for sharing information and knowledge with a group at once. While not the most efficient use of time for each individual participant (opportunity cost of attendance was other tasks and workload), the group benefitted by receiving the most recent exercise or operational information, identifying experts within the group, building trust, and gaining awareness of others’ planning progress.

Impromptu face-to-face meetings between individuals were useful for achieving rapid mutual understanding of a particular topic. Office visits were most useful for tackling complex planning issues (e.g., unique operational requirements, unusual considerations), discussing a collection of topics at one time (e.g., updating the executive officer [XO] on numerous assigned tasks), or conducting some sort of persuasion. Knowing when to initiate (or schedule) face-to-face interaction versus communicating

using email or a phone call was a skill developed over time. As mentioned earlier, some staff officers were more inclined to face-to-face communication or phone calls, while others preferred email.

Face-to-face communication has the benefits of the rapid mutual understanding, trust, awareness and context through iterative dialogue. It was always much quicker to provide the necessary context to a conversation (e.g., who, what, when, where, how) when both parties (or all parties in a larger meeting) were actively engaged in the communication process. Despite the benefits of the rich communication, not all face-to-face meetings were mutually convenient for both parties. For example, constant unscheduled face-to-face meetings can easily distract staff officers from other duties or time sensitive work. Alternative forms of communication, such as email, require one party of the conversation to initiate the conversation and wait for the other to respond. The following face-to-face communications routines were common within MAG-12:

- Official group meetings (staff meetings)
- Mentoring
- Social interaction
- Impromptu meetings

#### *b. Remote and Computer Mediated*

Other communications methods had various levels of utility within MAG-12 depending on the situation. A phone call is usually considered better than email or other forms of communication, but not as good as face-to-face interaction. A phone call provides for the mutual two-way dialogue of face-to-face communication but without the non-verbal signals. Due to the travel schedule of many of the MAG-12 staff officers, phone calls were often difficult to initiate (e.g., international travel, different time zones, cell or land line phone availability). Additionally, phone calls require the dedicated attention and interaction from both parties at the same time, whereas alternative methods do not. Like unscheduled meetings, unscheduled phone calls can also adversely affect workflows and routine. Voicemail, email, or instant messenger can be replied to later,

and do not require the immediate attention of the recipient. The real-time dialogue possible through voice communication, specifically phone calls, can be used for mentoring, storytelling, and discussion.

Email was by and large the most widely used communication method within MAG-12. Emails can include file attachments that can increase the richness of the textual communication. Attachments such as pictures, slideshows, and documents were frequently sent between staff members. Often these attachments would enhance the conversation by providing reference material. Unfortunately, reading, writing, and responding to email consumed much of the workday for many staff officers due to the typical volume of email sent within the command. The default private nature of email makes it a channel-based communication medium. Only the recipient(s) of the email message sees its contents. Of course, the recipient can forward the message to another address or distribution list after receipt, but the fact remains that the recipient of any message must be determined up front. This model works well for communication that requires privacy, such as sensitive personnel matters, senior to subordinate tasking, and other situations. It does not work so well for the sharing of knowledge that has the potential to benefit others outside the email channel. Anyone left out of the email chain has no awareness of the conversation happening; they do not know what they are missing. Since awareness of an email conversation is restricted to the sender and receiver, redundant and potentially inconsistent conversations on the same topic could be occurring in multiple locations.

As one example, an action officer would email back and forth with the logistics officer in regard to gear and personnel movement plans for an upcoming exercise. No other staff officer would be included in this email conversation. Many of the other staff officers would not need to be involved, but some could benefit from the knowledge shared between the action officer and logistics officer during the conversation. The communications officer, currently planning communications support for this particular exercise, would love to know about the possible gear and personnel

movement plans so he could refine his own plan for support. The communications officer is left out of the conversation, and does not learn of the discussion or decisions made until the next exercise meeting.

Instant messenger and chat applications were frequently used during exercises of varying sizes to enable real-time text-based communication between individuals and groups. The use of instant messenger avoided some of the technical and workflow overhead of email. The real-time conversation capability of instant messenger mimics some aspects of a phone conversation, and eliminates the requirement for both parties to be actively engaged in the conversation. An instant message is usually sent with the expectation that the recipient will respond at his next convenience, and that he will not delay significantly. One large benefit of instant messenger is the chat room capability that enables multiple users to congregate in a shared group conversation. Even if only two of the room members are communicating, the remaining room members can see the conversation and thus gain awareness of any information or knowledge being shared. Instant messages can be addressed to individuals (like email) but can also be addressed to certain chat rooms whose membership may be active, passive, or transient. Instant messenger applications are staples of USMC command and control centers, regardless of the unit makeup (e.g., GCE, ACE, LCE).

Online virtual meetings became more commonplace within MAG-12 as a hybrid form of multiple previous communications technologies. Defense Information Systems Agency's (DISA) Defense Connect Online (DCO) platform provided a dedicated Adobe Connect meeting server for use by anyone with a DoD common access card (CAC). This commercial platform, adapted for use within the DoD, had the capabilities of real-time voice, video, instant messenger, file sharing, and collaborative markup (e.g., shared digital whiteboard). These online meetings were slowly becoming popular alternatives to traditional teleconferences and video-teleconferences (VTC). DCO created the ability to present a briefing (e.g., slideshow) to a distributed audience without losing much of the richness of a face-to-face meeting. While a face-to-face meeting was still preferable, DCO was an excellent up-and-coming alternative.

Toward the end of the investigator's tour with MAG-12, instant messenger applications were emerging for everyday use in a garrison environment. This instant messenger capability was provided through DCO as a standalone and separate application from Adobe Connect. This alternative to email was beneficial among early adopters for routine daily activities through quick real-time communications and presence awareness. Increased use of instant messenger for daily work is expected to increase over time as Marines gain familiarity with the application.

### 5. Knowledge Searching and Knowledge Discovery

Within MAG-12, awareness of knowledge (e.g., existence, location) and the identification of experts were built primarily through social interaction and experience. The following continues the previous example of a new junior staff officer. After a few days on the job and a handful of meetings the new officer will have built an awareness of the knowledge resources available to him, the location of knowledge, and experts within the command (even if only by role and position). This awareness would grow over time as the staff officer slowly increased the breadth of interaction to other units (during planning and collaboration). It was observed that, generally speaking, awareness of knowledge was restricted to the few 1stMAW units with which the individual frequently interacted. Occasionally, experts would be identified in other units while attending a planning conference or exercise (e.g., USAF, USN, foreign military counterparts).

Despite the Marine Corps' structure of shared training and institutional social networking, the investigator never built a good awareness for the expertise and knowledge of communications officers in other fixed wing MAGs (e.g., MAG-16, MAG-11). This was partly due to the geographic separation. MAG-16 and MAG-11 were located in California and South Carolina (respectively). It would seem logical for Marine officers holding similar billets in similar units (fixed wing MAGs in this case) to share knowledge between each other. After all, they will generally work on the same problems and tasks (e.g., communication planning, garrison communications networks).

A Marine may be able to find the name, rank, phone number, and email address of particular Marine within another unit. This information was typically found by searching the global address list (GAL) within MS Outlook on NMCI computers. This enterprise directory included all Marines with an NMCI email address, and many email addresses of Marines deployed to Iraq or Afghanistan. Additionally, unit directories were sometimes published to an intranet SharePoint page. It was possible to display more information on a SharePoint page than was available from the GAL, but many pages rarely did. Unless there was a specific question or inquiry Marines did not typically reach out to their counterparts in other units just to share knowledge. This was especially true for Marines reaching outside their respective MEFs. This seems to be a pathology that could be improved with social media tools such as ESNs and social profiles. Nobody really had the time to initiate new professional connections for the sake of potential knowledge sharing. It seems logical to assume that Marines in similar in billets across different units would benefit from an awareness of ongoing projects and problems being tackled by their peers, but the cost in time or effort is often prohibitive for making these types of connections with existing communication tools.

It was observed that most social connections created through routine work (e.g., planning conference, exercises, operations, daily workflows) were excellent conduits for knowledge discovery. On many occasions the investigator created social connections with Marines from other units during planning, collaboration, or coordination for upcoming exercises. The working relationships often bred a mutual understanding of the expertise of each individual while the social interaction built mutual trust. These relationships would be strongest between highly competent Marines. Despite the benefits of the social connection, over time neither Marine would go out of their way to inform the other about current projects, tasks, or workflows via email or phone calls; that required too much effort. However, if these two Marines ran into each other in the hallway or during a non-work social function they would exchange updates regarding work. These casual updates improved the mutual awareness of any projects or happenings within their respective units. Sometimes this awareness would instigate follow-up communication with a third party referenced during the conversation.

Ultimately, it seemed that an increased amount and variety of social connections improved a Marine's knowledge network. Difficult questions posed to a staff officer during a meeting often required that he access his social knowledge network for an answer or direction to the location of the knowledge (e.g., another Marine, explicit resource). A wider informal social network allows Marines to tap into knowledge networks of other groups and units outside their MOS or specialty.

## C. ANALYSIS

### 1. Communications Routines and the SECI Model Knowledge Sharing

Drawing heavily from Nissen's knowledge flow adaptation of the SECI model, diagrams of MAG-12 knowledge flows are presented in the following section. Many of the communication routines and knowledge sharing processes described in the narrative can be applied to one or several of the SECI processes. The logic behind the association of the various communication routines and knowledge sharing processes to their particular SECI process will be explained. The "As-Is" descriptions and illustrations provided here will serve as a baseline for the proposed application of Web 2.0 and social tool use cases in the following section.

#### *a. Combination (Explicit to Explicit)*

The combination knowledge flow process represents the creation of explicit knowledge from existing sources of explicit knowledge. For example, the explicit knowledge contained within several sources (e.g., emails, AARs, publications) could be referenced and combined by an individual during work on another explicit knowledge project (e.g., email, point paper, instructional brief). Once this new explicit knowledge is created, it is easily and rapidly shared via available ICT. Due to the nature and transportability of explicit knowledge, combination is generally associated with short flow times.

Figure 36 illustrates the explicit-to-explicit knowledge flows observed within MAG-12. Existing explicit knowledge can be easily shared through numerous methods. In the example of MAG-12, the most common method of new explicit

knowledge transfer was email. The vector AD represents explicit knowledge shared between individuals. Perhaps this was an AAR or point paper shared with a single individual via email. The modern implementation of email allows addressing to multiple recipients; therefore, the individual can also send the new explicit knowledge to a group (e.g., department, planning group, unit) as represented by vector AE. The flow of explicit knowledge across the group dimension follows the same patterns as the individual dimension, and are represented by vectors BD (group-to-individual) and BE (group-to-group). For example, staff officers (as a group) collaboratively combine the explicit knowledge of various exercise AARs into one document. This document, a product of the group, can then be transferred to the CO for action (vector BD). The CO receives this explicit knowledge and takes action as appropriate. Vector BF represents the flow of explicit knowledge from the group to the organizational level. For example, a particular CoP (e.g., Marine communications officers, Marine aviators) can create new explicit knowledge, through collaboration, and share that knowledge to the organization to be included in future organization-wide explicit knowledge (e.g., publications, training manuals).

Many of the vectors in Figure 36 are bi-directional. The points A, B, and C are located within the create stage of the knowledge lifecycle dimension, and the points D, E, and F are located within the share dimension of the knowledge lifecycle dimension. The vectors going from create to share (AD, AE, BD, BE, BF, CE, CF) all represent the sharing of explicit knowledge that has been created through combination. The vectors going from share to create (DA, DB, EA, EB, EC, FB, FC) represent the creation of new explicit knowledge from previously shared explicit knowledge through the process of combination.

The vectors in this model represent different flow times. The dashed vectors represent relatively short knowledge flow times, and the solid vectors represents longer flow times. Vector EF represents the increased flow time required for explicit knowledge to be shared with the organizational level. For example, individuals (e.g., staff officers) and groups (e.g., unit staff, department) construct an exercise AAR (AD, AE, BD, or BE) and share it among other individuals or groups (DE or ED). This AAR is

refined and revised through standard staff action and then sent to the MCCLL (EF). The flow time between the group and the organization-wide level (EF) is longer because the organization takes more time to digest the explicit knowledge into actionable form. The MCCLL will not recommend changes to USMC doctrine, training, tactics, or procedures based upon a single exercise AAR, but must perform due diligence by looking at a more holistic selection of AARs and trends from numerous groups across the entire USMC.

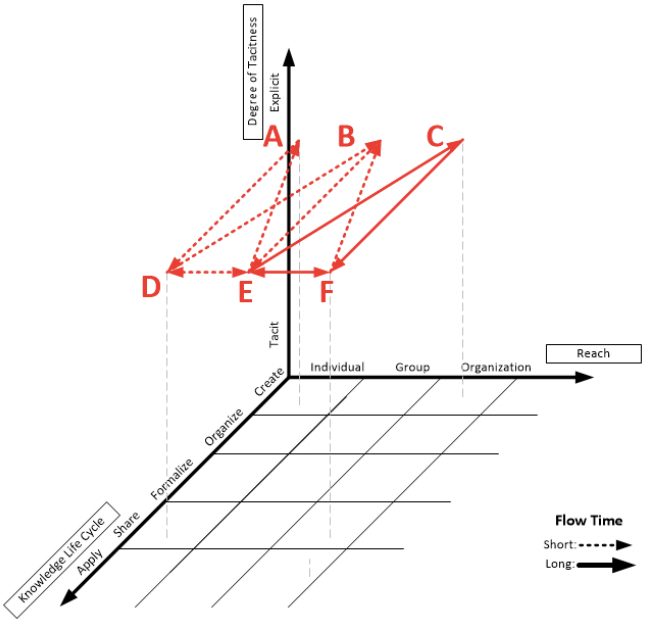


Figure 36. Combination Knowledge Flows

### *b. Externalization (Tacit to Explicit)*

Externalization is the process of creating explicit knowledge from individual or group tacit knowledge. The rich experience-based tacit knowledge is converted into explicit form. However, it is important to realize that this conversion is subject to attenuation. The creation of explicit knowledge (e.g., AARs, reports, emails, point papers) during externalization is a product of the author's tacit knowledge. Additionally, externalization generally takes longer relative to the combination process, but Figure 37 includes only short and long flow times for simplicity. Figure 37 represents the knowledge flows associated with externalization. The loops between points AB, GJ, and IK illustrate the tacit knowledge creation through on the job training (OJT) and

experience. The vertical vectors AC and GF represent the creation of explicit knowledge from tacit knowledge by both the individual and group (respectively). The flow time for this creation is short (relative to the other vectors in this particular figure) because it takes much less time to generate explicit knowledge compared to the time it takes to accumulate the tacit knowledge. The creation of the explicit knowledge represented by the vertical flows is the conceptual exercise involved in the creation of some form of explicit knowledge document or resource (e.g., AAR, email, report).

The vectors drawn across the explicit dimension (CD, CE, FD, FE, and DE) represent the distribution of the explicit knowledge after it has been created. These vectors are no different from the patterns of knowledge flows within the explicit dimension identified in the previous example of combination (Figure 36). Individual and group sharing of explicit knowledge is conducted via traditional communication routines (e.g., email, network storage). One difference here is the formalization of explicit knowledge at the organizational level. Vector EH represents the sharing of group explicit knowledge (e.g., unit, command, CoP) to be eventually formalized by the USMC as an organization (e.g., TECOM, MCCDC). This vector represents the organizational changes made to USMC training, education, tactics, and procedures based upon tacit knowledge, now in explicit form, generated from the fleet. The flow time is longer for this action due to the cycle time required to institute service-wide change (e.g., change in doctrine, change in training). Vector IH represents the explicit product of the numerous learning processes at the organizational level. For example, the searching and innovation activities of the MCWL or other agency generates tacit knowledge that is eventually converted into organizational doctrine or tactics in explicit form. The flow time for this knowledge is also longer due to the time required to institute changes to organizational doctrine.

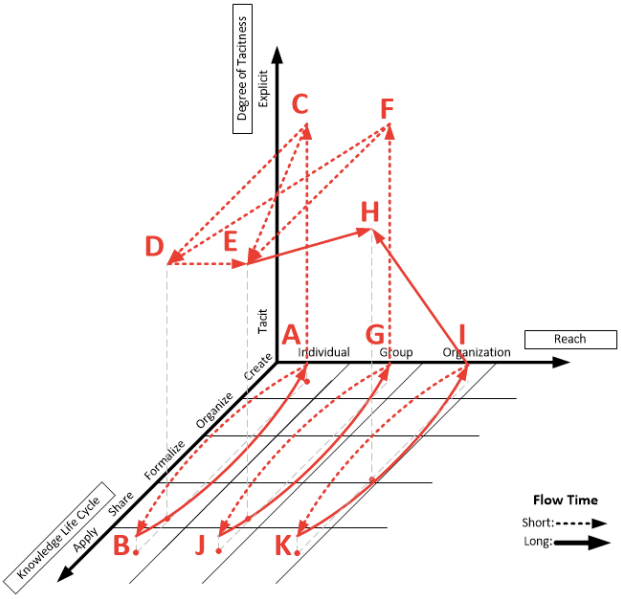


Figure 37. Externalization Knowledge Flows

### *c. Internalization (Explicit to Tacit)*

Internalization is the process of applying explicit knowledge through action. Tacit knowledge is generated from the experience of performing that action. For example, a MAG-12 action officer, while planning an exercise, may collect various sources of explicit knowledge, such as previous exercise AARs, email correspondence from other staff officers involved in previous exercises, and standard operating procedures for exercise planning. The action officer uses these pieces of explicit knowledge to plan and execute the exercise. During the execution of the exercise, firsthand experience is gained and tacit knowledge is created. Learning occurs for the action officer by internalizing the different explicit knowledge sources into personalized tacit knowledge.

The process of collecting explicit knowledge in preparation for an exercise was almost ritualized within MAG-12. Several steps would be followed by anyone planning an exercise (action officer or other planner): (1) search through any relevant turnover binders for specific exercise knowledge, (2) search for any AARs from the last iteration, and (3) email any previous Marine participants (same unit or different unit) to solicit any explicit knowledge they could provide. Once collected, the planner would

leverage this explicit knowledge in order to make informed decisions and plans enacted for the exercise. Tacit knowledge would be generated based upon the experience gained through both the planning and execution phases of that particular exercise.

Figure 38 represents the internalization knowledge flows. The trapezoid AEDCB represents the available explicit knowledge across the knowledge lifecycle and reach dimensions. Vectors EF, EG, DF, and DG represent the application of explicit knowledge to the task at hand. Tacit knowledge is created, as illustrated by the vectors FI, GJ, and HK, from the application of the explicit knowledge at points F, G, and H (individual, group, organization). The nature of tacit knowledge creation dictates the longer flow time represented by vectors FI, GJ, and HK. The logic of previous examples remains consistent regarding the flow time of knowledge between the group and organization. As explained previously, it takes longer for the organization as a whole to apply explicit knowledge from particular groups (vectors DH and CH).

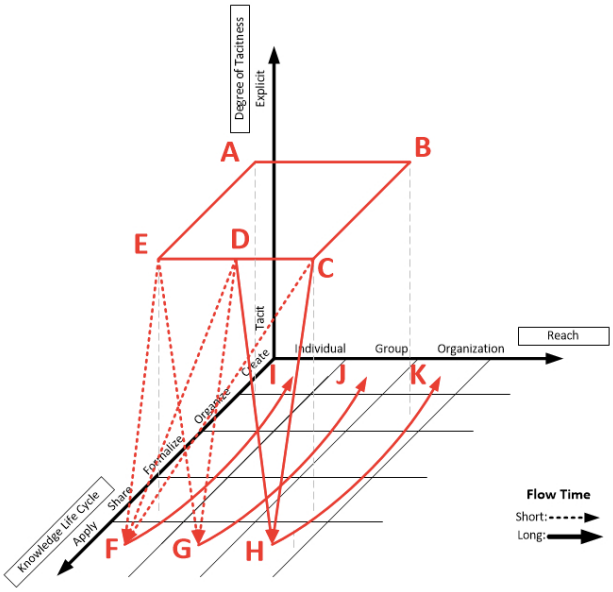


Figure 38. Internalization Knowledge Flows

### *d. Socialization (Tacit to Tacit)*

Socialization is the process of creating or sharing tacit knowledge from existing tacit knowledge sources. The rich internalized tacit knowledge contained within

individuals is difficult to write down or explain, but can be shared through social interaction. This social interaction enables tacit knowledge sharing through participation, imitation, observation, and collaboration within both informal and formal networks. One of the most common methods of sharing tacit knowledge is face-to-face interaction (e.g., meetings, office visits, teamwork). Mentoring, apprenticeship, and imitation are also mechanisms for sharing tacit knowledge. Generally, tacit knowledge has longer flow times when compared to the sharing techniques associated with explicit knowledge. Tacit knowledge cannot be instantly transmitted to a receiver, but must be built through interaction over time. For example, tacit knowledge was transferred between the investigator and his replacement communications officer during a billet turnover. It was transferred over the course of roughly two months (exceptionally long for a PCS turnover) consisting of face-to-face interaction, shadowing, mentoring, and dialogue. Even after the long turnover period there was no possible way that three years of rich tacit knowledge could be transferred completely in just a matter of weeks. However, the transfer that did occur was much more rich and useful than the alternative conversion of tacit-to-explicit knowledge (externalization) followed by explicit-to-tacit knowledge (internalization). Luckily, these two communications officers had the time, energy, and shared proximity over a period of time to dedicate to tacit knowledge sharing. This is not typical for many billet turnovers within MAG-12 or the USMC writ large.

Repeated interaction is often necessary because trust must be established for successful tacit knowledge transfer. If a Marine meets another Marine for the first time during a planning conference or exercise they will not instantly begin to share tacit knowledge. The process of trust building would occur first, how else would they know if each other's knowledge was credible or trustworthy? Trust and credibility can be built through dialogue and repeated interaction (e.g., teamwork, planning sessions). Within MAG-12 most tacit knowledge sharing occurred in offices, meetings or social settings (e.g., the officers club, non-work functions) after credibility and interpersonal trust had been generated. Staff officers who traveled together often shared much tacit knowledge because they had the time and proximity necessary for sustained dialogue and interaction.

In the digital space, similar dialogue can occur (e.g., email, instant messenger). However, these mediums require a much higher volume of interaction and time before tacit knowledge sharing begins. A single email explanation or instruction between two Marines would be considered explicit knowledge. The active conversation back and forth between the two Marines regarding the original message can be considered dialogue. The difference in latency between face-to-face or voice communication and email correspondence is significant when considering tacit knowledge sharing. An email conversation cannot transmit non-verbal cues or signals and is basically a half-duplex transmission medium (only one person can talk or transmit at a time). Face-to-face and voice communication (e.g., phone call) can be full duplex (both sender and receiver can transmit at the same time).

Figure 39 illustrates the socialization knowledge flows within MAG-12. The loops AD, BE, and CF represent the creation of tacit knowledge through OJT. The single vectors across the various lifecycle dimensions represent tacit knowledge flows between individuals, group, and the organization as a whole. Vectors L, K, and J represent tacit knowledge sharing between individuals and between groups via repeated dialogue and interaction (e.g., face-to-face, email, voice, instant messenger). Vectors G and I represent the organization of tacit knowledge between individuals and within groups. Over time, individuals who interact with each other begin to identify what people know. In other words, they identify the experts and begin to organize the knowledge into personal or community knowledge directories. These vectors represent the natural organization of tacit knowledge through knowledge networks (e.g., transactive memory, “who knows what”). Vector H represents the creation of new tacit knowledge through social dialogue and interaction among individuals and groups. This dialogue and interaction leverages the existing tacit knowledge of both parties (e.g., individuals, groups) to create new tacit knowledge for those involved in the process. Notice that most of these vectors represent relatively slow knowledge flows.

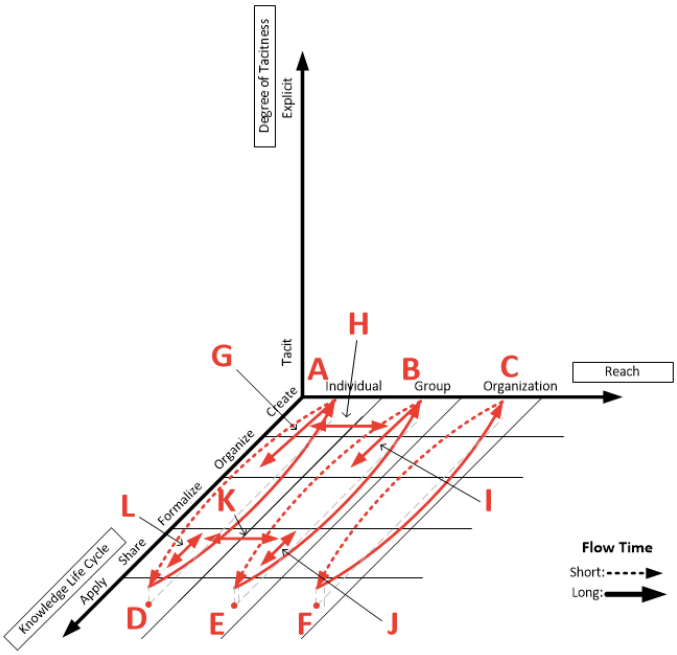


Figure 39. Socialization Knowledge Flows

## D. PROPOSED WEB 2.0 AND SOCIAL TOOL APPLICATION

Much of a unit's explicit knowledge is a product of individual tacit knowledge created through the process of externalization. Marines with tacit knowledge (e.g., experience, expertise) must expend both time and effort to convert this tacit knowledge into explicit knowledge in the form of an email, report, or perhaps an AAR. Alternatively they can share tacit knowledge directly through face-to-face interaction and dialogue, but this is more difficult due to time and schedule constraints, and geographic separation (especially in the case of MAG-12). The maturing landscape of Web 2.0 and social tools can support and enable more efficient explicit and tacit knowledge sharing. The following section will present some potential use cases for common Web 2.0 and social tools within MAG-12 or any USMC unit. Two important assumptions supporting these use cases are the organizational adoption and widespread use of such tools. The benefits of such tools can only be realized if they are integrated into existing workflows and adopted by a critical mass of users. A few lone champions cannot achieve network

effects. Accordingly, recommendations for future research regarding adoption rates, cultural motivation, and organizational knowledge sharing incentives will be provided in Chapter V.

### 1. Potential Web 2.0 and Social Tool Use Cases

#### *a. Blogs and Micro-blogs*

Blogs and micro-blogs represent a broadcast form of explicit knowledge distribution. Content can be published to the public or network (depending on security concerns) for anyone willing to consume. The long-form nature of traditional blogs provides a platform for experts to transmit ideas and experience. Blog posts can include rich content, such as pictures, diagrams, videos, or other files that can further enhance the media richness of the explicit content. The comments and ensuing discussion between the author and his audience creates a dialogue that, over time, can create the opportunity for tacit knowledge sharing (e.g., increasing mutual awareness of experts, shared experience, imitation).

Micro-blogs enable short-form distribution of status updates or information. The value of micro-blogs resides in the mutual awareness it can create within a network. Most micro-blog posts are not directed to any one individual or group (e.g., email), but broadcast to an audience of subscribers or content browsers. Marine knowledge seekers can view the historical collection of another Marine's micro-blog postings. In some cases, this can serendipitously help identify expertise, build trust, and initiate future interaction.

#### *b. Wikis*

Wikis achieve some of the same benefits of blogs (e.g., wide distribution) while adding the capability of collaborative content generation. Wikis seem the most useful for staffs, departments, or CoPs inside or spanning unit boundaries. The tacit knowledge of each contributor is used to create explicit knowledge (externalization) in the form of a wiki page or site. Every Marine's experience is different; therefore, many Marines should have something novel to contribute regardless of the size of the

contribution. One small detail or a longer explanation added to the wiki document expands upon the existing knowledge. Standard capabilities of wikis, such as version control, cross linking of content, contribution attribution, and other factors make wikis wonderful tools for information and explicit knowledge organization.

A large wiki site could be created to serve as a unit's AAR. Instead of producing a document after the exercise, why not have a wiki started at the beginning? A wiki, available from the exercise start, would enable collaborative knowledge capture in near real-time by multiple users across different functional areas. Individual AAR documents, adherent to MCCLL formatting, could be generated post-exercise from the wiki page, and the wiki page could remain active within the unit for future reference and continued contribution.

#### *c. Social Profiles*

Identification as an expert usually happens by a jury of your subordinates, peers, and superiors. If you ask Marines who the unit's resident expert is for a particular area, they will usually be able to tell you. They know who the expert is because they have personally interacted with him or know of others who have. The patterns of interaction within a unit tend to identify expertise and trustworthiness. Everyone in the unit knows who they can trust to accomplish a task with little supervision, and those who cannot. The recognition of these qualities occurs through social interaction. Instances of competency or expertise are attributed to individuals during interpersonal interaction and maintained throughout the social network.

An online social profile for a Marine could contain numerous artifacts that could generate credibility or trust without the previously mentioned social interaction. An online profile would not substitute for rich face-to-face interaction or close collaboration on a project, but it would help break the ice, increase awareness of potential expertise, and perhaps speed along the trust-building process. Many staff officers must prove themselves to new commanders, peers, or subordinates through their actions over time. A dynamic online profile or dynamic digital biography could inform interested parties of your activities, interests, work history, or previous projects before even a first meeting.

While none of the Web 2.0 or social tools listed here transfer tacit knowledge directly, they may support tacit knowledge between Marines by improving awareness, communication, and trust within both informal and formal social networks. The basic methods and processes for knowledge discovery and sharing within MAG-12 are already inherently social, but existing ICT (as used) did not adequately support these social functions in digital space. Minimal improvements can be made to face-to-face interaction's role in tacit knowledge transfer, but the non–face-to-face methods of tacit and explicit knowledge sharing could be greatly enhanced by available Web 2.0 and social tools.

Imagine if the publication of such knowledge would follow the author via some form of professional online profile. No longer would the author just be a name and phone number on a historical AAR, but his contribution would be visible to anyone interested in looking.

#### *d. Tagging and Rating*

Tagging and rating systems provide a mechanism by which content consumers can quickly and easily contribute to the validity of a piece of information or explicit knowledge. Content with ratings from a variety of users can indicate validity, usefulness, relevance, or any number of attributes. Marine functional areas are notorious for producing explicit knowledge in the form of publications, quick references, and instructions. Many times similar units will all have slightly different versions of the same information or knowledge. Perhaps it is a standard operating procedure (SOP) for tactical radio network installation and operation. Obviously, this would be a communications-focused piece of explicit knowledge, but which unit's SOP is the best? Social tools encourage the formation of CoPs, and members could use the tagging and rating features of a social platform to elevate the most useful pieces of explicit knowledge to a higher level of visibility within the group or to the larger functional area population (e.g., all USMC communications personnel).

Many units' intranet SharePoint sites and web pages contain numerous archival documents and files. The simple application of content tagging and rating

systems would reinvigorate traditionally static collections of information and knowledge. The best knowledge would receive the highest rating, and would be voted to the top or organized in some useful socially determined configuration. The active engagement of participant users would shift focus to certain pieces of knowledge to correspond with the current operational environment. This shaping of community focus from users within the community illustrates the network effects and wisdom of the crowd principles of Web 2.0.

A Marine's tagging and rating history is a valuable addition to his or her social profile. Informal social connections could build awareness about a particular Marine's functional area, expertise, current projects or professional interests simply by browsing the tagging history in their social profile.

#### *e. Enterprise Social Network*

Numerous software products exist that combine many of the Web 2.0 or social tools already discussed into one platform. The benefit of such platforms is seen in the integration of profiles across various tools. In addition to professional profile data, a user's profile on an ESN may include their file upload contributions, voting or tagging history, blog posts, wiki contributions, microblog status updates, and other historical activity. This profile information is capable of building trust and credibility with profile viewers without the direct interaction of the profile's user. The rapid mutual trust made possible by such tools sets the stage for novel new connections outside typical network boundaries. The discovery of another Marine with similar responsibilities and interests usually stimulates dialogue and knowledge sharing; in the past, this stimulation would occur during face-to-face meetings (e.g., exercises, planning conferences), but ESN platforms could create an environment for serendipitous online connections across the USMC as a whole. Robust profile and online contribution information enabled through ESN platforms would benefit those Marines conducting knowledge search outside their formal networks.

## 2. Proposed Web 2.0 and Social Tool SECI Model

### *a. Combination (Explicit to Explicit)*

The only significant constraints on the combination process observed within MAG-12 were generally associated with distribution. Email, network drives and intranet portals were the primary mechanisms for the distribution and storage of explicit knowledge. These tools, while efficient and practical, tended to reinforce existing silos of knowledge sharing within the unit. For example, if new explicit knowledge was created it would only be distributed to one group of people (e.g., MAG-12 staff officers) due to the patterns of interaction within the unit, and the utility of the explicit knowledge is limited to that group as a result. Of course some within the group may share the explicit knowledge with another individual or group, but this would be an overt action and not automatic. The use of Web 2.0 and social tools such as blogs, wikis and ESN may enable a greater potential distribution of the explicit knowledge outside the traditional group. For example, if a report was constructed from existing explicit knowledge (e.g., AARs, publications) and published to an individual blog (instead of just emailed) the potential audience of that explicit knowledge would be much greater. Not only would the intended original recipients receive the explicit knowledge, but also other Marines within MAG-12 or other 1stMAW units could possibly benefit from the knowledge published to the blog.

Figure 40 illustrates some potential improvements to the externalization process through the use of some Web 2.0 and social tools. The original vectors (i.e., from the combination diagram in Figure 36) of AD, AE, DE, BD, and BE have been highlighted green to represent improvements in distribution and flow time possibly enabled through Web 2.0 and social tools, such as blogs, wikis, ESN platforms, and others. The application of these tools creates additional conduits for sharing explicit knowledge. The improved knowledge flows (AD, AE, DE, BD, and BE) still represent distribution across the same reach dimensions (e.g., individuals, group, organization), but the same vectors can now reach larger sets of that particular dimension. For example, explicit knowledge shared almost exclusively via email (text or attachment) can now be posted to blog, and updated as required by the original author. The blog post can be sent to the intended recipients (just like an email), but the explicit knowledge can now also

benefit an unintended audience of interested Marines (e.g., knowledge seekers)—more individuals than previously possible when the explicit knowledge was distributed strictly via email. This same logic applies to flows to and from the group dimension (AE, BD, BE); explicit knowledge can flow to a wider range of possible audiences (individuals and other groups) as a result of the more public, persistent and archival nature of blogs or other social tools.

Vector DF is an entirely new knowledge flow vector (i.e., from the combination in Figure 36) added to this illustration to represent the knowledge flows now possible between an individual expert and the organization across the reach dimension. An individual expert can now achieve organization-wide visibility through the consistent publishing of valuable explicit knowledge to some form of blog or ESN platform. For example, the explicit knowledge of a single communications officer regarding a novel topic (e.g., tactical employment of wireless mesh networks for HADR missions) published to a blog can generate attention, interest and conceptual momentum throughout the organization; this attention builds his intra-organization reputation for expertise in a certain area. Organizational learning institutions, such as MCCDC, MCWL or TECOM now have the ability to view this explicit knowledge directly from its source (e.g., the communications officer's personal blog) rather than wait for it to trickle up to them via the traditional mechanisms (e.g., AARs, reports, collection activities). This is not to say that this form of knowledge sharing would supplant the existing organizational routines, but it could provide an additional conduit that would be valuable in certain situations.

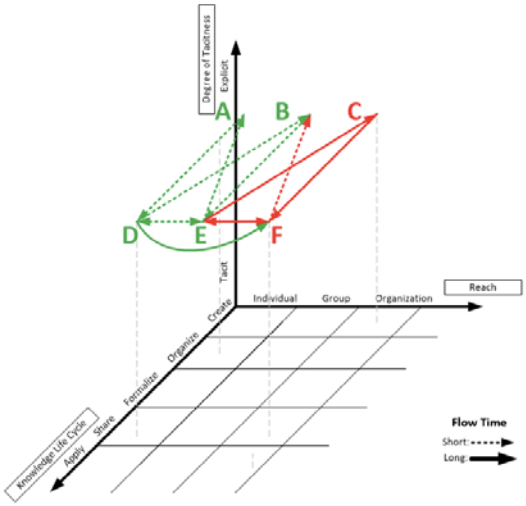


Figure 40. Improved Combination Knowledge Flows

### *b. Externalization (Tacit to Explicit)*

Web 2.0 and social tools can improve externalization knowledge flows by providing platforms for the collaborative generation of explicit knowledge from tacit sources. In Figure 41, vectors AD, AE, GD, and GE have been added to the original externalization diagram from above (Figure 37) to illustrate the additional explicit knowledge that can be generated through commenting dialogue, feedback, and tagging enabled through various Web 2.0 and social tools. Consider an AAR report created by an individual or group. This AAR is posted in a blog or an ESN platform. The audience of this piece of explicit knowledge can then leverage their tacit knowledge for the creation of additional explicit knowledge associated to the original document in the form of feedback. Comments by readers on the blog post or social network post represent their tacit knowledge in explicit form. These comments can validate, supplement, or contradict the original explicit knowledge. Regardless of the purpose of the comment or response, additional knowledge has been added to the original posting through collaboration. A small supporting or validating comment such as "This AAR is spot on! It discusses, in detail, many issues I have personally experienced while deployed on exercises," adds credibility to the original post by referencing the tacit knowledge of the commenter. Comment chains of questions and answers can form dialogue useful for further refinement of a concept or idea within the original document. It is important to note that

this online dialogue mimics the communication patterns that would occur during face-to-face interaction, but without the requirements of proximity or dedicated real-time attention. This dialogue is not quite as rich as the face-to-face alternative, but it serves as an excellent surrogate in many cases where such face-to-face interaction is not possible or practical.

The other vectors highlighted green in Figure 41 (CD, CE, FD, FE, and DE) represent the improvements to distribution of explicit knowledge enabled by Web 2.0 and social tools. These improvements are same improvements discussed in the improved combination knowledge flows diagram above (e.g., distribution improvements) (Figure.40).

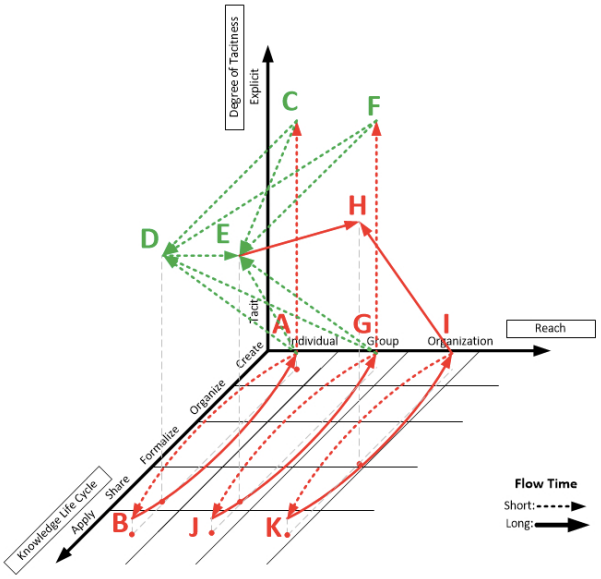


Figure 41. Improved Externalization Knowledge Flows

### *c. Internalization (Explicit to Tacit)*

Improvements to the internalization processes are mostly created by an increased awareness of the explicit knowledge. Before Web 2.0 and social tools, one would have to be told about the existence of some explicit knowledge. With new tools such as microblogs and RSS, an individual can subscribe to certain groups or experts to be notified once new explicit knowledge is published. This passive simple monitoring of

networked individuals greatly reduces the cost of the knowledge search. Therefore greater and faster access to a wider range of explicit knowledge is possible.

Figure 42 illustrates the potential improvements to the internalization knowledge flows from Web 2.0 or social tools. The vectors highlighted in green (EF, EG, EH, DF, and DG) represent the improved distribution of explicit knowledge due to the increased access and awareness generated by the social tools. It is much easier for an individual to monitor other Marines and multiple groups for the new explicit knowledge if a microblogging or ESN platform is used within his organization. This same logic applies across the reach dimension. No new flows of explicit knowledge are created, but a greater potential volume of tacit knowledge creation can be attributed to the increased access and awareness of a wider variety of explicit knowledge sources.

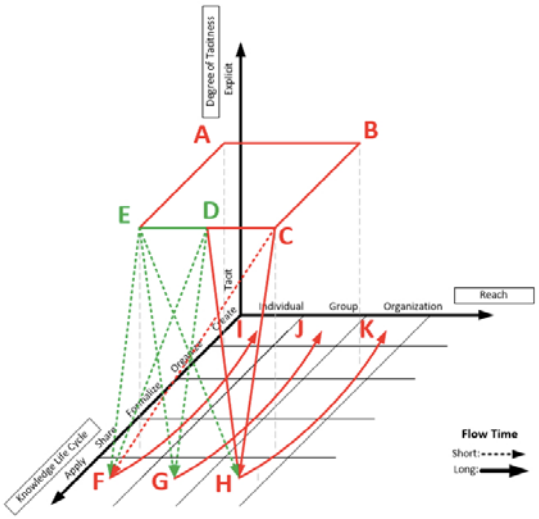


Figure 42. Improved Internalization Knowledge Flows

### *d. Socialization (Tacit to Tacit)*

Web 2.0 and social tools cannot eliminate the requirement for the social interaction for tacit knowledge sharing. However, they can support additional patterns of interaction, awareness, and improved trust that can support tacit knowledge sharing. Figure 43 illustrates the same vectors as the original socialization knowledge flow model described earlier (Figure 39). The improvements here are highlighted green. First, there

has been a change from long flow time to short flow time for several of the vectors (L, J, G, I). Sharing of tacit knowledge via face-to-face and other forms of communication requires long flow times due to the time necessary to build interpersonal trust and awareness of the knowledge available for transfer. The implementation of Web 2.0 social tools such as ESN platforms, blogs, microblogs, and social profiles enables trust and knowledge awareness to be constructed between people outside traditional communications channels. For example, instead of asking a person what they know during conversation or dialogue one could look up that individual's microblog feed or social profile to gain an understanding of their expertise, projects, or experience prior to any interaction. The ability to browse for this information without the active participation of the other user streamlines the tacit knowledge sharing processes when the face-to-face meeting or digital dialogue begins; these tools provide a richer context to that conversation. These same social profiles enable better organization of tacit knowledge between individuals and within groups. The available tacit knowledge can now be better organized through the use of social tools and profiles. For these reasons, the flow times of the vectors L, J, G, and I have been reduced.

Vectors K and H represent improvements to the range of possible individuals and groups for tacit knowledge sharing. The addition of serendipitous external network contacts to the existing social structures creates multiple potential sources of tacit knowledge. Consider a communication officer browsing a hypothetical USMC ESN. While casually searching through listings and profiles of fellow communications officers, he stumbles across a Marine who served in his current billet a few years prior. Seeing his profile and experience listed, the first Marine is able to initiate contact with the discovered Marine creating a new connection (one that would not have occurred otherwise) and a potential source of tacit knowledge.

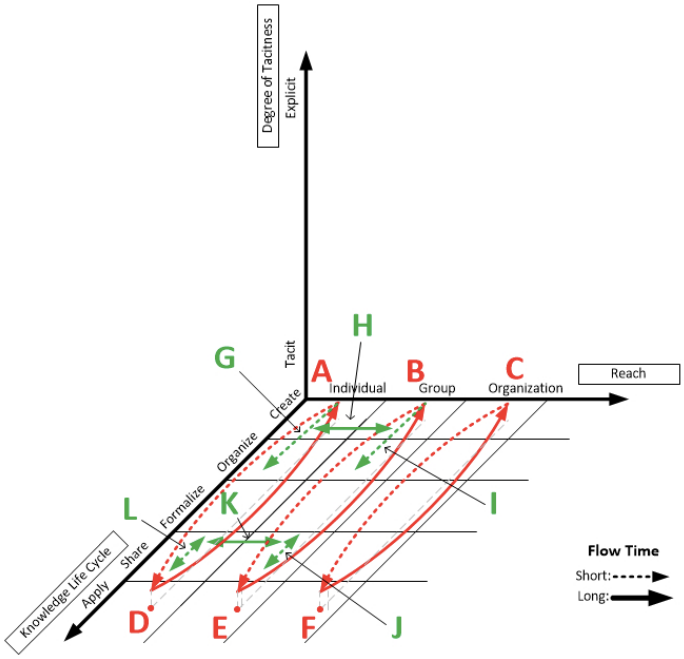


Figure 43. Improved Socialization Knowledge Flows

## E. SUMMARY

This case study focused on the knowledge flows within MAG-12 as observed by a primary staff officer. Existing communication routines and patterns of interaction tended to create silos of information and knowledge within the unit and its typical planning partners. Little knowledge was shared outside the unit because there was not necessarily a requirement to do so, and outside sharing would consume additional time and effort, both of which are very limited in organizations maintaining high operational tempos. The use of Web 2.0 and social tools may enable a wider distribution of knowledge outside the unit. Figure 44 represents a summary illustration of the concepts discussed in this section.

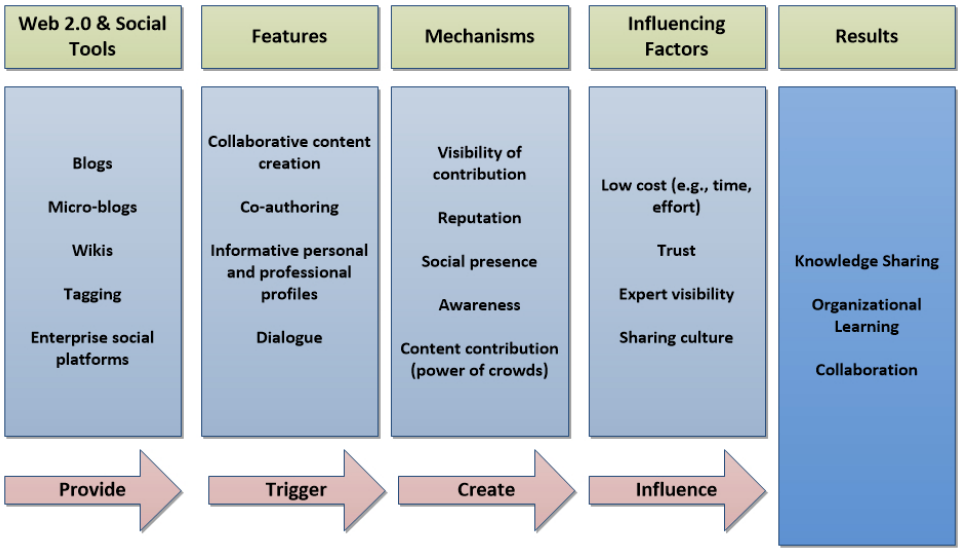


Figure 44. Framework for Web 2.0 and Social Tools for Knowledge Sharing (After Gordeyeva, 2010)

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# V. CONCLUSIONS AND RECOMMENDATIONS

## A. SUMMARY OF RESEARCH

This research set out to explore the benefits of social media tools for tacit knowledge sharing within the USMC. Specifically, this thesis posed the following research question, "How can social media tools be used to improve USMC tacit knowledge sharing?" The desired end state was to reduce the ambiguity related to the application of Web 2.0 and social tools for knowledge sharing. Many of these tools demonstrate obvious enhancements to communication and collaboration, but their contribution to knowledge sharing within the context of the USMC was more uncertain. The foundation for this study was established in Chapter II through a literature review of the existing academic and practitioner research of knowledge, organizational learning, knowledge management, Web 2.0, social tools, and Enterprise 2.0.

Chapter III described the research design of the case study method used for this research. The case study presented in Chapter IV leveraged the knowledge flow patterns presented during the literature review to analyze case evidence collected through retrospective observation of organizational routines within MAG-12. A case study was an appropriate method for this research because it allowed for the exploration of real-life knowledge flow patterns within a USMC unit. The existing communications routines, tools, and patterns of interaction both inside and outside the command illustrated inefficiencies in knowledge distribution, sharing, awareness, and discovery. Email communication, unit intranet portals, and shared network storage perpetuated explicit and tacit knowledge silos within the command and among its frequent planning partners (e.g., other units, staffs). Use cases for Web 2.0 and social tools, grounded in existing literature, were developed and presented as potential solutions or improvements to the illustrated knowledge flow pathologies.

The structural similarities between the case study subject, the USMC writ large, DoD, and other military organizations contribute to the external validity and reliability of

the study. Due to the standardized communications routines and patterns throughout the USMC, the observations presented and analysis conducted here could easily be replicated in other USMC units with similar conclusions.

## B. CONCLUSIONS

This research has shown that Web 2.0 and social tools can indirectly enhance existing tacit knowledge sharing processes within USMC units. These tools do not directly enable tacit knowledge sharing, but indirectly increase tacit knowledge sharing by improving expert awareness, building social networks, enabling dialogue, and improving interactions among individuals. According to several authors, these improvements are enablers of tacit knowledge sharing (Gordeyeva, 2010; McAfee, 2009; Ikujiro Nonaka & Takeuchi, 1995; Panahi et al., 2012, 2013). The academic and industry trends highlighted in Chapter II represent growing theoretical support of social tools for tacit knowledge management (Panahi et al., 2013). Social tools enable individuals to easily maintain larger formal and informal social networks than was previously possible (Gordeyeva, 2010). The USMC is the smallest and most tightly integrated service within the DoD. Marines already cultivate a unique service-wide social network due to their small size and integration (e.g., MAGTF). The proper application of Web 2.0 and social tools could enhance the value and reach of the social network Marines already enjoy.

According to Johnson, "For USMC KM to be effective knowledge sharing must exist throughout the organization, and a knowledge portal that gives access to all Marines, while simultaneously supporting working groups, CoPs, and other communities of interest, will help to induce the flow of knowledge at all levels of command" (2010, p. 65). This research indicates that Web 2.0 and social tools can improve knowledge sharing across the individual and group levels, both inside and across USMC units. The service-level organizational learning apparatus in the form of USMC agencies and commands (e.g., TECOM, MCWL, MCCLL) are excellent tools for implementing change and knowledge distribution at the highest levels, but a true learning organization must allow individuals to share experience at all levels of the organization (Garvin, 1993)—not just distributed from the top. Web 2.0 and social tools, if implemented correctly, can provide

individual Marines the ability to widely distribute, discover and identify knowledge within the organization, regardless of unit or network boundaries.

Findings from this research contribute to the growing body of knowledge surrounding the use of Web 2.0 and social tools for both knowledge management in general (Cross & Parker, 2004; Davenport & Prusak, 2000; McAfee, 2009) and tacit knowledge sharing in particular (Gordeyeva, 2010; Panahi et al., 2012, 2013). The recommended use cases presented here for blogs, microblogs, wikis, and ESN platforms within the USMC coincide with current and emerging research in the areas of knowledge management, social tools, and Web 2.0. This research adds to what we know about USMC unit knowledge flows from Polania (2010) and investigates the use of Web 2.0 and social tools as candidates for the KM tools suggested by Johnson (2010).

## C. IMPLICATIONS

The results and insights of this study are important to numerous USMC stakeholders at many levels. These findings highlight the benefits of Web 2.0 and social tools to both explicit and tacit knowledge sharing as well as collaboration and communication. These findings could be of interest to senior USMC organizations such as MCCDC and TECOM because they are the agencies responsible for the USMC's overall organizational learning apparatus.

One of the stated goals of the recently established USMC KM CoP is to "Identify and leverage standard, interoperable internet-based capabilities that best enable secure collaboration and information and knowledge sharing across USMC and DoD information enterprises" (Deputy Commandant for Combat Development and Integration, 2013, p. 2). This research shows that Web 2.0 and social tools fall squarely within this goal as collaboration, information sharing, and knowledge sharing tools. As suggested by Johnson, the KM strategy of the USMC should include specific KM tools (Johnson, 2010). Web 2.0 and social tools would fit well within such a strategy while bringing a valuable social emphasis to existing KM endeavors.

## D. RECOMMENDATIONS

The results of this study highlight the knowledge sharing benefits of Web 2.0 and social tools. Based upon the findings of this research, it is recommended that the USMC invest in the acquisition and implementation of Web 2.0 and social tools in order to improve both tacit and explicit knowledge flows across and between multiple levels of the organization. However, this broad recommendation may be impractical to implement or difficult to justify considering current competing priorities across the Marine Corps. Therefore, leveraging existing tools for increased knowledge sharing may be a better initial course of action toward a more socially enabled Marine Corps.

The various Web 2.0 and social tools presented throughout this study may not be available to the USMC as an enterprise application suite (e.g., Yammer, Jive), but many of these tools exist as capabilities within other applications or programs. For example, even older versions of MS SharePoint include features such as wiki pages and other content solutions. These existing tools, when advertised to the organization with instructions and guidance from senior agencies can enable many of the knowledge sharing benefits described within this study. Therefore, one near term recommendation for the USMC enterprise is to publish and distribute marketing materials and best practices for the use of such existing tools for improved collaboration and knowledge sharing.

The largest current DoD implementation of a Web 2.0 and social tool platform is the collection of web applications known as milSuite. MilSuite (www.milsuite.mil) claims to be the "…collection of online tools and applications…" for "…the purpose of bringing online collaborative methods and secure communities to the entire Department of Defense." MilSuite contains various Web 2.0 and social tools, such as a wiki platform (milWiki), SNS (milBook), social content aggregator (milWire), social idea exchange (Eureka), and social video distribution (milTube). MilSuite mitigates many security concerns by limiting access to its applications to DoD common access card (CAC) holders only. Users create profiles that are visible across the different applications. The tools provided within the milSuite platform mimic many of the popular commercial SNS applications (e.g., Facebook, Twitter, YouTube).

Users can collaborate, interact, and associate with the various groups, communities, and individuals across the DoD through the collection of milSuite applications. MilSuite is a DoD enterprise initiative soon to be migrated to Defense Information Systems Agency (DISA), but has yet to generate significant Marine participation. However, there are currently a few USMC specific communities and groups within the milSuite platform. Notable among these communities are the USMC Information Management and Knowledge Management CoP and the USMC Communications Knet (CoP). In fact, interactions and discussions within this platform inspired much of this research.

While not an Enterprise 2.0 platform implemented directly within the MCEN (and the benefits that implies), milSuite represents an excellent sandbox for the development and cultivation of a more socially enabled Marine Corps. Organizational innovation and knowledge sharing advocates (e.g., USMC KM CoP, MCCLL) should advertise the capabilities and features of milSuite to the Marine Corps in order to generate interest and participation in this DoD Enterprise 2.0 endeavor. At the unit level, milSuite could be used to establish persistent unit communities; over time these communities would collect the profiles and interactions of unit members past and present, thus creating a unit-specific knowledge network. The existence of the USMC Communications Knet (CoP) within milSuite is an excellent example of a functional area or MOS specific online community for sharing knowledge across the organization. This CoP could easily be used as a template for other MOSs and groups within the USMC.

This platform (milSuite) costs nothing to the Marine Corps, yet it provides a robust and growing collection of tools discussed throughout this study. However, it is uncertain how long it would take to generate enough participation on milSuite among Marines to create the desired network effects of Web 2.0 and social tools. Therefore, milSuite may be a good target platform for pilot programs and experiments within the USMC to determine if investments in other ESN platforms would be worthwhile.

## E. SUGGESTIONS FOR FUTURE RESEARCH

There are numerous opportunities for future research through similar case studies of the knowledge flows within various units and organizations, such as non-aviation Marine units, MEUs, joint task forces, or coalition partners. Further exploration of existing knowledge flows within various units would continue to inform the ongoing discussion of knowledge flows within military organizations. This particular case study was a single unit of analysis and single case. Future research could replicate this study in other military units, and expand upon the scope of analysis by included multiple cases.

This study focused on exploring the benefits of Web 2.0 and social tools for knowledge sharing. It successfully illustrated many of these benefits, but did not present practical recommendations for the acquisition or implementation of these tools at the enterprise level. Future research could investigate the considerations necessary for the implementation of such tools and applications within the Marine Corps Information Enterprise (MCIENT) architecture and the MCEN (e.g., security, program structure, training).

Any recommendation for the implementation of enterprise software applications and platforms initiates debate regarding the tradeoffs between software alternatives. Should the USMC develop custom Marine specific software to enable the social tools presented in this study? Would industry provided ESN solutions be a better choice? These questions, among many, emerge quickly from the types of recommendations presented in this study.

The cultural considerations for implementing social tools or Web 2.0 applications within the USMC were not analyzed in any depth during this study. Future research could investigate the specific cultural organizational changes required within the USMC for the successful implementation and adoption of social tools. The USMC and other U.S. military services cling to a traditional hierarchical organizational structure. Some authors argue that this type of structure is not a great environment for enterprise social tools

(Riedl & Betz, 2012). Additional research could identify conflict areas and make recommendations for their resolution during any future USMC enterprise Web 2.0 or social tool implementations.

The many adoption considerations for enterprise social tools were not a focus of this research. While some of these considerations were mentioned throughout this study, numerous opportunities exist for future research in the area of knowledge sharing motivational factors, organizational incentives, or the organizational trust necessary for the adoption of such social tools within the USMC. Research along these lines could be focused on investigating adoption considerations for social tools across ranks, experience, MOS, or unit type. Would grassroots adoption (e.g., bottom-up) and subsequent knowledge sharing participation in social tools emerge if senior leaders put the proper tools in place? Can senior leadership dictate or incentivize participation in such tools (e.g., top-down)?

The cultural environment of the DoD, especially within USMC, present unique opportunities for research within a military context; this would both contrast and supplement the emerging body of knowledge regarding the implementation of social tools, which at this time is predominantly industry focused (e.g., business). Research by Paroutis and Saleh identifies leadership involvement and training and rewards systems as motivational factors for user participation in enterprise social tools (Paroutis & Saleh, 2009). Vuori and Okkonen identify several motivational factors affecting knowledge sharing via enterprise social tools in two commercial companies (Vuori & Okkonen, 2012). These two studies represent blueprints for similar studies within the USMC or U.S. DoD that would generate useful insights into the motivational factors of Marines and service members for using enterprise social tools.

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# APPENDIX A. THE FORRESTER WAVE: ENTERPRISE SOCIAL PLATFORMS, Q3 2011

The following figure is an excerpt from a 2011 Forrester report regarding current trends in ESN platforms. This figure lists examples of the most popular commercially available ESN platforms, and their selection criteria, in order to illustrate the growing availability of such software applications.

| Vendor | Product name | Version | Release date |
|---|---|---|---|
| Atlassian | Confluence | 3.5 | March 2011 |
| Cisco | Quad | 2.5 | June 2011 |
| IBM | Connections | 3.0.1 | April 2011 |
| Jive | Jive SBS | 4.5.6 | January 2011 |
| Microsoft | Microsoft SharePoint Server | 2010 | May 2010 |
| NewsGator | Social Sites 2.0 | v2 | May 2011 |
| OpenText | OpenText Social Communities | 8.1 | July 2010 |
| Socialtext | Socialtext | 4.6 | February 2011 |
| Telligent | Telligent Enterprise | 2.6 | October 2010 |
| | Telligent Evolution | 5.6 | October 2010 |
| | Telligent Community | 5.6 | October 2010 |
| | Telligent Analytics | 3.6 | November 2010 |

**Vendor selection criteria**

**Offered a breadth of social capabilities.** Participating vendors were required to have most or all of the following: blog, wiki, profiles, microblogging, activity feeds, community capabilities, tagging, tag clouds, RSS, discussion threads. This implies a broad array of social capabilities that represents a fairly level field of comparison. Vendors with more focused technology offering were not included and will be covered under separate Forrester research.

**Provided five references of customers in production.** As vendors enter this crowded market on a regular basis, Forrester requires vendors to demonstrate a basic level of market presence and staying power.

**Received frequent consideration in enterprise social strategy or collaboration strategy.** In order to maintain the Forrester Wave at a manageable number of vendors, Forrester queried our internal customer relationship management system and solicited feedback from appropriate analysts to help determine which vendors were most highly relevant to Forrester clients.

Source: Forrester Research, Inc.

Figure 45. Evaluated Vendors: Product Information and Selection Criteria (From Koplowitz, 2011)

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# APPENDIX B. MAKING THE BUSINESS CASE FOR ENTERPRISE SOCIAL NETWORKS

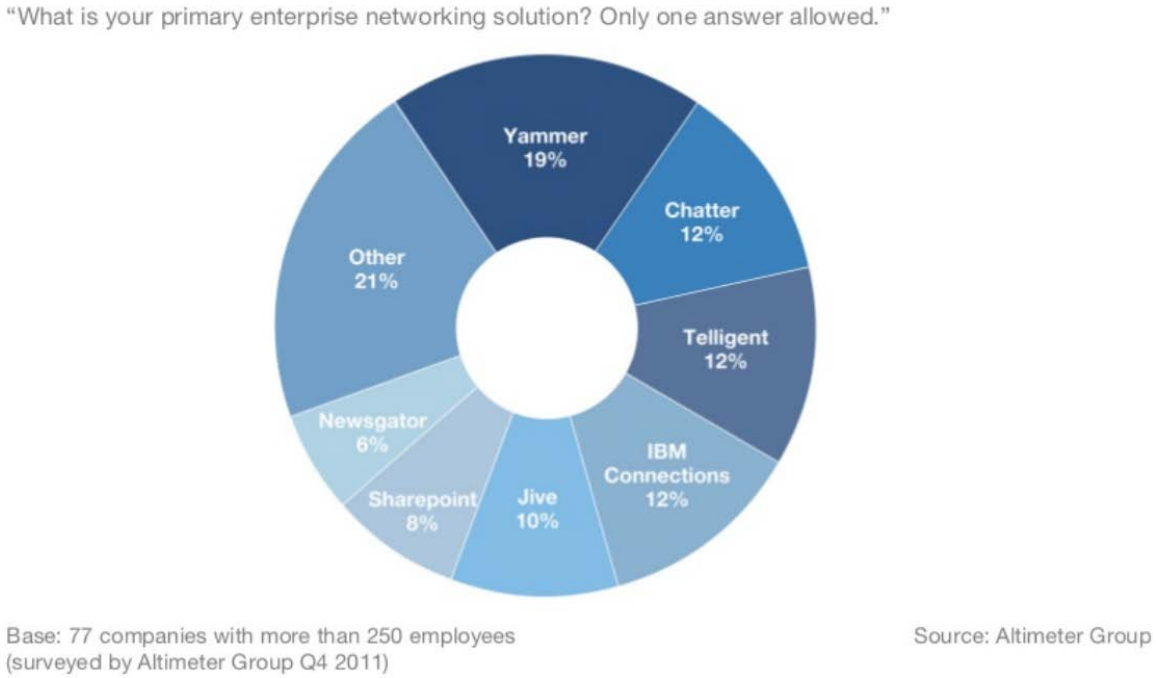
The following figures are excerpts from a 2012 Altimeter report regarding the potential business value achieved through the implementation of ESN platforms. According to Li, three requirement scenarios drive an organization's choice to pursue an ESN platform (2012). Four drivers of business value are attributed to ESN platforms, such as encourage sharing, capture knowledge, enable action, and empower people (Li, 2012). Common ESN software vendors and their estimated market share are provided as examples of current commercial ESN options.

| Scenario | Why Pursue This Path | Examples |
|---|---|---|
| **Standalone solution**<br>- Can exist independently<br>- Also can be integrated into enterprise apps | It's fast, easy, and cheap.<br>Most are developing integration APIs. | Google+<br>Salesforce.com Chatter<br>Socialcast<br>Yammer |
| **Collaboration**<br>- Tends to be one major platform in each organization | Collaboration platforms are already social and in-house. ESN is a feature that is easily "turned on." | Box.net<br>Cisco Quad<br>Clearvale<br>Drupal<br>Jive<br>Moxie<br>Mzinga<br>Socialtext<br>Telligent |
| **Enterprise application add-on**<br>- Integration into critical enterprise apps | While not inherently a collaboration platform, it can turn on or layer on social technology to make them an ESN. | Lotus/IBM Connections<br>Salesforce.com Chatter<br>SharePoint + NewsGator<br>TIBCO/tibbr |

ESN Technologies Evolve From Three Scenarios (From Li, 2012)

| | |
|---|---|
| Encourage Sharing | • Creates two-way dialog<br>• Makes business personal<br>• Reduces power distance to leaders<br>• Connects globally, person by person<br>• Forms private groups |
| Capture Knowledge | • Identify expertise<br>• Avoid duplication and have better coordination<br>• Transfer knowledge<br>• Improve best practices |
| Enable Action | • Solve problems faster and better<br>• Bring outsiders in<br>• Streamline processes |
| Empower People | • Give employees a voice<br>• Make meaningful contributions and innovations<br>• Increase engagement, satisfaction, and retention |

Four Ways ESN Drive Business Value (From Li, 2012).




The Nascent ESN Market Results in a Wide Diversity of Technology Solutions (From Li, 2012)

# APPENDIX C. USMC KM COP CHARTER

DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
3300 RUSSELL ROAD
QUANTICO, VA 22134-5001

IN REPLY REFER TO:
5420
CKO
16 Apr 2013

From: Deputy Commandant for Combat Development and Integration (DC CD&I)
To: Distribution List

Subj: USMC KNOWLEDGE MANAGEMENT (KM) COMMUNITY OF PRACTICE (COP) CHARTER

Ref: (a) MCO 5400.52, DoN Deputy Chief Information Officer Marine Corps Roles and Responsibilities dtd 5 Jan 10
(b) 10 USC § 5063, USMC Composition; Functions dtd 10 Aug 56
(c) Marine Corps Vision and Strategy 2025 dtd 18 Jun 07
(d) Marine Corps Information Enterprise Strategy dtd 14 Dec 10
(e) FM 6-01.1, Headquarters, DoA KM Operations dtd 16 Jul 12
(f) DoN KM Strategy Memorandum dtd 20 Oct 05

1. Purpose. This Charter establishes the USMC KM CoP and sets forth its functions, membership, meetings, duration, and records disposition. In accordance with reference (a), those responsibilities are assigned to the Chief Knowledge Officer (CKO), Combat Development and Integration (CD&I).

2. Background. The role of the KM CoP is to support the Commandant of the Marine Corps U.S. Code Title 10 responsibilities of organizing, training, and equipping the Marine Corps, and developing the necessary capability and capacity to effectively operate in today's information environment as outlined in references (b) and (c). Marines must be trained and educated to take on the challenges and opportunities presented by the Information Age. Reference (d) calls for the need to institutionalize KM practices across the Marine Corps and evolve into a knowledge-based force that achieves decision and execution superiority in traditional warfighting domains, cyberspace, and business mission areas.

a. As state and non-state actors complicate the global security environment by blurring traditional and irregular capabilities and tactics, the Marine Corps must explicitly build environments for creating and leveraging its information and knowledge. Additionally, the current fiscal environment has called for greater attention on how the Marine Corps captures, shares, and transfers information and knowledge assets within and across its commands and organizations in an effort to facilitate operational efficiency and effectiveness, continuity of operations, and remain as our nation's premier expeditionary fighting force.

b. KM is the art of creating, organizing, applying, and transferring knowledge to facilitate situational understanding and decision-making. KM enables organizational learning, collaboration, and innovation to influence future events and performance. As described in reference (e), effectively sharing relevant, accurate, and timely information serves as a catalyst and force-multiplier for commanders, planners, and decision makers. This thereby enhances the Marine Corps ability to bring its collective human, intellectual, social and structural capital and capabilities to bear, fostering innovation and developing a knowledge-based force that effectively accomplishes its organizational objectives and missions across the tactical, operational, and strategic levels.

c. Since the 1990s, KM has become a widely-adopted business practice and a critical imperative. The discipline has continued to evolve from an academic concept, to a software vendor-influenced tool, and, now, to a more holistic organizational goal. This larger picture of KM contains many different, yet interrelated aspects such as strategy, culture, process, technology, performance, and learning. For KM to be successful and make a difference, all aspects must be considered and addressed.

d. As with many Department of Defense (DoD) organizations, the Marine Corps faces considerable challenges in establishing KM capabilities within its commands. A complex and challenging mission coupled with the loss of valuable experience and expertise due to assignment changes and attrition directly impacts the Marine Corps capabilities and mission performance. In light of these circumstances, retaining and sharing valuable strategic and tactical information, lessons learned, subject matter expertise, and best practices play an important role in maintaining force readiness, agility, and mission effectiveness.

e. The USMC KM CoP will champion KM practices and principles across a broad spectrum and focus on people, process, and technology in a multi-disciplined approach to identifying, capturing, and sharing the organization's knowledge; and ensuring that relevant, accurate, timely, and useable information and knowledge assets are accessible to commanders, planners, and decision makers.

3. Applicability and Scope. This Charter is applicable to HQMC agencies, the Operating Forces, and supporting establishments.

4. Functions. Per the guidance set forth in reference (f), the Marine Corps KM CoP will serve as a catalyst in enabling the Marine Corps to achieve its strategic KM vision:

*A Marine Corps enterprise environment that promotes leveraging information and knowledge assets, along with a continuous learning organization that takes advantage of technology, to effectively share, communica te, and collaborate in order to maintain mission readiness.*

The USMC KM CoP will pursue six goals that address the elements of a successful KM programs across the enterprise. The goals of USMC KM are to:

a. Enable, sustain, and institutionalize information and knowledge sharing across the Marine Corps.

b. Develop open communities where people may question, learn, and collaborate in a manner that builds organizational expertise and fosters individual growth.

c. Advocate and support information and knowledge sharing to increase operational efficiency and effectiveness, and enhance planning and decision - making processes across the tactical, operational, and strategic levels of command.

d. Develop processes, procedures, and standards that best enable the capture, sharing, and maintenance of relevant and timely information and knowledge assets.

e. Create, capture, store, and share information and knowledge assets in a manner that provides accurate and actionable information for commanders, planners, and decision makers, on demand.

f. Identify and leverage standard, interoperable internet-based capabilities that best enable secure collaboration and information and knowledge sharing across USMC and DoD information enterprises.

5. Membership. Marine Corps KM CoP participation is voluntary for all HQMC agencies, the Operating Forces, and supporting establishments.

6. Meetings. Meetings will be held quarterly via an electronic meeting capability (tele-, data-, or videoconference). In addition, formal face-to-face meetings will be held occasionally, as required. Real-time communications and collaboration will be conducted over various DoD enterprise platforms, including the "usmc_km" unclassified Defense Connect Online Jabber room (conference 2 chat server).

7. Duration. The Marine Corps KM CoP will remain in existence until two years from the effective date of this Charter, whereupon it may be renewed on an annual basis.

8. Records. The Marine Corps KM Program Office will be responsible for the maintenance of this charter and all other records associated with the USMC KM CoP on the CoP's portal: https://eis.usmc.mil/sites/usmckm.

9. Point of Contact. My point of contact for this matter is the CD&I KM Office at 703-432-8310/8607/8663 (DSN 378).

RICHARD P. MILLS

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