Building a Knowledge Organization

A Proposal for Improving Product Quality, Customer Expectations and Innovation via Communication, Information Access and Knowledge Management

Prepared for

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1.0 Introduction

Customer Reputation is Crucial

The Communications Service Provider (CSP) business unit within Fluke Networks (FNET), which our Operational Support Systems (OSS) Engineering group is a part of, is undergoing organizational change to better align with our business' core values and to meet our business unit's objectives for 2007. Prior to our acquisition in 2003, we had been able to maintain a solid reputation within the telecom OSS market. However, we face challenges relating to communication, information access and knowledge creation that make maintaining our positive reputation with our customers more and more difficult while the demand for revenue generating innovation, product quality and customer service continues to increase.

Negative perceptions are difficult to alter and existing reputations are critical to maintain. That is why delivering quality products to our customers is crucial in maintaining our company's reputation. This is especially important considering the limited customer base we currently hold. Though increased global expansion in Asia and South America is very likely, our reputation is determined by the relationships we maintain with those few customers we *currently* hold and the quality of the products that we deliver *now*.

Unfortunately due to recent misses in meeting customer expectations for our largest client, delivering quality products and continued first-rate customer service has become exceedingly difficult and sometimes downright impossible. Our strategic Policy Deployment goals have recently been adjusted to respond to these misses while our Quality Assurance area has been restructured to focus on quality. However, undefined processes, weak communication between functional areas and within teams, and inaccessible information are also core to the problem. In addition to adjusting our overall Policy Deployment goals and organizational structure, building a foundation for how our people work and communicate is just as important in response to our current situation. In fact, as stated by Susan Wiener in Strategic Communication Management, "knowledge management means putting into action the knowledge that exists in the company so it can meet your business goals"(qtd. in Wright 10). Now more than ever is an important time to consider a better way to manage our resources,

including the heart of our Engineering area: our human intellectual capital. Knowledge and the information needed to create knowledge is held within our employees; thus it is important to realize that fostering communication, enabling information access and supporting knowledge management are important to delivering high quality deliverables. More importantly, our deliverables are often the only things our customers base their opinion of the FNET brand and quality of our products on. Without recognizing that the key to delivering high-quality software is held within our employees' knowledge, access to that knowledge and the fostering of new knowledge, we risk further damaging the reputation we have with our customers.

This proposal suggests a plan for developing a knowledge management initiative within OSS Engineering in response to the challenges our area is facing. Specifically, this plan focuses on laying the groundwork for transforming OSS Engineering into a knowledge organization. This includes providing a centralized location to store knowledge and information used for knowledge creation and creating an environment that fosters interpersonal communication, collaboration and knowledge transfer between employees.

First, I will review the current situation, what is causing the situation and how these causes are affecting the delivery of product quality, customer satisfaction and innovation. Secondly, I propose a plan for the creation of a strategy and vision for knowledge management within OSS Engineering that will alleviate the challenges our Engineering area is encountering. I will review goals of the plan, who will be affected by the initiative and who will be held accountable for its creation. Then I will discuss the implementation steps, and the time line for implementation. Finally, I will break down the costs of implementing the plan. The goal here is to show how creating a vision, plan and strategy for building a knowledge organization will enable us to produce high quality deliverables while meeting and exceeding our customers' expectations.

2.0 Where We Are Now

How current challenges are affecting product quality, customer satisfaction and innovation.

In order to understand the suggestions outlined in the proposed plan, it is important to be aware of the factors that cause problems in delivering high-quality products, creating new products and meeting customer expectations.

2.1 Current Situation

Our OSS Engineering area, encompassing about 45 employees in all, is composed of four geographically dispersed offices in New Jersey, Ohio, Georgia, and Texas. Currently, there are five development teams each led by one project manager. Additionally, one QA Manager has recently been added who oversees a team of four testers. Each team is unique and may or may not include members rounding out systems engineering, database administration, architectural engineering and software engineering due to understaffing. Currently, there is one dedicated user interface designer and no dedicated technical writers or trainers. Members may also perform more than one function on a team and may assist other teams when needed.

Prior to the acquisition by FNET, the organization was able to develop and deliver quality software solutions that met customer expectations following undocumented and unstructured processes. At the time, the company was cohesive, agile and small enough to communicate and exchange knowledge and information in a rapid and informal manner. This worked well until other demands and challenges developed after becoming part of a larger and more structured organization.

2.1.1 Challenges

The OSS Engineering group faces challenges in the following areas:

- Communication
- Information access
- Knowledge creation, transfer, and sharing

When the OSS Engineering area was smaller, it was capable of communicating information quickly and informally. Teams worked closely, and information and knowledge were exchanged primarily via face-to-face interactions. Knowledge was created, shared and transferred verbally, and because the organization was so small, much of the knowledge created was undocumented and held in the heads of employees as tacit knowledge. People just "knew" how to do things or "knew" someone who could do the things they needed.

The organization grew and additional employees were added across four geographically dispersed offices. Though the organization became part of a larger, more formalized entity in 2003, today it is still largely performing in an informal fashion which has proven insufficient in being able to communicate and share information efficiently across functional areas, offices and teams. In addition, information is not easily accessible, resulting in employees not knowing where to look or even who to ask for information. Without efficient communication or information exchange, knowledge creation, sharing and transfer has been limited.

In addition to the challenges relating to communication, information access and knowledge management other challenges include:

- Short development time frames
- Limited human resources
- Limited budget

Like any software development organization we face the typical challenges of constrained time, people and money. This is complicated by the fact that OSS Engineering has a healthy pipeline of new product development projects as well as a long list of scheduled maintenance releases for existing products. These projects have short development time frames due to signed contractual agreements and customer demands. In addition, OSS Engineering is faced with limited employees to develop the products and little budgetary resources to support such things as hiring new employees, obtaining training for existing employees or the purchasing of software/hardware to create the appropriate development and testing environments.

2.1.2 Effects

As a result of the challenges outlined above, employees and the deliverables they create are affected in a number of ways:

- Inefficient work practices
- Decline of quality deliverables
- Late release of deliverables
- Inability to meet customer expectations
- Lack of innovation

Employees also have a lack understanding about the following:

- What things engineering does
- How things are done
- Why things are done
- Who does those things (Applen 306)

Communication

A breakdown in communication between functional areas and within teams themselves has led to inefficient work practices, miscommunication, and unmet customer expectations that lead to poor product quality. Communication problems between functional areas causes missed deliverables and products that don't meet our customers' expectations. In fact, OSS Engineering recently missed a deliverable deadline to a customer in China because the strategic action item was never communicated to OSS Engineering. Therefore, the project wasn't scheduled or committed for Engineering work. Other instances of insufficient communication between Marketing and Engineering have resulted in vague ideas of what the customer requires. Oftentimes these communication gaps result in trouble reports being reported after delivery when in fact the product functions properly, just not as the customer expected.

At the team level, lack of communication results in inconsistent products and inefficient ways of working. There is a tendency for development teams to work in silos. Communication within and across teams is weak. For example, one team has initiated devel-

opment on a new project but has not conveyed critical design information and requirements to all team members. Thus, some team members are developing off of incomplete or outdated requirements. Code has to be rewritten, but fortunately it is early in the development lifecycle.

Information Access

Lack of access to critical information within OSS Engineering results in lack of understanding regarding our business unit's objectives, employees' roles and responsibilities, development standards, processes, procedures and basic Engineering resources. At a high level, the strategic Policy Deployment goals and action plans are not shared across the OSS Engineering area, so employees don't see the roadmap of what OSS Engineering is to achieve for the year. Associates lack understanding of their value to the organization and how the work they perform daily contributes to the strategic goals.

At the employee level, associates often are not clear about what their own roles and responsibilities or the roles and responsibilities of their coworkers. Without understanding who does what or the ability to find that information, people end up doing extra work or even worse, the work doesn't get done at all. We currently have two projects in development right now that have Engineering associates performing Marketing functions. If both Engineering and Marketing associates had access to Marketing resources or understood Marketing's roles and responsibilities, they would be able to focus on their Engineering responsibilities.

In addition to knowing who does what, is the need to share and access information about what things are done within and across teams. An example of this was realized when one development team's engineers coded the same exact functionality independent of each other. The reuse of code is just one example of how information could be shared at the team level.

Knowing how things are done and why they are done that way is an area that is underdeveloped within OSS Engineering. Even if information is accessible, clear understanding about when, how and why to use that information is not defined. This can be seen by the rollout of the newly documented Software Development Process. Though the process is fully documented and accessible via a centralized location, employees don't understand when they are supposed to use it and why they have to follow the process in

the first place. It was quickly discovered that just because the information is available, doesn't make it useful.

Knowledge Management

Without the ability for employees to access information critical to product development at the strategic and team levels, the creation, sharing and transfer of knowledge is limited. Even if the information is available it was found that it isn't useful unless employees know how and why to use it. Due to the current limitations of information access and understanding, innovation and process improvement cannot fully take place. As a result of other problems, OSS Engineering has not focused on capturing best practices or lessons learned. Without addressing the things that not only went right but also the things that went wrong in a project, we will fail to see improvement or innovation that takes us to the next level of software development.

It is unlikely that factors such as increased workload, short project deadlines, budgetary constraints and lack of human resources will change for the OSS Engineering area anytime soon. However, we can acknowledge and begin to address problems with communication, information access and knowledge management now. Especially since the effects of current circumstances will continue to grow if not addressed. In order to maintain the reputation we have and had with our customers in the past, we need a plan to deal with our situation going forward.

3.0 The Plan

Build a Knowledge Organization

To overcome the challenges that the OSS Engineering group is facing with communication; information access; and knowledge creation, sharing and transfer requires a plan for a knowledge management approach that is tied to our corporate and business unit's strategy. The proposed plan is to build a knowledge organization that includes:

- Creating a strategy/vision for knowledge management
- Mapping existing knowledge
- Preparing the IT infrastructure
- Connecting people to information
- Connecting people to people
- Measuring success
- Maintaining the solution

3.1 Goals

Transitioning OSS Engineering into a knowledge organization will address the challenges that we face in our current situation. The primary objectives are to:

- Improve communication
- Enable information access
- Foster knowledge creation, transfer, and sharing

3.2 Strategy

The plan to implement knowledge management within the OSS Engineering area is the first step in transitioning CSP OSS Engineering into a knowledge organization. Building a knowledge organization takes time because "[k]nowledge management is an evolving practice" (Davenport and Prusak 145). Knowledge management projects typically have three broad objectives, according to Davenport and Prusak. The first is to inventory and capture existing knowledge in knowledge repositories. The second is to

provide access to knowledge via networks or some other mechanism meant for transferring knowledge. This relies upon connecting people to the knowledge they need or to people who have the knowledge they need. The third objective is to foster a culture and work environment conducive to creating, sharing and transferring new knowledge (146). Davenport and Prusak also suggest that knowledge management projects are more effective if they employ one or more of the previously stated objectives rather than focusing on just one (150).

Thus, it is in our best interest to employ a strategy for building a knowledge organization that utilizes a combination of these objectives. Becoming a knowledge organization is a progressive undertaking requiring a well thought-out and supported plan for gradually evolving the way our organization works. A strategy and vision for knowledge management that aims at meeting our organization's strategic goals and is fully supported by our sponsor will guide the organization through this progression (Rumizen 52-53).

A phased approach to transitioning our organization makes the most sense. The first phase will focus on building the foundation for becoming a knowledge organization. This will include mapping the knowledge that currently exists within OSS Engineering; preparing the IT infrastructure that will provide the mechanism for sharing and transferring knowledge; and utilizing technology, collaboration and social networking to promote the creation and innovation of new knowledge.

As the figure below indicates, the approach for phase one will be centered upon connecting:

- People to information
- People to people

We will put the pieces in place to connect people to the information/knowledge we already have and connect employees to the people that hold knowledge they need. Once we have taken inventory of the information and knowledge we already hold, we will employ technological means to share and transfer that information to the people that need it. This technology will also be

used to support the connection of people to other people in our organization.

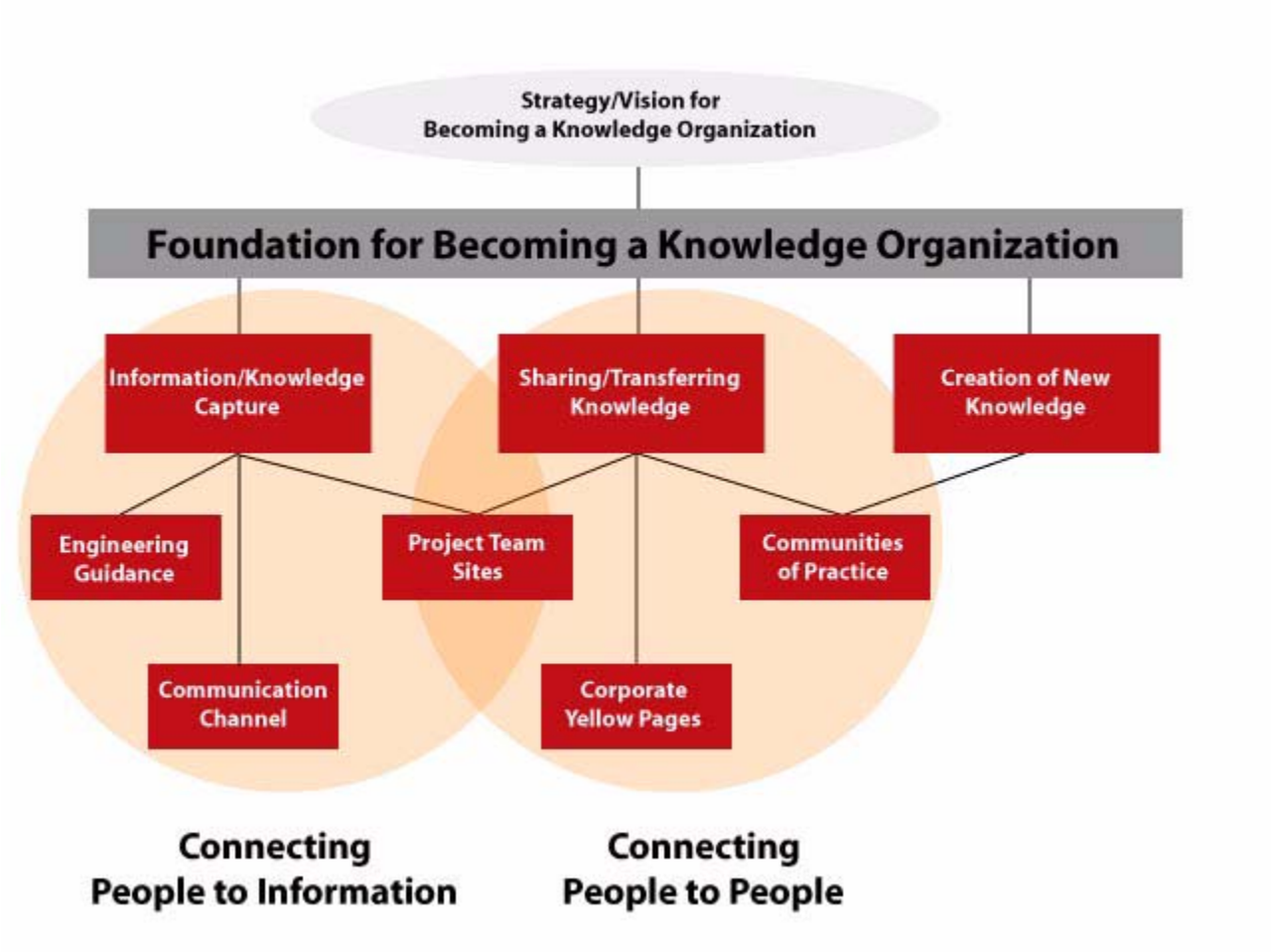

FIGURE 1. Phase One Approach: Connecting People to Information and People to People

Microsoft SharePoint Services, a collaboration and document management tool will be the technology utilized to make this happen. The tool will be configured so that a communication mechanism, engineering guidance, project team sites, communities of practice and the corporate yellow pages can be created to store, share and transfer information and knowledge. The sites will be customized for the specific functions they will serve. SharePoint supports document management, asynchronous discussions, surveys, task/issue management, event/calendar creation, among other features.

Since we are building an initial foundation here, we will be starting small. The first phase will ensure that we address the first two objectives that were stated earlier. We will capture information and knowledge and provide the access to it. However, the third objective of fostering a culture and work environment conducive to creating new knowledge will be created over time. Phase one will create the foundation for us to grow into a knowledge organization. Subsequent phases will include plans for:

- Lesson learned
- Best practices
- Tacit knowledge capture (before it walks out the door)

As we become more mature at sharing knowledge across our organization, we will eventually find that the old ways we operated no longer mesh with our current processes. Gradually we will need to incorporate knowledge management approaches into our work processes, so that knowledge management becomes part of how we operate. There may be "a gradual shift from IT-based solutions to focus on organizational structures and processes, and finally new values" (Kumar and Thondikulam 172).

At some point we would move from an organization that addresses knowledge management with an "initiative" or "project" as proposed in this plan to embedding knowledge management into our overall strategy, goals and business processes. This is because "[t]o the knowledge organization, creating and leveraging knowledge is a core source of value, a form of competitive advantage, a core driver of its business, and a mission-critical activity permeating almost every aspect of the organization" (Wick 519).

3.3 Who

I, along with Jenni Smith (another FNET employee) will be driving the plan for building a knowledge organization. We will work closely to create the phase one deliverables outlined in the table below. However, Jenni's focus will primarily be centered around creating a knowledge network to connect people to people within OSS Engineering. I will focus upon the capturing and storage of explicit knowledge and setting up a communication channel and project sites; however, I will also ensure that our overall plan for

creating a knowledge organization is defined, implemented and met. This includes responsibility for the strategy/vision, knowledge mapping, IT infrastructure, assessment and maintenance of the focus areas outlined below.

Jenni and I will also act as knowledge coaches on a long-term basis as subsequent phases are implemented. We will guide, train and coach employees in utilizing the tools and methods for knowledge management.

Focus Areas	Deliverables	Person Responsible
Strategy/Vision	• Blueprint for becoming a Knowledge Org. rooted in our strategic business goals.	**Lisa Hauser (w/Sponsor and Jenni Smith)**
Knowledge Mapping	• A prioritized mapping of most important information/knowledge and people who hold knowledge w/in and outside OSS Eng.	**Lisa Hauser (w/Sponsor and Jenni Smith)**
IT Infrastructure	• SharePoint Services Set-up	**Lisa Hauser/Jenni Smith**
People to Information	• Engineering Guidance Site • Project Team Sites • OSS Engineering Communication Channel	**Lisa Hauser**
People to People	• Communities of Practice • Corporate Yellow Pages • Project Team Sites	**Jenni Smith**
Assessment	• A summary of Phase One Achievements	**Lisa Hauser (w/Jenni Smith)**
Maintenance	• Maintenance Schedule	**Lisa Hauser (w/Jenni Smith)**

TABLE 1. Knowledge Management Focus Areas: Phase One

3.4 Accountability

The sponsor of the KM initiative will help guide and support the OSS Engineering's vision and goal of becoming a knowledge organization. The sponsor's support will be especially crucial during the first phase when the foundations of the knowledge organization are being created. However, responsibility for OSS Engineering achieving its goal of improving communication, supporting

the access and use of important information and knowledge and the creation of new knowledge will ultimately be up to the employees themselves. In order for this to happen, it is vital to encourage a culture that values knowledge in addition to providing the technological means for capturing and sharing that knowledge. Jenni Smith and myself, the knowledge coaches identified in the previous section, will work closely with the sponsor and employees to ensure that the strategy/vision and goals of the initiative are being met and delivering continuous business value.

3.5 Budget

3.5.1 Cost

Initially building the foundation for our knowledge organization will not incur any significant costs. Software licensing for MicroSoft SharePoint Server is estimated at $2300 per year, but is included with our normal Microsoft Developer's Network (MSDN) subscription. Labor rates for support and maintenance of the Microsoft SharePoint Server sites is included in Information Technology's (IT) staffing budget which includes technical support and regularly scheduled maintenance for all FNET owned software and hardware. Administration will fall under the already budgeted responsibilities of myself, the process engineer.

3.5.2 Funding

Budgetary impacts for this proposed plan would be minimal in actual funding being requested. Phase one of the plan should not incur significant costs outside of employee labor hours which are not part of the funding request. Any costs are predicted to come from the purchase of software plug-ins in the form of SharePoint WebParts that are often free or available for purchase at a cost between $35 - $500 per WebPart.

Currently no funding is being requested for the knowledge organization project. Funding for the purchase of SharePoint WebParts will be requested via the sponsor.

3.6 Schedule

Phase One: Creating the Foundation		
Strategy/Vision	**January**	**Creation of KM Strategy/ Vision, Stakeholder Support**
Knowledge Mapping	**January-April**	**Assessment/collection of current information, knowledge and knowledge workers.**
Preparation of IT Infrastructure	**January-March**	**Assessment of technological options, preparation/configuration of the technology selected.**
Connecting People to Information	**April - ongoing**	**Implementation of project sites, Eng. Guidance site, and a communication channel.**
Connecting People to People	**Jenni**	**Implementation of communities of practice, yellow pages, and project site template.**
Assessment	**August**	**Summary of Phase One Achievements**
Maintenance	**February**	**Maintenance Schedule/Roles/ Responsibilities**

TABLE 2. Phase One Schedule/Deliverables

3.7 Literature Review

Resources regarding knowledge management, knowledge organizations and the transfer, creation and sharing of knowledge is vast. Though the subject of knowledge and knowledge creation is nothing new, there has been a flood of knowledge management research, articles, books and solutions that crested in the nineties and continues today. However, even with the plethora of literature available, it is still difficult to gain a clear understanding or agreement of exactly what knowledge management is or the best approaches to use to implement it in practice. This is especially true when observing the differing cultural philosophies of knowledge that exist between the East and the West.

Ikujiro Nonaka acknowledges the differing views when describing his theory of organizational knowledge creation. He summa-

rizes that Eastern cultures such as Japan focus on individual's "accumulation of tacit knowledge through 'hands-on' experience," whereas Western cultures like the United States emphasize a more "explicit-knowledge-oriented approach" (21-22).

His theory and knowledge spiral framework emphasize that organizations are reliant upon individuals to create and support knowledge creation. He states that in order to increase total knowledge quality of an individual, tacit knowledge support and enhancement needs to be balanced and interact with aspects of explicit knowledge (22). This emphasizes human knowledge that is valued as a resource, relying on human interaction and information technology to enable it (Kumar and Thondikulam 173). Nonaka's theory and views are explained further in the Theory section that follows.

Davenport and Prusak state, as mentioned in the Strategy section, that building a knowledge organization takes time because "[k]nowledge management is an evolving practice" (145). They outline that knowledge management projects generally have three objectives. The first is to inventory and capture existing knowledge in knowledge repositories. The second is to provide access to knowledge via networks or some other mechanism meant for transferring knowledge. This calls for connecting people to the knowledge they need or connecting them to people who have the knowledge they need. The final objective is to foster a culture and work environment conducive to creating, sharing and transferring new knowledge (146). Effective knowledge management projects employ one or more of the previously stated objectives rather than focusing on just one (150).

Nonaka, Davenport and Prusak agree that information is a necessary means to creating knowledge. Davenport and Prusak specifically outline four principles for collecting and codifying information and knowledge:

- The organization's strategic goals must be framed and linked to the knowledge capture strategy.
- Existing knowledge must be identified.
- Evaluation of the knowledge identified must take place.

- An appropriate medium for codification and distribution must be decided upon (69).

Their principles align with the methodology for knowledge mapping that is explained in the Methodology section that follows. Ermine, Boughzala and Thierno developed a method for taking inventory of an organization's knowledge in order to determine what information/knowledge should be preserved, developed, or abandoned. They state that the mapping of knowedge should be one of the first steps performed in a knowledge management project. They also emphasize, just as Davenport and Prusak, that the business' strategic goals should be linked to this knowledge mapping or codification of knowledge (129).

Just as linking knowledge mapping to the organization's overall strategic goals is important, so too is the development of a strategy and vision for knowledge management. Rumizen recommends that even before work on identifying existing information/knowledge is undertaken, a strategy be developed specifically for the knowledge management initiative or project. Like Nonaka, Davenport, Prusak, Ermine, Boughzala and Thierno, she recommends that this knowledge management strategy and vision be "rooted in the context of your organizational strategy" because the whole point of the knowledge management initiative or project is to help achieve the organization's overall strategy and goals. It is important not to forget that (52-53).

Kumar and Thondikulam align with Davenport and Prusak when they outline a three-stage knowledge management process. The building of a knowledge organization entails first, the locating and capturing of knowledge, then turns to a focus of transferring and sharing that knowledge across the organization. Once that foundation for knowledge is available, the organization is then able to generate new knowledge (172).

As the third stage progresses, "companies are able to innovate by converting knowledge and insights into solutions that deliver distinctive value to customers." Knowledge management approaches will gradually be worked into work processes, so that knowledge management becomes part of how the company operates. There may be "a gradual shift from IT-based solutions to focus on organizational structures and processes, and finally new values" (Kumar and Thondikulam 172).

Wick goes on to explain that eventually there comes a point where the company moves from an organization that addresses knowledge management with an "initiative" or "project" to a company that embeds knowledge management into their overall strategy, goals and business processes. Knowledge adds value in the form of competitive advantage that drives business to the next level of quality and operation. Essentially, knowledge creation becomes a mission-critical activity permeating almost every aspect of the organization" (519). The measure of a successful knowledge management initiative then is the transition to a true knowledge organization.

3.8 Theory

The Knowledge Spiral

Nonaka provides one of the most extensive frameworks of knowledge creation (Kumar and Thondikulam 173). His theory on organizational knowledge creation including his knowledge spiral model is widely referenced in the study of knowledge management and organizational learning.

Nonaka points out that organizations do more than just process information. In fact he states that when organizations react to changing environments, they not only process information, "but also create information and knowledge," or at least they should (14). In this regard, he believes that "information is a necessary medium or material for initiating or formalizing knowledge". However, the importance of information, especially in relation to knowledge creation is in its content and conveyed meaning, not the form in which it exists (16).

Polanyi had two classifications for knowledge: explicit and tacit knowledge (qtd. in Nonaka 16). Explicit knowledge is able to be codified and "transmitted in formal, systematic language" while tacit knowledge involves technical and cognitive aspects that are "rooted in action, commitment, and involvement in a specific context" that aim to build mutual understanding (Nonaka 16-17).

While organizations create knowledge as a collective whole, it is really the individuals within the organizations that create knowledge. Organizations cannot create knowledge without its individuals, which is why it is crucial that companies value

intellectual capital by supporting creativity and an environment for innovation and knowledge creation.

Nonaka's knowledge spiral model, as seen in Figure 2, emphasizes the fact that human knowledge is a valued resource with human interaction and information technology being key enablers (Kumar and Thondikulam 173). His model describes four patterns of interaction between tacit and explicit knowledge that result in the conversion of existing knowledge into new knowledge: tacit to tacit via socialization, explicit to explicit via a combination of transfer modes, tacit to explicit via externalization, and explicit to tacit via internalization (18).

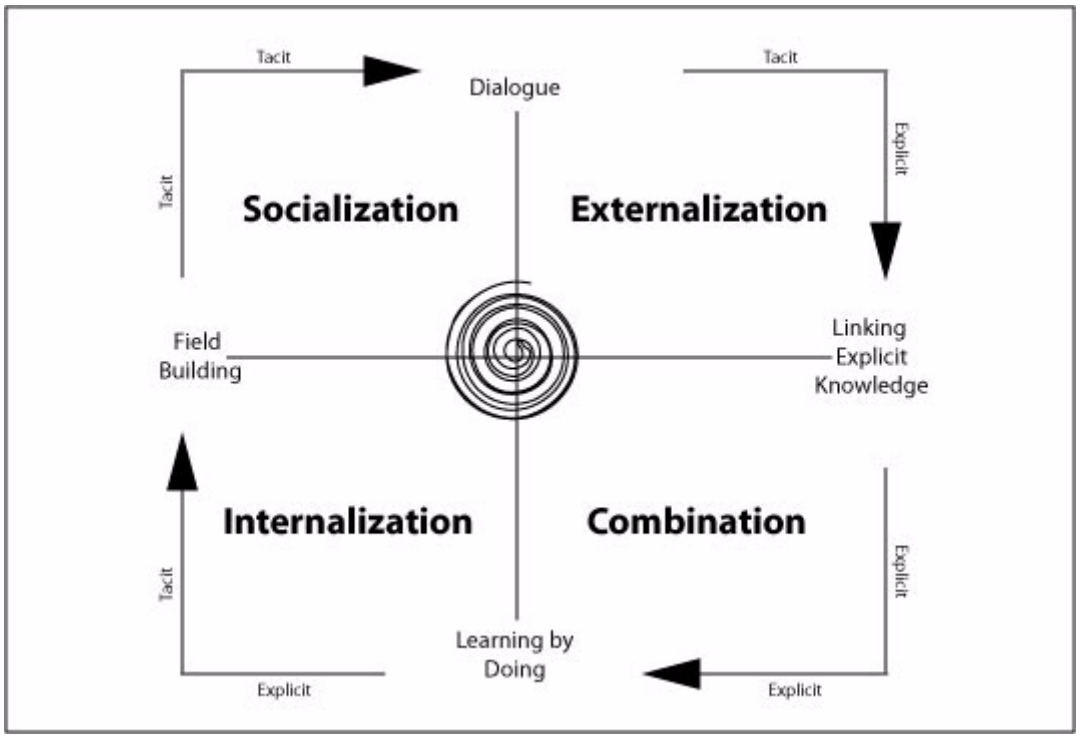

FIGURE 2. Nonaka's Knowledge Spiral

Socialization is the transferring of tacit knowledge from person to person. New knowledge is created from the interaction or the shared experience. This exists in the form of apprenticeships, mentoring or on-the-job training.

Combination refers to the process of creating explicit knowledge from explicit knowledge. This can take the form of documents, emails, databases, etc. that are somehow changed, reconfigured, modified and redistributed via some process such as a meeting, conference call, or automation. Information technology (IT) is utilized extensively for this type of knowledge creation.

Externalization is when tacit knowledge is transferred into explicit knowledge. Dialog is the primary method for conveying and creating knowledge. This can happen in meetings where people come together to discuss and share knowledge.

Internalization is when explicit knowledge is transformed into tacit knowledge. This can best be described as experiential learning or learning by doing.

The knowledge spiral highlights the fact that interaction between people is at the center of knowledge creation. In fact, the combination mode of transfer is the only one that does not need human interaction to create knowledge (Rumizen 22). In this mode, IT tools alone can be utilized to turn explicit knowledge into new explicit knowledge.

With this said we cannot forget that information is necessary in formalizing knowledge. Thus we can use Nonaka's model as the basis for implementing our plan for building a knowledge organization, underscoring the fact that though information is important to knowledge creation, the individuals interacting within OSS Engineering are really the key to building a successful knowledge organization.

3.9 Methodology

Knowledge Mapping

In order to create the foundation for becoming a knowledge organization, one of the key tasks that has to be performed is the analysis of the information/knowledge we currently hold. This is accomplished utilizing an analysis method known as knowledge cartography or knowledge mapping. Knowledge mapping is the "process, methods and tools for analyzing knowledge areas in order to discover features or meaning and to visualize them in a comprehensive, transparent form such that the business-relevant

features are clearly highlighted" (qtd. in Ermine, Boughzala, and Thierno 129). Basically this means that we have to take inventory of the knowledge we currently have so that we can decide what we "must preserve, develop, abandon, etc." (Ermine, Boughzala, and Thierno 129).

I will be utilizing a domain oriented approach to map our knowledge called the M3C methodology by Ermine, Boughzala and Thierno. The M3C methodology is based upon three models: the formal, graphic and criticality models. Each of these models accomplishes a specific function for comprehensively mapping knowledge that defines the information/knowledge, presents it in a visual way and prioritizes it.

The formal model aids in classifying the information/knowledge into hierarchical domains or levels. These "knowledge domains" are fields of activity or functions for a group. It is from the people in these groups that the information and knowledge is gathered. The model calls for the identification of the "core knowledge" that is based on the organization's strategic goals or mission. "Knowledge axes" exist off of the core that are associated with the different goals or functions of the organization. The domains exist within these axes and are grouped by theme (Ermine, Boughzala, and Thierno 131).

The graphic model provides a visual representation of the domains identified. This is where the information/knowledge identified in the formal model is "mapped" using a graphics utility or mind-mapping tool.

The criticality model evaluates the risks/opportunities of the domains. The evaluation helps determine the value of the information/knowledge so that it can be prioritized. This identifies the most critical knowledge, the knowledge we need to develop and the knowledge not worth saving. I will use the Critical Knowledge Factors (CKF) grid identified below for conducting my evaluation (Ermine, Boughzala, and Thierno 132). The grid contains 20 criteria for evaluation that exist within four themes. Each criterion is rated on a scale of 1-4.

Theme Areas	Criteria
Rarity	• Number of Experts Available • Externalization • Leadership • Originality • Confidentiality
Utility	• Correspondence to Strategic Objectives • Value Creation • Emergence • Adaptability • Use
Difficulty to Capture Knowledge	• Identification of Knowledge Sources • Mobilization of Networks • Tacit Knowledge • Importance of Tangible Knowledge Sources • Rapidity of Obsolescence
Nature of Knowledge	• Depth • Complexity • Difficulty of Appropriation • Importance of Past Experiences • Environment Dependency

TABLE 3. Critical Knowledge Factor (CKF) Grid

Following the M3C methodology will entail a plan that will include:

- Framing the situation
- Locating the knowledge domains
- Elaboration of the criticality criteria
- Sampling/data collection
- Analysis

Interpretation of the analysis results will provide a good understanding of the knowledge domains within OSS Engineering and the ability to determine what information/knowledge is most important, is in need of creation and has little overall value to our organization. Additionally, the graphic model in the form of the knowledge map itself will help employees visualize the knowledge domains.

4.0 Conclusion

Taking the first steps in transitioning CSP OSS Engineering into a knowledge organization means putting the knowledge that exists in our company into action so it can meet our strategic goals (qtd. in Wright 10). The heart of our Engineering area: our human intellectual capital, is held within the heads and interactions of our employees. Fostering communication, enabling information access and supporting knowledge management are important to delivering high quality products. High quality deliverables that meet our customers' needs influence the perception of the FNET brand and create customer loyalty and trust, which in turn create increased opportunities.

Phase one of the plan to implement knowledge management within the OSS Engineering area is the first step in transitioning CSP OSS Engineering into a knowledge organization. As we become more mature at sharing and creating knowledge across our organization, we will eventually incorporate knowledge management approaches into our work processes, so that knowledge management becomes part of how we operate.

Building the foundation for becoming a knowledge organization will allow us to create and leverage knowledge that is valuable in forming a competitive advantage and driving our business to the next level of quality, efficiency and innovation (Wick 519).

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