Nuclear Energy Fuel Cycle Knowledge Management Strategy

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ABSTRACT

A strategy for the development of a Knowledge Management Pilot Program for the Nuclear Energy Fuel Cycle Program at Sandia National Laboratories.

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Introduction

The purpose of this strategy document is to establish a Knowledge Management Project for the Nuclear Energy Fuel Cycle (NEFC) Sub-Program under the Secured Energy and Earth Systems (SEES) Program at Sandia National Laboratories. The NEFC program consists of two major components: Commercial Nuclear Power Generation (CNPG) and Back End of the Nuclear Fuel Cycle (BENFC). Under both CNPG and BENF, NEFC leverages over 45 years of experience to inform policy decisions and lead in developing, integrating, and implementing technically safe, viable, and sustainable solutions to nuclear energy challenges, ranging from power generation to the management of spent nuclear fuel and high-level radioactive waste. Specific to the BENFC, the NEFC is uniquely positioned to provide technical management, integration, and direction across the DOE complex for the back end of the fuel cycle, and to provide technical basis to inform policy development. Specific to CPNG, the NEFC leads the advanced energy conversion program across multiple DOE offices and performs specialized analyses to support national security, such as small modular reactors and safety analysis for space nuclear missions. Primary customers consist of the DOE Office of Nuclear Energy, the Nuclear Regulatory Commission, the National Aeronautical and Space Administration, and Non-Federal Entities, both national and international.

The Nuclear Energy Fuel Cycle Sub-Program

As part of SEES strategic planning activities, the NEFC leadership team has engaged in developing a robust strategy that will guide the program over the next five to seven years, and beyond. The following guiding principles were developed as a result of the strategy discussions.

Vision

We ensure clean energy and environmental stability for national security by advancing nuclear energy and waste management in the national interest.

Mission

*We lead in developing, integrating and implementing technically safe, viable, and sustainable **solutions** to nuclear energy challenges, ranging from power generation to the management of spent nuclear fuel and high-level radioactive waste. With this expertise, we analyze alternative strategies as a **trusted agent** of DOE and we **inform decision making**.*

Potential Future States

The potential future states for both the CNPG and BENFC were developed during SEES scenario planning workshops. Scenario planning is based on the observation that, since we cannot know precisely how the future will play out, a good strategy is one that plays out well across several possible futures. Scenarios are a way of understanding the driving forces shaping the future. Some of the decisions we make today will make sense across all the futures. Others will make sense only in one or two. But by identifying the implications that work in all scenarios, we have greater confidence that our program planning is better able to deal with future uncertainties. The NEFC workshop results are shown in the two quadrants in Figure 1.
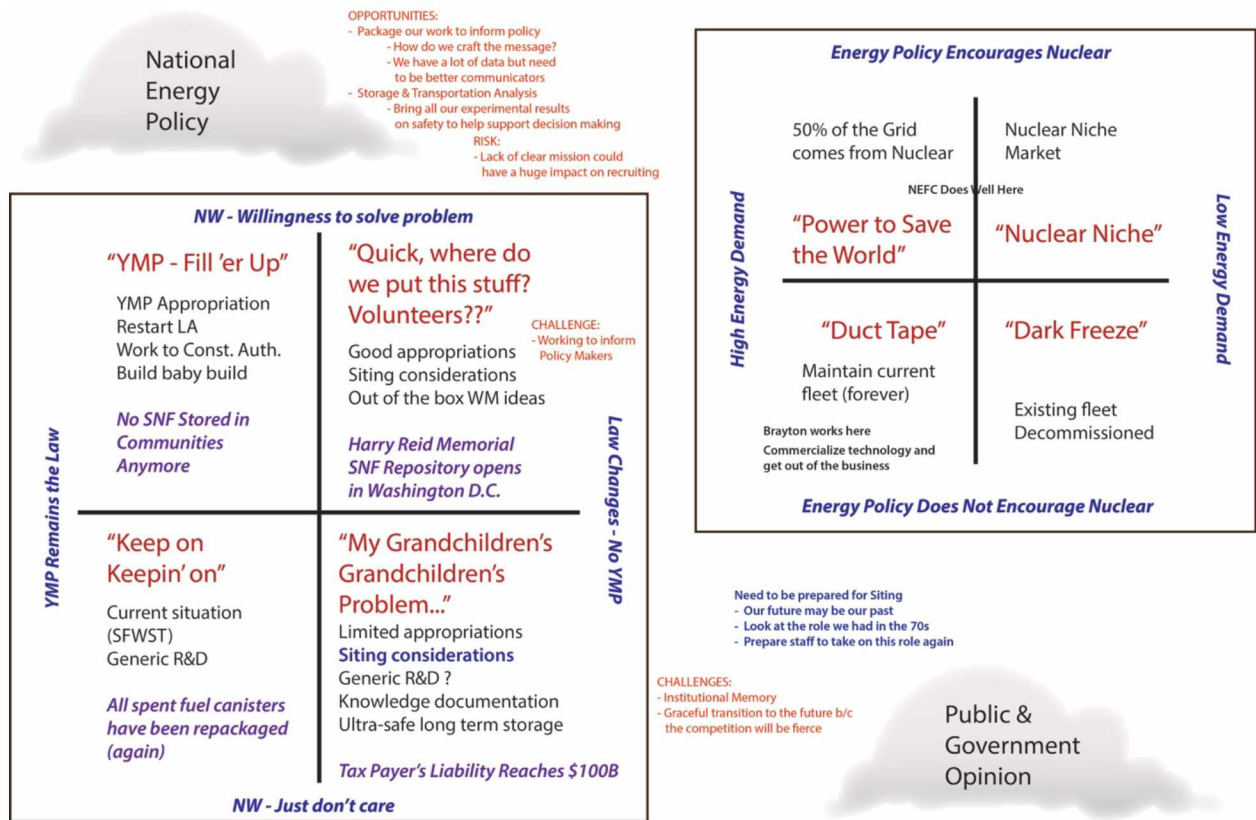
National Energy Policy

OPPORTUNITIES:
- Package our work to inform policy
  - How do we craft the message?
  - We have a lot of data but need to be better communicators
- Storage & Transportation Analysis
  - Bring all our experimental results on safety to help support decision making

RISK:
- Lack of clear mission could have a huge impact on recruiting

NW - Willingness to solve problem

"YMP - Fill 'er Up"

YMP Appropriation
Restart LA
Work to Const. Auth.
Build baby build

No SNF Stored in Communities Anymore

"Quick, where do we put this stuff? Volunteers??"

CHALLENGE:
- Working to inform Policy Makers

Good appropriations
Siting considerations
Out of the box WM ideas

Harry Reid Memorial SNF Repository opens in Washington D.C.

YMP Remains the Law

"Keep on Keepin' on"

Current situation (SFWST)
Generic R&D

All spent fuel canisters have been repackaged (again)

"My Grandchildren's Grandchildren's Problem…"

Limited appropriations
Siting considerations
Generic R&D ?
Knowledge documentation
Ultra-safe long term storage

Tax Payer's Liability Reaches $100B

Law Changes - No YMP

NW - Just don't care

Energy Policy Encourages Nuclear

High Energy Demand

50% of the Grid comes from Nuclear

Nuclear Niche Market

NEFC Does Well Here

"Power to Save the World"

"Nuclear Niche"

"Duct Tape"

Maintain current fleet (forever)

Brayton works here
Commercialize technology and get out of the business

"Dark Freeze"

Existing fleet Decommissioned

Low Energy Demand

Energy Policy Does Not Encourage Nuclear

Need to be prepared for Siting
- Our future may be our past
- Look at the role we had in the 70s
- Prepare staff to take on this role again

CHALLENGES:
- Institutional Memory
- Graceful transition to the future b/c the competition will be fierce

Public & Government Opinion

Figure 1: Potential future states for the CNPG and BENFC

Needed Capabilities

The SEES and NEFC strategic planning sessions identified the following necessary capabilities for the NEFC program:

Existing Capabilities

1) Geologic Disposal: Post-closure science, performance assessment, licensing
2) Research & Development related to storage, transportation and disposal of spent nuclear fuel, including spent fuel stored in dual-purpose (storage and transportation) canisters
3) Policy-informing technical analyses
4) Microsystems reactors
5) Advanced Energy Conversion using supercritical fluids, Waterless Power

New Capabilities

6) Integration of expertise in front and back end of the fuel cycle to inform policy decisions
7) Criticality safety
8) Siting and site characterization for nuclear waste management facilities

NEFC Program Goals

Focus on the advanced energy conversion program using supercritical fluids to eliminate Rankine Cycle and the use of cooling water, and to create higher efficiency in the operation of nuclear power plants.

Advance the integrated management of spent nuclear fuel and high-level waste across storage, transportation, and disposal for any national nuclear waste program consistent with existing policy.
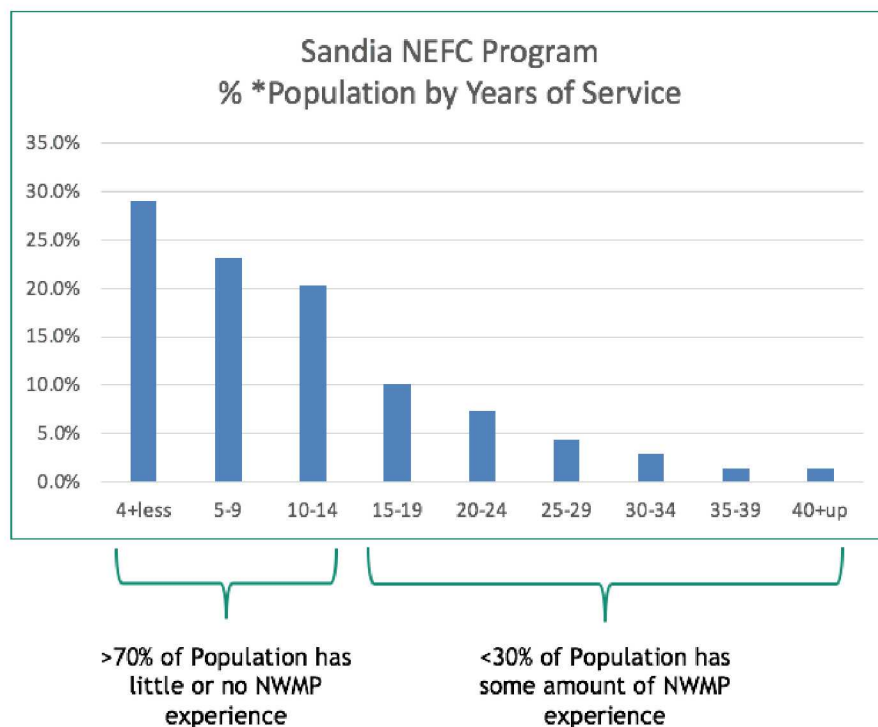
Integrate – Take an integrated approach toward advanced nuclear reactors that considers the whole nuclear energy fuel cycle – open or closed.

Leverage our current capabilities to support special programs (e.g. nuclear space missions) of national security interest.

Future Demographics

The NEFC Sub-Program is in a constant state of flux due to changing national priorities and policies as well as staff departures and hiring.

Staff members within the NEFC sub-program are considered highly technical with the majority having advanced degrees (Masters level to Ph.D. in such fields as nuclear engineering, chemical engineering, mechanical engineering, geosciences, mathematics, materials science, etc.). Preparing new employees for work on complex projects for diverse customers takes time and is usually the responsibility of individuals who already have a full workload.

Organizational knowledge loss is a national and international issue. Demographic change at Sandia is happening not only in NEFC but Labs wide. Late-career staff and mentors are retiring and taking their tacit knowledge with them. There is an influx of early-career staff without the necessary knowledge management tools. The need for a knowledge management strategy is urgent.

Figure 2: NEFC program population by years of service (NWPM: Nuclear Waste Management Project)

Loss of Institutional Knowledge

Sandia National Laboratories is a complex, multi-mission organization with a unique and diverse culture. For new staff members, getting up-to-speed on institutional requirements and project responsibilities can be time-intensive and daunting given the complexity of the mission space and organization. New

hires are dependent on their more experienced peers to on-board them (sometimes formally, but often informally) on all aspects of their jobs including Sandia training and processes, customer requirements and cultural nuances.

Demographically speaking, Sandia is experiencing an exodus of retirement-eligible senior staff and management and an influx of new staff members. In the Energy and Homeland Security Portfolio, where the NEFC program resides, 46% of staff have been at the laboratory for less than 10 years.

Need for Knowledge Management

The loss of senior staff members and managers who are not only leaders and mentors but also seasoned subject matter experts, and the influx of new staff necessitates a more intentional approach to ensure a more efficient (in terms of both time and money) and rigorous approach to transferring and cataloging institutional knowledge. Senior management for the NEFC sub-program has recognized the need for a Knowledge Management Program (KMP) and has reached out to subject matter experts formerly with the Nuclear Regulatory Commission (NRC) for guidance on best practices for establishing a KMP.

Knowledge Management Overview

Knowledge Management is the process used to handle and oversee the knowledge that exists within an organization. Knowledge Management relies on an understanding of knowledge, which consists of discrete or intangible skills that a person or institution possesses.

Knowledge Types

The field of knowledge management identifies three main types of knowledge.

1. *Explicit knowledge* is knowledge or skills that can be easily articulated and understood, and therefore easily transferred to others (this is also known as *formal* or *codified* knowledge). Anything that can be written down in a manual such as instructions, formulae, etc. qualifies as explicit knowledge.
2. *Tacit knowledge,* by contrast, is knowledge that is difficult to neatly articulate, package and transfer to others. Tacit knowledge typically involves intuitive skillsets that are challenging to teach, such as body language or innovative thinking. Tacit knowledge is difficult to codify or document because it is the result of human experience and human senses. The skills of an expert or of a top manager cannot be learned from a textbook or even in a class; but are usually gained through years of experience or apprenticeship.
3. A third knowledge type is *implicit knowledge*, which is information that has not yet been codified or transferred and is difficult to transfer. (Dalkir, 2017) It is information that is gained through incidental activities, or without awareness that learning is occurring. It can be considered a combination of instinct and practice. An example of implicit knowledge is language acquisition that is naturally occurring and the learner, especially in children, is largely unaware of the process.

Knowledge Management Categories

Efforts to preserve knowledge within an organization can be described according to their two functions: applied knowledge management and knowledge preservation. Both approaches, described in greater detail below, are essential components of a successful Knowledge Management Program.

Applied Knowledge Management: The purpose of Applied Knowledge Management is to ensure accessibility to knowledge resources. This ensures continuity of day-to-day operations and business processes. This approach is important when a workforce is facing staff turnover.

Knowledge Preservation: Consists of efforts to preserve and protect institutional and cultural knowledge in the face of subject matter expert departures (due to retirement or new opportunities). In highly technical and specialized areas, this category of knowledge management is critical to ensuring maintenance of intellectual capital.

Knowledge Lifecycle

There are numerous theories on the lifecycle of knowledge within an organization but they each share common goals of capturing and cataloging information so it's secure and easily accessible to employees. In some models, such as the one in Figure 1, the first step to successfully managing the knowledge lifecycle it to create a culture where the management of knowledge is incentivized and valued. The full list of steps and a brief description are below. (Fire Oak Strategies, 2019)

Figure 3 Organizational Knowledge Lifecycle (Fire Oak Strategies, 2019)

Create: Communicate the need and value of a collaborative culture. Help your employees understand that they will be gaining much more than they are giving.

Capture: This stage involves eliciting knowledge assets (e.g., documents in electronic or print format already stored in a repository such as SharePoint). In addition, this stage identifies subjectively held tacit knowledge.

Secure: Once knowledge is determined to be valuable to an organization based on analysis and assessment, it is secured and stored as an active component of the organizational memory.

Describe: This step ensures that knowledge assets must be stored in a structured way that allows them to be efficiently manipulated, retrieved and, eventually shared.

Share: Knowledge assets are retrieved from the organizational memory to be shared (disseminated/communicated) both internally and externally. The timing and frequency of sharing can be either pre-established or in an ad-hoc fashion based on organizational needs.

Re-Use: Once shared, knowledge assets can be put to use, and their value can be extracted and applied throughout the organization to solve problems, make decisions, improve efficiency, or promote innovative thinking.

Knowledge Management Programs

Knowledge Management Programs (KMP) provide a framework for organizations to establish a systematic process for organizing, sustaining, applying, sharing and renewing all forms of knowledge to enhance organizational performance and create value. Institutions devoted to organizational learning are interested in maintaining and building upon internal knowledge at an organizational level – not just helping individuals accrue the skills required to be successful in their jobs but to spur innovation and ensure that this knowledge is available to the entire workforce.

Figure 4 Critical Elements of Successful Knowledge Management Programs (Fire Oak Strategies, 2019)

As an outcome of this KPM, NEFC will strive to utilize its people, tools/technology and processes to inform the organization's strategy, mission, priorities and culture (among other things).

Objectives: NEFC has four primary objectives with this KMP: to capture knowledge, to increase the active exchange of knowledge and access to it throughout the organization, to enhance the knowledge environment, and to manage knowledge as an asset.

Benefits: If successful, this KMP will increase organizational efficiency for improved decision-making. The idea is that building expertise into an organization and dispersing it among staff will empower them to make more informed and effective decisions in a more efficient manner.

Secondary benefits will include:

- Increased collaboration and idea generation
- Establishment of a knowledge-sharing culture
- Protected intellectual capital
- Intellectual capital viewed as an asset and differentiator
- Knowledge that is stored and captured for a future workforce

Steps to Develop a Knowledge Management Strategy:

According to the Knowledge Management Institute, there are three key questions to ask when developing a Knowledge Management strategy: where are you, where do you want to be, and how do you ensure you get there successfully? These three pillars are also known as the Current State, the Target State and the Roadmap. (Knowledge Management Institute, 2019)

As we develop the Knowledge Management strategy for Sandia's NEFC sub-program, we'll use this approach to guide us.

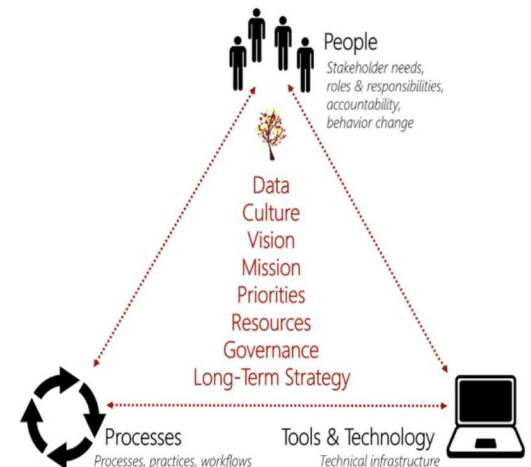## Knowledge Management Exemplar: The Nuclear Regulatory Commission

Before we consider the approach to be taken by the NEFC sub-program at Sandia National Laboratories' in developing its Knowledge Management strategy, it is worthwhile to consider the experience of the Nuclear Regulatory Commission (NRC) in successfully creating their KMP. This is a good example for Sandia to consider since the complexity, culture and demographics of our organizations are similar.

The NRC has been practicing knowledge management behaviors and principles for many years – even prior to the term "knowledge management" becoming popular. It wasn't until 2006, with the establishment of a formal KM program that the agency formalized its approach. The primary driver, at that time, is similar to that currently facing Sandia – changing demographics of its workforce and the recognition that a significant percentage of the NRC's highly skilled workforce was poised for retirement. Not unlike Sandia, the agency was also in rapid growth mode with large numbers of newly hired and soon-to-be hired employees who needed to get up-to-speed quickly to meet customer/project demands. It was a high priority to not only capture and preserve the knowledge of an aging workforce but to transfer it to others – especially newly hired employees.

The NRC knowledge management program has been successful due, largely, to its system of governance that integrates KM vertically within the NRC's individual offices, and horizontally across the various NRC offices through formalized governance bodies and people networks. The NRC KM strategy has proven to provide an effective balance of both centralization and decentralization spurred by the NRC's recognition of the vital role performed by NRC employees, NRC values and principles of good regulation, and effective and sustained implementation of the KM program. Finally, strong executive leadership involvement and support has been a key factor in the agency's success. These successful aspects of the NRC KM program have been incorporated into the NEFC strategy development process.

Knowledge Management Strategy for the Nuclear Energy Fuel Cycle Sub-program

As described previously, Sandia's NEFC sub-program currently faces challenges similar to those described in the example of the NRC's development of a KMP – a demographic consisting of retiring specialized subject matter experts and new hires replacing the outgoing workforce. The recognition of this shift and potential loss of critical intellectual capital has spurred the NEFC senior manager to initiate a pilot KPM. This pilot effort will be focused on the documentation and preservation of tacit knowledge within the NEFC sub-program. Sandia National Laboratories already has a process for storing and tagging all papers or presentations released publicly. This library, known as the SAND report library, can be a resource as we identify explicit knowledge resources.

Approach

Our approach in developing our KMP strategy aligns with best practices espoused in the literature and the KMI (Knowledge Management Institute). Given the complexity of Sandia, our highly specialized workforce and the potential pitfalls of a KMP, we plan to take the following approach during this first phase of the KM project to achieve our objectives.

Phase 1 – Knowledge Capture Pilot Project

As a sort of triage project, NEFC will implement a pilot project to address the urgent need at hand – capturing the tacit knowledge from our senior staff before they retire. This pilot project will include 5

parts: Strategy Development, Focus Groups, Workshops, and Deep Dives, along with Initial Database Creation in the KM Repository and Processes phase.

Strategy

Develop and establish knowledge management program for the NEFC Program (both CPNG and BENFC) to leverage decades of nuclear energy experience.

Strategy highlights Include:

- Document and map the current state of critical knowledge at risk of loss
- Share and record key topics during workshops and deep dives allowing for capture and transfer of organizational knowledge from seasoned or late-career staff to new or early-career staff
- Archive current state of knowledge using videos, transcripts, wiki pages, and other web-based methods
- Develop processes for ongoing knowledge capture to create a regularly updated archive

Focus Groups

- Used to inform the development of the Workshop, Deep Dives, and the KM Database
- Collect staff opinions and preferences about mechanisms for accessing preserved knowledge
- Collect staff views about the existing strengths and weaknesses of the knowledge scope within the program
- Identify channels, means of communication, and collaboration that are difficult to capture using formal peer-to-peer or subordinate-manager channels
- Identify knowledge types that are more prone to have uncodifiable characteristics
- Identify, elicit, and capture knowledge that has so far remained unacquired, uncodified, and inaccessible.

Workshop

- Multi-day workshop led by Subject Matter Experts designed to capture and document critical tacit knowledge within the program
- Critical knowledge at risk of loss will be shared and recorded (both video and audio) during the workshop sessions, and will be further analyzed, tagged, and stored for ease of access.
- SME Presentations with additional time for questions and group discussions with staff from a variety of experience levels (new hires through experienced)
- Examples of topics include: Sandia's History in Disposal and The Past Repository Siting Process

Deep Dives

- Multi-day deep dives into complex topics requiring additional in-depth discussion
- Thematic presentations shared and recorded by Subject Matter Experts – both internal and external to Sandia
- Designed to inform early and mid-career staff, including questions and group discussions
- Will serve as part of the initial contributions to the database of knowledge and reference material for the NEFC Knowledge Management Program

Lessons Learned

- Conduct Lessons Learned (LL) exercise for this pilot stage
- Identify what worked well and what didn't

- Identify techniques that should be reviewed or revised for future activities
- Begin developing roadmap for Phase 2 of the KM implementation
- Note: The initial database creation will occur before the Lessons Learned takes place, but the LL will inform ongoing development of the final KM Repository

Initial KM Database Repository Creation

- Dynamic database will be created to map and track important knowledge and knowledge at risk
- Information collected during focus groups, workshops, and deep dives will be the initial data set
- Review data set to ensure information deemed essential from senior staff is captured
- Processes will institutionalize steps to identify, collect, and archive program knowledge
- A cultural shift will be required within the program to make the effort sustainable and successful. Champions will be enlisted to strengthen the program and promote its use among the staff.
- Result: Sustainable knowledge management system to improve knowledge retention to support the organization's knowledge-intensive operations

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Appendix 1 - Phase 2 – Develop and Implement a Fully-Sustainable KMP

Once the initial pilot is complete, NEFC will explore continued support from leadership, stakeholders, and customers to begin work on a sustainable KMP for the program.

Understand the Current State

To understand the current state of our knowledge assets and gaps, knowledge sharing practices and culture, we will conduct a Current State Assessment using Focus Groups involving the current NEFC staff members. Knowing that several crucial factors influence how well a Knowledge Management Program is ingrained in an organizations' culture and day-to-day operations, we'll approach our current state assessment from five perspectives: People, Processes, Content, Culture, and Technology. See Appendix 2 for more detail.

Current State Outcome: The current state analysis will provide a summary of the NEFC Program's people and their skill sets and standing in the organization (early, mid or late-career staff). We'll also have a better understanding of the processes used for identifying, transmitting/sharing and storing knowledge, and an inventory of available knowledge including gaps. Lastly, the culture for sharing knowledge and the current technologies being used to store, transmit, tag and search the repositories where knowledge is stored will be better understood.

Identify the Target State

After the Current State Assessment is complete and we have a better understanding of where we are on the KM continuum, we'll focus on defining our target state for the NEFC program's Knowledge Management Program. Questions to be addressed in this phase include: Where do we want to be in terms of KM capabilities and when we should reach that state? What is realistic for an organization like Sandia given our complexity and culture? What can we realistically achieve?

It is likely that recurring themes have arisen from our Current State Assessment. The causes of the themes that arise in the current state analysis are likely complex and multi-faceted. As was done in the Current State Assessment, to determine our target state, we'll look at the five closely related aspects: people, processes, content, culture, and technology. These aspects are closely related and we will develop them in sync by following several key steps:

- Assessing the strengths and weaknesses revealed in the current state map.
- Balancing strengths and weaknesses against the perceived business needs and wants by determining the areas that would have the biggest business impact with lowest costs.
- Focusing our discussions and explorations on these areas with the greatest need and greatest interest.
- Addressing the organization's needs and wants with KM best practices to develop an effective and achievable solution that the NEFC Program can maintain and grow for the long term.

For more information on questions addressed in this phase, see Appendix 2.

Target State Outcome: An understanding of the NEFC program's current state coupled with key discussions by stakeholders on the questions posed above and in Appendix 2 will help us to identify our targeted objectives. This will prepare the team to move in to the first phase of the KMP roadmap described below.

Roadmap

Critical to the success of any Knowledge Management Program, a roadmap will guide the team as they navigate the complexities and pitfalls inherent in any initiative that seeks to disrupt an organization's processes, rhythms and culture. After defining the Current and Target State of knowledge management within the NEFC program, the roadmap depicted in Figure 3 will be used to define the path forward and critical decisions.
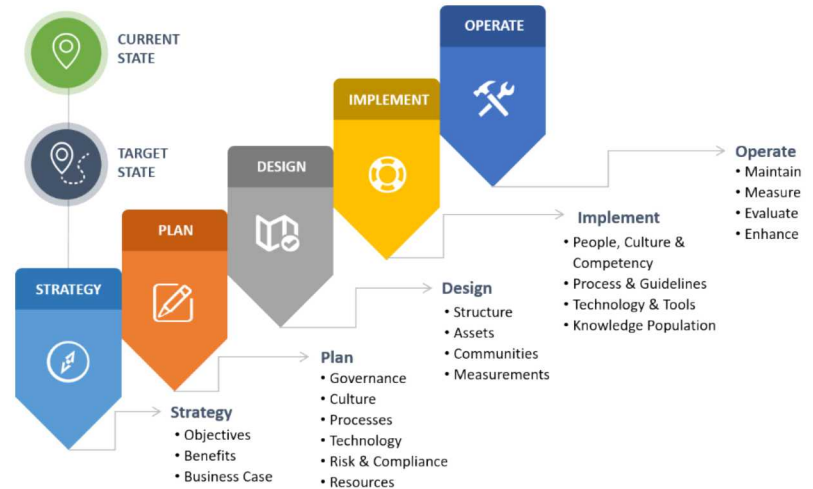
Figure 5 Proposed Roadmap for the Nuclear Energy Fuel Cycle Knowledge Management Program

Strategy: In this phase of strategy development for the NEFC Knowledge Management Program, stakeholders will use the findings from the Current and Target State analysis to identify KMP objectives. Objectives initially thought to add value to an organization can change drastically after a thorough scan of the current environment is completed. With objectives identified, the leadership team can begin to identify the benefits that will inform the business case. The business case is important to establishing a KMP for several reasons including: 1) socializing with sponsors, leadership and the end-users to obtain necessary resources and buy-in and 2) identifying and galvanizing the KMP team members.

Plan: Several critical issues will need to be addressed prior to moving in to the Design phase of the NEFC's Knowledge Management Program. The Governance model, which includes three elements, will lay the foundation for a successful program. The elements include:

1. A clear set of Corporate Expectations for the management of knowledge in the program including accountabilities for the ownership of key knowledge areas, and the program/Sandia standards for Knowledge Management.
2. Performance Management of KM including monitoring and measuring the application of KM through metrics linked to reward and recognition. A way to ensure staff members are held accountable for applying the system in the way that they are expected to. An early warning system to identify the need for new interventions to improve the KM system, and to ensure a continuous improvement in the ability of the program to manage strategic knowledge.
3. Support for KM, including a KM support team, KM reference material and KM training.

In addition to creating a solid governance model, plans to address the following critical elements of a KMP are addressed in this phase of the roadmap.

- Culture
- Processes
- Technology
- Risk and Compliance
- Resources

Communication	Capture	Internalize	Organize
• Community Q & A Forums • Ask the Expert Forums • Instant Message • Blogs & Microblogs • Video conference, phone, email, meeting	• Digital Video and Audio • Lessons Learned Management System • Team Blogs • Wikis • Software (Microsoft Office Products such as Word and PowerPoint)	• Search engines and tools • E-learning • RSS • Community blogs and forums	• Wiki • Portals • SharePoint • Lessons Learned Management System • End Note

Technology is the enabler for any successful Knowledge Management program. Key technology platforms and their use are identified in Figure 4. Technologies will be chosen based on the KM objectives, governance model, culture, and rules and regulations (this is especially important at a national laboratory).

Figure 6 Possible Communication Tools for Knowledge Management Programs

Culture: Implementing Knowledge Management shouldn't be viewed as a tactical or operational effort but rather a strategic initiative that will require behavioral change. Implementing KM is one of those big changes that requires a well-thought-out plan to change the organization's culture over time.

For KM to succeed within the NEFC program, all levels of staff should feel they have a "piece of the action." Management, technical and administrative staff and IT personnel should feel as though they are contributors to, and beneficiaries of, the KM process. Six steps for building a Knowledge Management culture are below. (source: HDI)

Step 1: Recognize that implementing a KM MUST be a strategic initiative.

Step 2: Take a life cycle approach to implementation

Step 3: Realize that there are silos to overcome

Step 4: Focus on the strategy and the process first, not the KM tool

Step 5: Make it easy to capture knowledge as a by-product of work

Step 6: Build KM in to the way people work

Design: The design phase of the roadmap entails addressing the following:

- Structure
- Assets
- Communities
- Measurement

Implement: This phase will focus on the following:

- People, Culture and Competency
- Process & Guidelines
- Technology & Tools
- Knowledge Population: For this KM initiative, the knowledge population is defined as staff members and management working in or supporting Sandia's NEFC Program.

Operate: This phase of the roadmap addresses four key elements, which will ensure continuous improvement and adoption of the NEFC KMP. They include:

- Maintain
- Measure
- Evaluate
- Enhance

Appendix 2 - Current State Assessment

(Knowledge Management Institute, 2019)

1. People

Organizations often make the mistake of focusing solely on technology and underestimating the people aspect. With that in mind, here are some critical questions to ask when developing your KM Strategy:

- Who are your users: demographics, business units and structure, roles, etc.?

- What information do they need on a daily basis?

- How do they connect and communicate currently? How would they like to do that in the future?

- Are there established thought leaders? If not, what is preventing that?

- Do they like sharing expertise? If not, what is stopping them?

- Are there any informational and/or functional silos within the organization and what is the root cause for them to form?

2. Processes

Organizational processes are driven by information. Every step in a process consumes some kind of data, and produces some form of output, be it a document, the number of produced items, or a simple email. As such, analyzing organizational processes is integral for developing a working KM strategy.
When analyzing current processes in an organization, we address questions like the following:

- What are the main business processes for the organization, as well as for each business unit?

- How are the processes instantiated, applied, and followed? What are the gaps, and where can they be improved?

- Does your staff perceive the existing processes as efficient or more cumbersome than necessary?

- How are the processes being followed in "real life?"

- Are there established roles and well-defined staff to fill these roles in each process step?

3. Content

Hand-in-hand with understanding organizational processes, analyzing the information and content that flows through these processes and how, is another critical aspect for forming the Current State Assessment and guiding the Target State definition. While diving into the actual content analysis, also consider the following:

- How "fresh" is your content and what are the obstacles for keeping it current? How much does your staff trust the content they find on internal systems?

- Where is this content housed? How is it organized and accessed? Is there a defined access control in place? Are there security and confidentiality concerns that need to be addressed?

- Do people collaborate in contributing new content? Are there approval workflows with established roles in place or are they not needed?

- What are the current procedures for knowledge retention when staff leaves?

- Do you need to collaborate or share some of your content with external audiences?

- How has the content been enhanced (with tags, formatting, etc)?

- Again, what silos exists and why?

4. Culture

Another important aspect that has crucial impact on enterprise KM, yet is often overlooked, is company culture. Along with processes and procedures, company culture shapes staff's behavior and attitude toward capturing, managing, and sharing information. For example:

- Is knowledge sharing fostered by your company's culture? Are there incentives for thought leadership contributions?

- Do people like to share or do they prefer to keep their intellectual property to themselves?

- What about sharing across business units?

- Further, does your staff feel pressured to maintain high utilization and does "data entry" hinder that?

5. Technology

It's important to thoroughly understand the existing technology ecosystem and the restrictions it implies. We approach this effort by addressing questions like these:

- Is there an existing IT architecture plan? What is the level of integration between systems, e.g. user account management, content and document management, intranet, search, taxonomy management, marketing and finance applications, etc.

- What is the technology stack preference of the organization? Microsoft, open source?

- What are the technology development and maintenance capabilities of the organization? Is there dedicated IT staff? What are their skills?

- Where in their lifecycle are current systems? Are any of them planned to be sunset? Are any new ones already in the procurement process?

- What are the cost factors? Do license restrictions cause inefficiencies?

- Is there an access control plan for the full technology ecosystem? If not, what issues does that cause?

Appendix 3 - Target State

(Knowledge Management Institute, 2019)

In order to define a practical, realistic, and sustainable Target State, approach this task in a manner similar to the Current State Assessment by diving into each of the five aspects: people, processes, content, culture, and technology. These aspects are closely related and we develop them in sync by following several key steps:

- We start by assessing the strengths and weaknesses revealed in the current state map.

- We then balance those against the perceived business needs and wants by determining the areas that would have the biggest business impact with lowest costs.

- Next, we further focus our discussions and explorations on these areas with the greatest need and greatest interest.

- Finally, we address the organization's needs and wants with our best practices experience in KM to develop an effective and achievable solution that the organization can maintain and grow for the long term.

Working through the above steps, we focus on areas where we have found the greatest potential impact. Below are examples of some of these areas for each of the five aspects:

1. People

As one of the critical pieces for knowledge development and retention, it is important to define a clear target for the human capital of the organization. That includes topics like these:

- Target level of thought leadership in the organization. Based on the established goals of the organization, we leverage our experience with similar organizations in that industry to recommend the level of staff coaching, development, and training to establish an optimal degree of thought leadership without it negatively impacting productivity.

- Extent and nature of collaboration. Influenced by your organization's line of business, collaboration among staff can be achieved in various ways. Here we define the type and level of collaboration that would be most valuable to your organization.

- Target level of processes and systems adoption. While it may be tempting to simply state a 100% adoption rate, that may not be reasonable or even needed depending on the organizational needs and environment.

- Balance between content accessibility and confidentiality protection. Having analyzed the types of content through the Current State Assessment, we bring our experience with securing content to define roles and access permissions levels to achieve that balance depending on the organization, type of work, and industry.

2. Processes

As previously discussed, understanding your current processes can identify gaps in data, capabilities, and knowledge acquisition. As part of the Target State, we define which gaps or weaknesses should be addressed. Some areas to consider:

- Process optimization and automation. Here we define potential process areas where optimization and automation would bring the most impact to efficiency. A straightforward example here is aiding and simplifying data flow from one system to another, thus eliminating manual data entry and potential for errors.

- "Unofficial" processes. There are often "unofficial" process steps needed for staff to complete a task. We consider these gaps and which steps to formally include in the organization processes.

- Process adoption. Evaluate processes that are not being followed, and, depending on the reason, determine whether they should be preserved, improved, or deprecated.

- New processes. New processes, as needed, to improve knowledge acquisition and retention.

3. Content

Having performed the content analysis piece of the Current State Assessment, we now have a solid understanding of potential gaps in the quality, availability, security, and freshness of content. Here is a sample of critical topics to address in the Target State content strategy:

- Information integration. Here we define the information sources that should be integrated and to what level. There could be valid points in keeping certain data segregated, while integrating all other sources. Here, having understood the "why" of existing silos, we can accordingly tackle breaking down the appropriate barriers.

- Content confidentiality and access. Similar to the point we made in the people aspect above, here we define the content types and sources that should be protected and to what level.

- Content enrichment. After planning for the basics of managing your content, consider the specific benefit of tools and methodologies for enhancing your content and relationships between various pieces with metadata, concept recognition, linking to related concepts, etc.

4. Culture

Company culture shapes how staff perceives and manages organizational knowledge and information. To help build the cultural aspect of the Target State, consider these:

- The "What's in it for me?" factor that hinders sharing. Here we define the need, type, and level of incentives and potential process tweaks to address such sentiment.

- The "I don't know where/how/what to share and who can see it" factor. In a previous example we mentioned how multitude of systems with overlapping functionalities can actually be a detriment to content contribution and sharing. Additionally, not all content may be shareable with all staff. Touching on access control again, we define what needs to be done to enforce it and communicate it. Employees need to be comfortable with the security of their content for content contribution and sharing to be fostered.

- The leadership support factor. Active leadership support is a critical requirement for implementing and maintaining a cohesive and effective KM strategy. With that in mind, in the Target State we define methods that should be implemented to strengthen leadership support for KM processes and tools and to foster knowledge sharing among staff. Some common examples, recognition of thought leaders, budgetary support for information systems implementation, administration, and governances, upholding established content management processes, etc.

5. Technology
When considering the technology aspect of a KM strategy, define the information and technical architecture for the organization. Take into consideration any constraints that have already been established and design the technology ecosystem that will support the targets defined in the above categories. To do that, some of the factors to consider include:

- Company IT capabilities. Is there a dedicated IT staff and do they have development capabilities? How comfortable is the organization with customizing tools and platforms, building custom linkages between tools, or even building custom tools?

- Existing technology ecosystem and integration capabilities. An important factor we keep in mind are the already existing tools and platforms and their integration capabilities. To develop a practical and cost-effective Target State, focus on leveraging the best of the tools that already exist and ensuring path to integration, thus trending toward fewer systems rather than more.

- Technology biases. In some situations there exists a bias toward or against a specific technology due to past or present issues. Business users may have had a bad experience with a specific platform.

- User management. Define whether it is beneficial for the organization to implement an enterprise-wide user account management solution and how single sign-on can be achieved.

- Enterprise search. If there isn't a solid enterprise search solution already in place, define the viability and level of implementation of one to reach as many data sources as possible.

- Advanced technologies. Depending on the maturity level of the organization in all aspects, cutting edge tools like semantic web and machine learning/AI could truly take enterprise knowledge to the next level with content augmentation, auto tagging, concept identification and linking, and so on.

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