

## **Maturity of a Nuclear-Related Knowledge Management Solution**

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### **INTRODUCTION**

Similar to many companies working in the nuclear industry, Westinghouse has an aging workforce and is currently experiencing a wave of retirements. [1] Due in a large part to nuclear industry fluctuations over the past decades, we see quite a large gap between our experts who are on the verge of retirement and our upcoming talent. As impending retirees come forward, we find that they are often our industry and process experts; they possess many decades of experience in highly technical areas. Thus, it is essential to capture as much of the knowledge held by these individuals as possible, prior to their exit.

With our Knowledge Management (KM) team in place, we have been able to ease the technology transfer process of these retiring experts, the groups they work for, and specifically for those who will carry on to become the new experts by offering creative solutions for defining, capturing, and disseminating our industry knowledge and experiences.

### **KNOWLEDGE TRANSFER IN PRACTICE**

When the Human Resources (HR) department learns of an impending retirement, a series of events is triggered – some of those events relate to the succession plan and ensuring that business and technical information/processes are maintained and transferred smoothly. The KM team has become part of that process as HR determines whether or not the retiree's knowledge needs to be captured into a KM system in some form and how to enable that capture.

From the knowledge elicitation methodology [2] that we attempted to follow when we initially built the KMN, our methods and resulting products have been modified in order to meet the demand and the need for preparing and maintaining our valuable knowledge and experiences within the nuclear industry.

### **Initial Approach -- Mentoring Many**

Our KM process began in 2010. As it was originally designed, the KM process was comprised of:

- A planning meeting - to define involved individuals, the scope of the content, and a schedule
- A series of elicitation sessions which included the expert and defined “protégés.” These were iterative sessions drawing out experiences and tacit knowledge over a number of weeks. They sometimes encompassed 40 hours or more.
- Conversion of captured audio and notes into key-worded, fully searchable, text-based material
- Validation of the materials by a team of experts, as well as a legal and export compliance review
- Entry into a standard intranet location – called the Knowledge Management Network (KMN)

The initial entries were from a small group of long-time technical leaders who are/were in roles that encouraged them to nurture younger and less experienced colleagues. They were recruited by lead HR staff who were charged with succession planning and retention of knowledge. The advantage of an online searchable tool (i.e., the KMN), as opposed to numerous calls, conversations, and emails appealed to this initial group of experts as a way to convert some of their tacit knowledge to “hard copy” so that others could easily locate it and read it – sometimes eliminating the need to contact the expert or at least having fuller background *before* calling the expert. The availability of the content was seen as one-to-many mentoring and was meant to capture critical knowledge and experiences that could help many engineers as well as support staff to understand our business and our customers.

The searchable KMN was designed to be fully integrated with our intranet to enable quick retrieval along with other related corporate documents.

## Emerging Approach -- Mentoring Many More

With our most recent wave of retirements, the timing and number of individuals have demanded that we modify our approach. Rather than the general technical content as gleaned from our initial group of experts, the products from our knowledge capture sessions (elicitations) now fall into *four* general types:

1. Technical Content of Interest to Many (the original concept)
2. Job Replacement
3. Facilitation
4. Critical Skill Transfer

Our knowledge elicitation capability was initially outsourced to Perigean Technologies [2]. As our knowledge management demands have evolved, so did the need to expand our elicitation capabilities. In May 2012, Perigean Technologies provided skill-based training in knowledge elicitation. With this, Westinghouse now has an organic capability in elicitation techniques, to include Applied Concept Mapping and the Critical Decision Method [3, 4]. Moreover, we have developed a confident corps of elicitors to use those techniques, which has made it possible for us to meet the growing and diverse demands of each of our capture types.

While there are overlaps between the four capture types, each are defined and described below. Table I lists benefits and challenges for each elicitation type. Table II lists the attributes each type of knowledge capture and Figure 1 illustrates the distribution of the types.

1. Technical Content of Interest to Many – This is an elicitation in its truest form and was the model used for early KMN entries. It is used to explore many facets of an expert’s experiences and situations. As such, it is driven by the depth and breadth of the content, not by a quick schedule due demanded by an impending

retirement. Elicitation probes are used to draw out a wealth of tacit knowledge, experiences, and contacts over a period of weeks. The information is converted to searchable text with multimedia supplements.

2. Job Replacement – This type of elicitation is designed to target general unwritten concepts and processes that need to be passed along to the individual whole will carry on in the job. Those referring to the information may be looking for models to follow, case studies, instinctive actions taken, and in-depth technical information that is not captured in written reports. Generally the timing is shorter and the audience is more clearly defined than the previous item.
3. Facilitation – With this type of capture, the expert already has in mind the type of information and situations that need to be transferred to those who are taking over tasks. Often the expert comes prepared with visuals, graphs, spreadsheets, and other items. The expert is comfortable talking about the job situations and tasks, but needs assistance to think and verbalize why something was done in a particular way or how a particular decision was made. The KM team concentrates on drawing out the unspoken thought process used by an expert.
4. Critical Skill Transfer – This type of capture is designed to draw out specific job tasks that the expert might think are obvious to the protégé, but that the protégé might not know to ask about. These tasks are not generally documented in any standardized way but may be captured in a collection of random notes

Type of Capture	Benefits	Challenges
1. Technical Content of Interest to Many	<ul style="list-style-type: none"> <li>• Elicitation is free to go in many directions, often limited only by the allotted time</li> <li>• Result can be an in-depth collection of tacit knowledge that may be of interest to many</li> <li>• Requires a high level of protégé engagement and provides opportunity for protégé capability to be evaluated</li> </ul>	<ul style="list-style-type: none"> <li>• Organizing the content in a way that makes sense to the expert and/or protégé.</li> <li>• Extensive content requires extensive review and validation prior to posting</li> <li>• Heavy burden in terms of time, cost, and supporting resources</li> </ul>

2. Job Replacement:	<ul style="list-style-type: none"> <li>Result is often a concept map which is quicker to produce and verify than extensive text and supplemental material as in 1) above</li> <li>Provides the opportunity to focus on a specific employee role</li> </ul>	<ul style="list-style-type: none"> <li>Finding the right focus and scope in the permissible/allotted time.</li> <li>Delivered content contains less depth.</li> <li>Organizing the content to be effectively searched</li> </ul>
3. Facilitation	<ul style="list-style-type: none"> <li>Since focus and scope is already set by the expert, no extra time is needed to define the knowledge areas</li> <li>Often uncovers items forgotten by the expert</li> </ul>	<ul style="list-style-type: none"> <li>Moving the conversation and presentation to those un-verbalized lessons learned and modes of communication</li> <li>Subject to quality of expert's material and communication capabilities</li> <li>Difficulty in pacing session(s) to match expert's material</li> </ul>
4. Critical Skill Transfer	<ul style="list-style-type: none"> <li>This is a focused collection of knowledge</li> <li>Case studies may provide a rich, relevant, and effective bases for the sessions(s)</li> </ul>	<ul style="list-style-type: none"> <li>Encouraging the protégé to write out the notes to ensure full understanding</li> <li>Narrow focus; often not suitable for publishing</li> <li>In certain circumstances, difficulty in replicating relevant work tasks</li> </ul>

TABLE I. Benefits and Challenges of KM Capture Types

	Resource Requirements	Audience (in session)	Audience (deliverables)	Types of participants	Typical Tools
<b>1. Technical Content of Interest to Many</b>	<b>High</b> , substantial resources required for authoring, editing, reviewing, elicitation, and publication	Best if limited to protégé and elicitors	Potentially applicable to a very wide audience, as large as the entire company.	Tends to be highly technical or highly involved work domains	Use of many elicitation tools with all being applicable
<b>2. Job Replacement</b>	<b>Low</b> , typically some supporting resources	Best if limited to the one or few individuals who are intended to replace the specific job function	Very limited applicability	Variable	Primarily concept mapping
<b>3. Facilitation</b>	<b>Minimal</b> , typically no supporting resources	Can be large, like in a classroom setting	Potentially applicable to a whole discipline or functional group.	Variable	Critical decision method
<b>4. Critical Skill Transfer</b>	<b>Medium</b> , typically medium effort	Best if limited to a small set of individuals who need the specific skill	Limited applicability	Variable	Concept mapping, Critical decision method

TABLE II. Attribute Comparison of the KM Capture Efforts

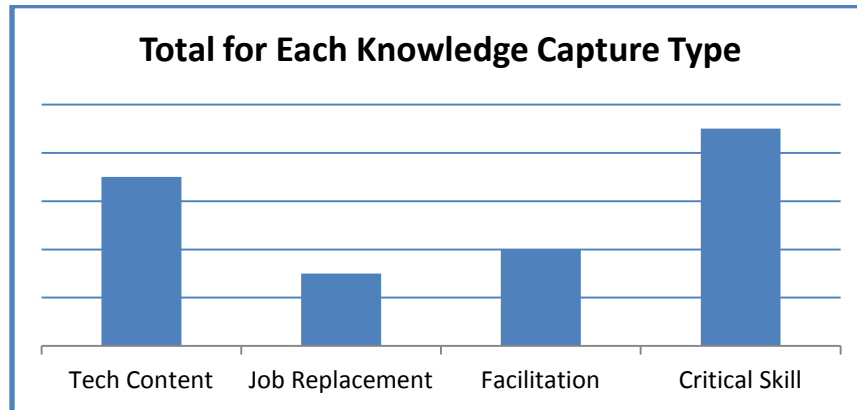


Fig. 1. Distribution of Recent Knowledge Capture Types

## RESULTS

As our KM processes mature and are modified, the KM team is building closer relationships with HR and the reputation of KM has grown. It is viewed as a valid alternative to one-on-one mentoring and project work in corporate efforts to increase technical bench-strength, and provide growth opportunities within our piece of the nuclear industry. To accomplish this, it has been imperative to modify the KM process and output as we strive to increase our competitiveness in the marketplace.

Our KM program has matured. As we first began to market our services, it appeared that we would focus primarily on the extensive type of elicitation (i.e., Technical Content of Interest to Many). However, we quickly found that, while that type of elicitation continues to hold value and will be used when it is appropriate, we have modified our scope to include a spectrum of knowledge needs, resources, and timing.

From our initial efforts onward, we have experienced high levels of expert engagement. Experts have been open to the process – seeing the value of capture and dissemination of knowledge that has not otherwise been stated or documented. Experts have consistently recommended the process to their peers and management. We have seen our usage data steadily increase in the number who refer to the KMN and in the number of global locations represented by those users. Moreover, our KM team has gained sufficient confidence and skill in the elicitation techniques to suggest creative products and alternative approaches as new opportunities come our way. We offer more diverse services than we initially envisioned and have designed and created a variety of knowledge tools due to customer demands and the creative initiative of KM team members.

## REFERENCES

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4. B. CRANDALL, G.A. KLEIN & R.R. HOFFMAN, p. 69-90, *Working Minds: A Practitioner’s Guide to Cognitive Task Analysis*, MIT Press, Cambridge, Massachusetts, 2006.