KNOWLEDGE CAPTURE: FOR WHAT YOU ABSOLUTELY, POSITIVELY CAN'T AFFORD NOT TO KNOW

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ABSTRACT

What happens when there is only one "guru" in an organization who understands a critical system's history, operation, or maintenance? What happens when that person is 55 years old and has chronic back problems, and is out of work the day that system goes down?

Our recent work with water and wastewater utilities has included the example given above (the guru with the bad back). Another utility, whose only staff member who knew the exact underground location of a 25-mile long water pipeline died suddenly of a heart attack, wished they had heard about knowledge capture earlier.

The needs for knowledge management, and succession planning, are common to many utilities, and arise in the contexts:

a. the retirement of key staff members, turnover, and reduction in staff by attrition;

b. the need to retain valuable employees, and the expectation that attracting qualified employees will continue to be difficult in the future;

c. the recognition that certain key processes are understood by a small number of employees, and that knowledge is largely tacit; and

d. the need to provide a framework for employees to be able to share knowledge of key processes with each other (in addition to the O&M manual/system).

KEYWORDS

Knowledge capture, knowledge management, succession planning.

THE KNOWLEDGE CAPTURE PROCESS

The strategic use of knowledge management begins with identification and prioritization of a small number of candidate processes for knowledge mapping and capture.

Such an approach would include the steps outlined below.

Step One: Select Candidate Processes

Meet with senior staff to identify a small number of candidate processes for knowledge mapping. This would involve using criteria for selecting key processes, such as:

a. risk of failure of the process (i.e. the consequences of not having the right knowledge in the right place at the right time),

b. number of employees who understand the process, and the degree to which the understanding of the process is tacit (Tacit knowledge is what you know, but don't know you know or how you learned it. People often think if it as intuitive.),

c. shared recognition that the process is critical,

d. relative simplicity of process (need to define it within manageable boundaries for the purposes of knowledge capture),

e. others identified by the senior staff group, or their discussions with their respective teams.

Following creation of a list of 4-5 key processes, one process would be selected to go forward with. The rest would constitute a "waiting list" for future knowledge management efforts.

Example processes offered by utilities include: budget development, process inflow upset detection and mitigation, key equipment troubleshooting, water line location, customer service call center and billing, and new connection plan review.

Step Two: Develop Process Flowchart and Knowledge Capture Analyses

Working with a team of 3-5 people (depending on the process chosen), meet to develop a process flowchart and to analyze the subtasks in terms of the key characteristics such as:

a. Knowledge sources

b. Staff roles (identifying process indicators, responsibility, support, confirmation, etc.)

c. Skills required

d. Information required (internal and external), including O&M manual

e. Other procedures required (e.g. health and safety)

f. Support, equipment and tools required

g. Process output/definition of success (how do we know that the process has been completed successfully?), other performance criteria

h. Components of risk, such as process upset frequency, consequences, and how they might be mitigated.

Following this exercise, a draft process flowchart would be developed and distributed for comment by team members and department managers, with a copy to the utility general manager for comment, as well.

Step Three: Evaluate and Plan Follow-Up

During this exercise, tacit knowledge surfaces in places that often surprise the team. For example, in a recent project, the team identified several key skills that they said, "nobody teaches you; you just have to know it!" Each of these items is a head's up to their managers for training (whether it is off-site, on-the-job or both), instrumentation and operational checklists.

Following preparation of the final flowchart and analysis, the senior staff group meets to evaluate the outputs of the process, what has been learned, next steps to take, and an action plan.

BENEFITS

There are several good reasons to include knowledge capture as an ongoing part of utility management. They include:

a. Getting agreement from different vantage points about the process goals, steps, skills and resources needed.

b. Identifying vulnerabilities and ways to improve processes, including ways to improve intergroup coordination and information availability.

c. Developing skills inventories for recruiting, training, and creating career paths and broadbanding.

d. Assessing how well teams are working together, and teaching knowledge-capture skills to team members.

e. Creating working flowcharts that help people solve problems in the short-term as well as long-term.

f. Providing a framework for understanding the elements of risk -- focusing attention on the primary drivers, and decreasing the severity, likelihood and mitigation options of upset conditions.

The table below shows actual improvements suggested by a utility team during the knowledge capture process. The subject of the exercise was troubleshooting a cake pump, hydraulic pump and twin screw conveyor system.

Symptom	Recommended Changes
1. Cake Pump Won't Start (when button pushed)	1. Develop list of pre-startup checks, including checking the water box. 2. Do planned maintenance when the incinerator is shut down, or shut down one pump at a time for maintenance. 3. Needs a diagram of operating settings. 4. Are there more settings options than we really use/need?
2. Twin Screw Charging Pressure Gauge Reads Higher than 20 psi	Address with truck drivers on a regular basis. Clean screen once per shift.
3. Hydraulic Charging Pressure Gauge Outside Acceptable Range	1. Acceptable charging pressure ranges need to be revised for slower stroking speed. 2. Oil temp range in O&M manual is too broad; need to revise.
4. Cake Pump Pipeline Pressure Gauge Outside Acceptable Range	Ranges in O&M Manual go too high (800 psi). (If gauge at cake pump >300 psi, or gauge at computer >350 psi, then need to troubleshoot.)
5. Hopper Level is too high (Lower Yellow Range)	A loud, audible alarm is needed when hopper level reading in the control room is in the first (lower) yellow range, to prevent cleanup accidents/injuries if hopper overflows.
6. Hopper Level is way too high (Upper Yellow Range)	Same as above.

In one utility, a knowledge map has already been used to successfully troubleshoot a key system (cake pump, hydraulic pump and screw conveyor). It has also been observed that the flowchart format is easier for people with strong spatial skills to interpret and use than a text format description. Finally, the flowcharts provide a baseline description, or template, against which potential process changes can be discussed and evaluated.

Knowledge capture is, therefore, a versatile part of the succession planning process. Although it doesn't, by itself, create plans for recruiting, retention and replacement of key staff, it does lay the groundwork for those functions. It identifies the skill sets that need to be sought and developed (e.g. knowledge of hydraulic systems); helps cross-train employees; and provides the basis for developing career paths, both of which help to retain the utility's inventory of people, their skills, experience. On a more subtle level, the process itself signals that what skilled and experienced employees know is valuable, worth spending time on, and recognized.