



## Creating Pathways for The Transfer of Skills and Knowledge

# Key Issue Companies are Facing

- Organizations are losing their experts and replacing them with novices. What does this really mean?

## Novices vs. Expert

“Booksmarts”

vs.

Experience

Rules and  
Routines

vs.

Mental Models

Reduce Problems  
to Fit Ability

vs.

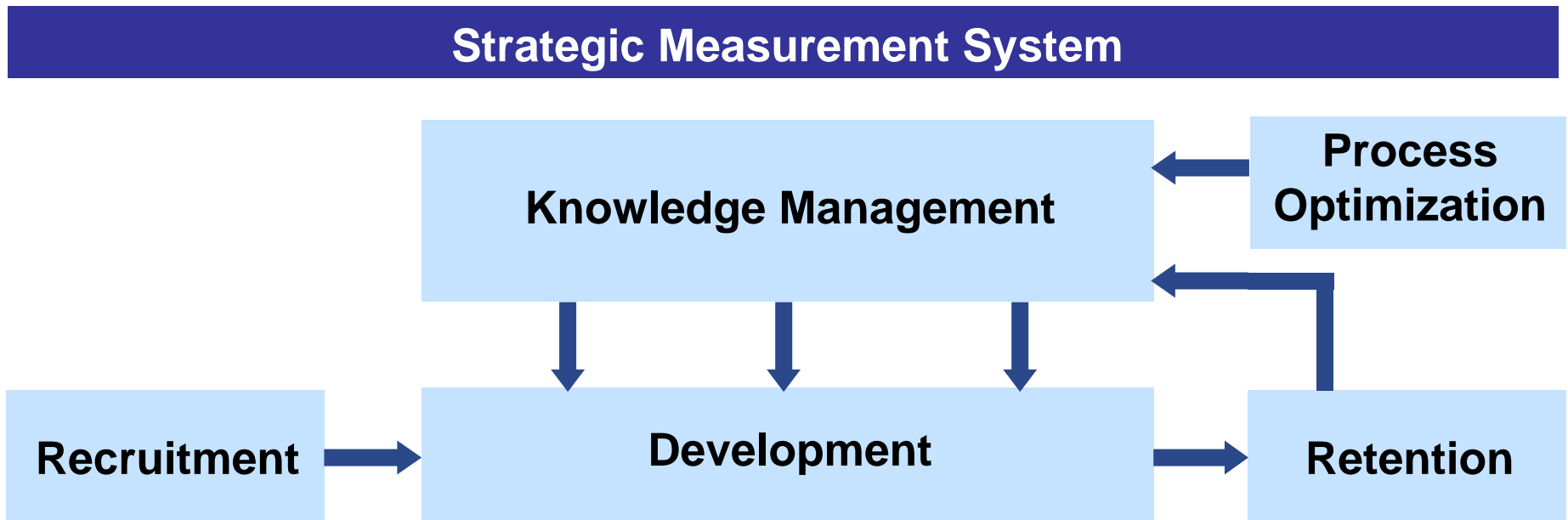
Progressive  
Problem-Solving

# Key Challenges Companies are Facing

## o Key Challenges:

- Large numbers of new people will be hired while the experienced workers are leaving. This represents a different paradigm from past efforts.
- Which skill depths are too shallow to guard against knowledge loss and how much time is left to act before this affect productivity?
- The majority current tools in place are “knowledge-based” and need to be “performance-based” to be effective.
- Historically, the knowledge assets have been owned by selected “experts. This increases business risk due to impending retirements. The organization must “own” the knowledge.
- Is the organization capable of developing the new level of talent required with the existing systems and processes?

# Workforce Supply Chain

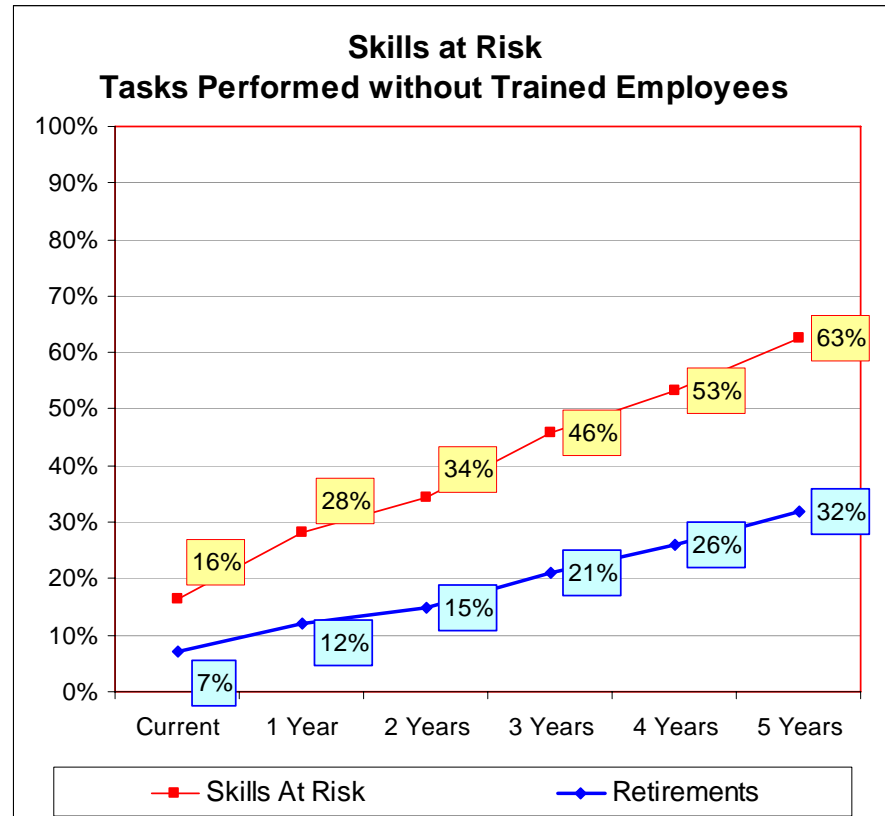


# Where to Start

- Know what skills and knowledge are leaving and what skills and knowledge need to be replaced.
  - Identify what skills need to be replaced and when.
  - What knowledge must be captured?
    - What knowledge can we capture through documentation of processes, procedures, etc? (Explicit Knowledge)
    - What knowledge is only gained through experience? (Tacit Knowledge)
- Identify and implement strategies to capture both explicit and tacit knowledge that is leaving the organization, and to replace lost skills.

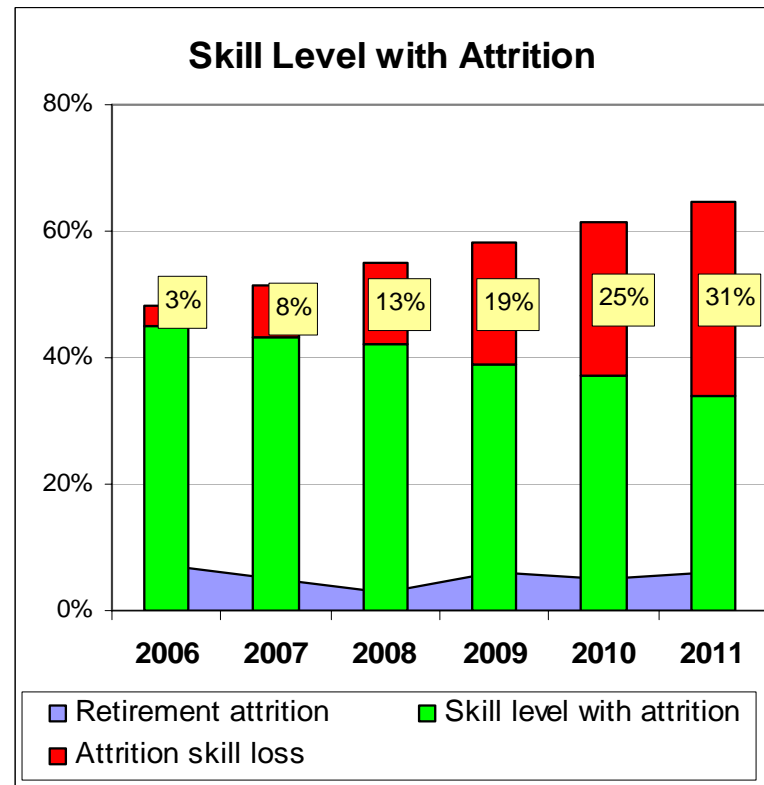
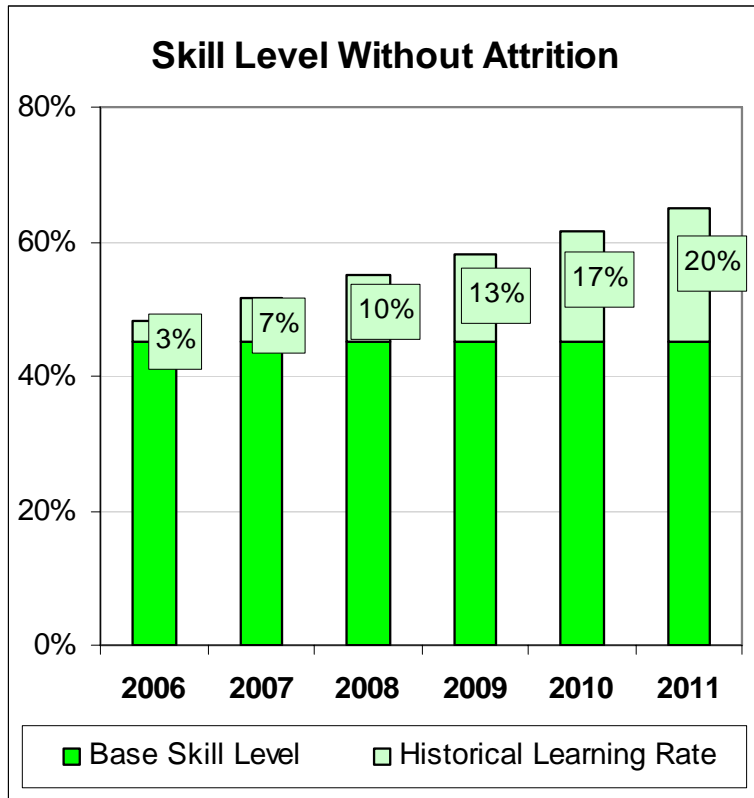
# Skills at Risk Measures

- Skill loss can be double the attrition rate.
- The risk rises faster than the retirement attrition rate since retirements occur mainly among the most experienced employees draining the pool of skills.



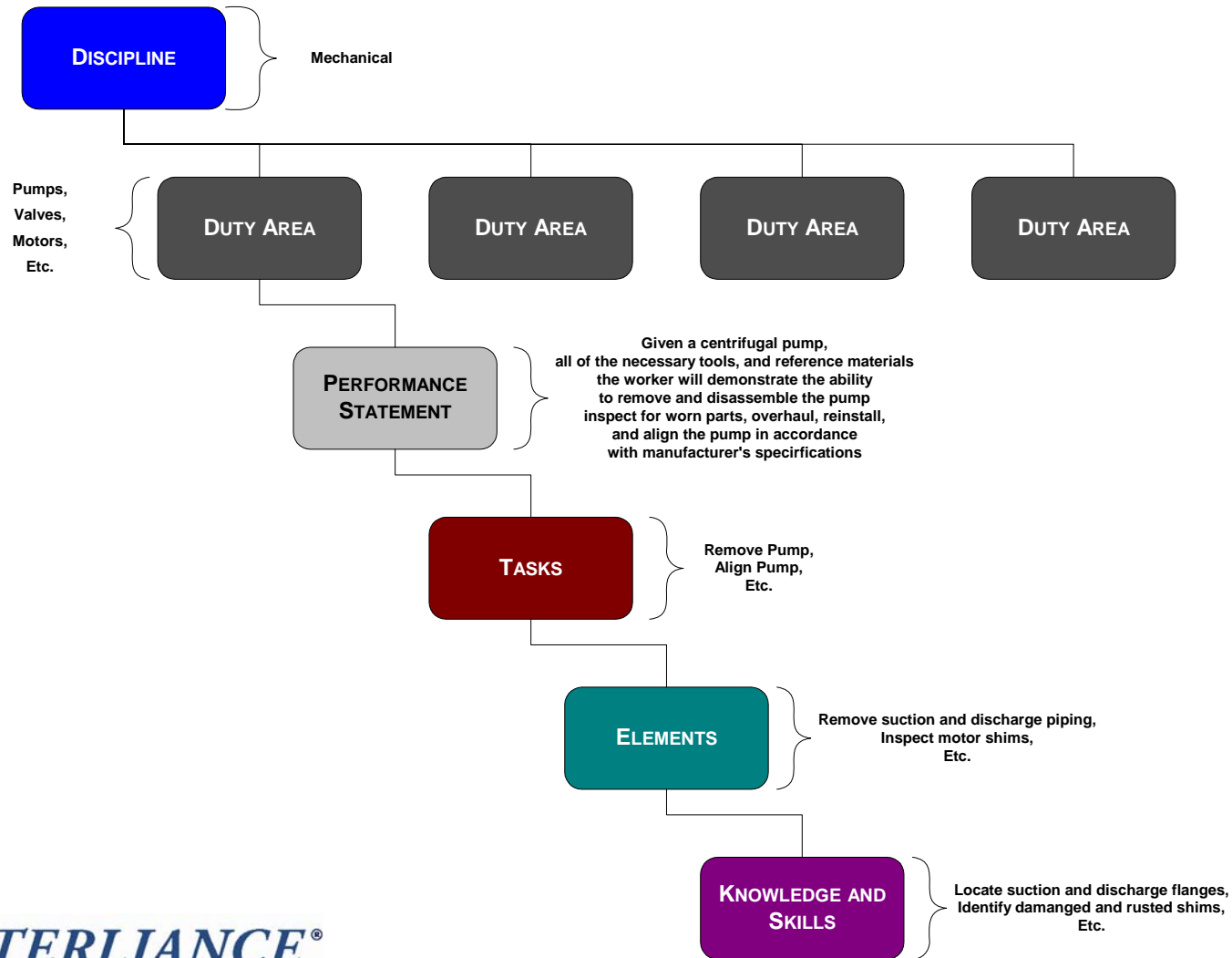
***If no action is taken, in 5 years, 63% of tasks will be at risk for being performed without a skilled worker available***

# Learning Rate Measures



***The impact of attrition can be significant over time, reducing the expected skill level by 31% in 5 years at the current learning rate***

# Structure of a Knowledge Base



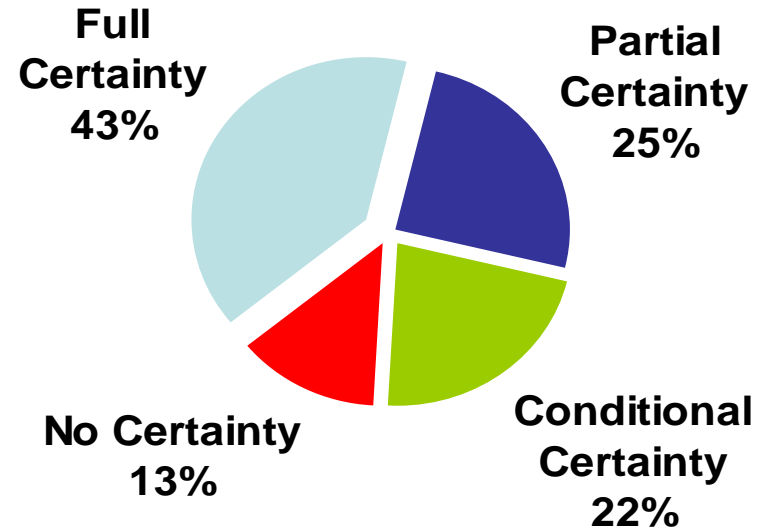
# Sample Skills and Knowledge

## EQUIPMENT: MOV ACTUATORS

<i>Task</i>	<i>Knowledge</i>	<i>Skills</i>
Assemble MOV mechanical components	Describe how to: <ul style="list-style-type: none"> <li>• Install the drive-sleeve assembly</li> <li>• Install the worm and torque-spring assembly</li> <li>• Install the handwheel and shaft</li> <li>• Assemble the worm shaft-clutch, worm shaft and shaft-clutch gear</li> <li>• Replace motor on actuator</li> </ul>	Be able to: <ul style="list-style-type: none"> <li>• Set drive sleeve assembly with de-clutching fork into unit housing</li> <li>• Install the de-clutch shaft</li> <li>• Install worm and torque spring cartridge assembly</li> <li>• Install spring cartridge cap and bolts</li> <li>• Install spring cartridge outer cover</li> <li>• Install tripper lever assembly</li> <li>• Slide tripper arm adjustment backup and tighten in place</li> <li>• Install de-clutch lever</li> <li>• Install housing cap with handwheel</li> <li>• Install the motor pinion gear and key to the motor and tighten setscrew</li> <li>• Install torque switch and limit switch</li> <li>• Install electric motor</li> </ul>

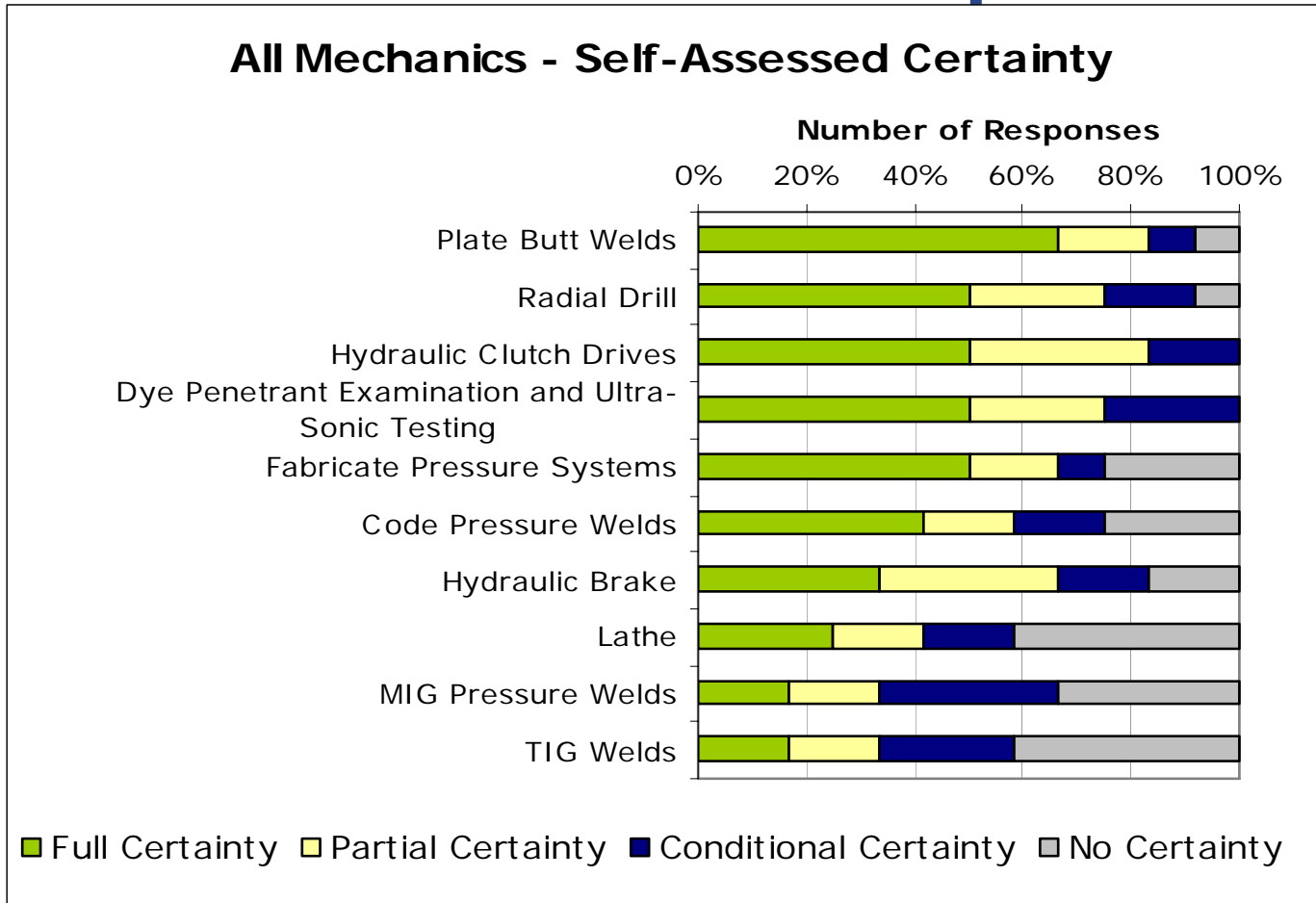
# Where do We Get the Knowledge from?

- On average, utility operations or maintenance employees report less than 50% full certainty for all skills within their job position.

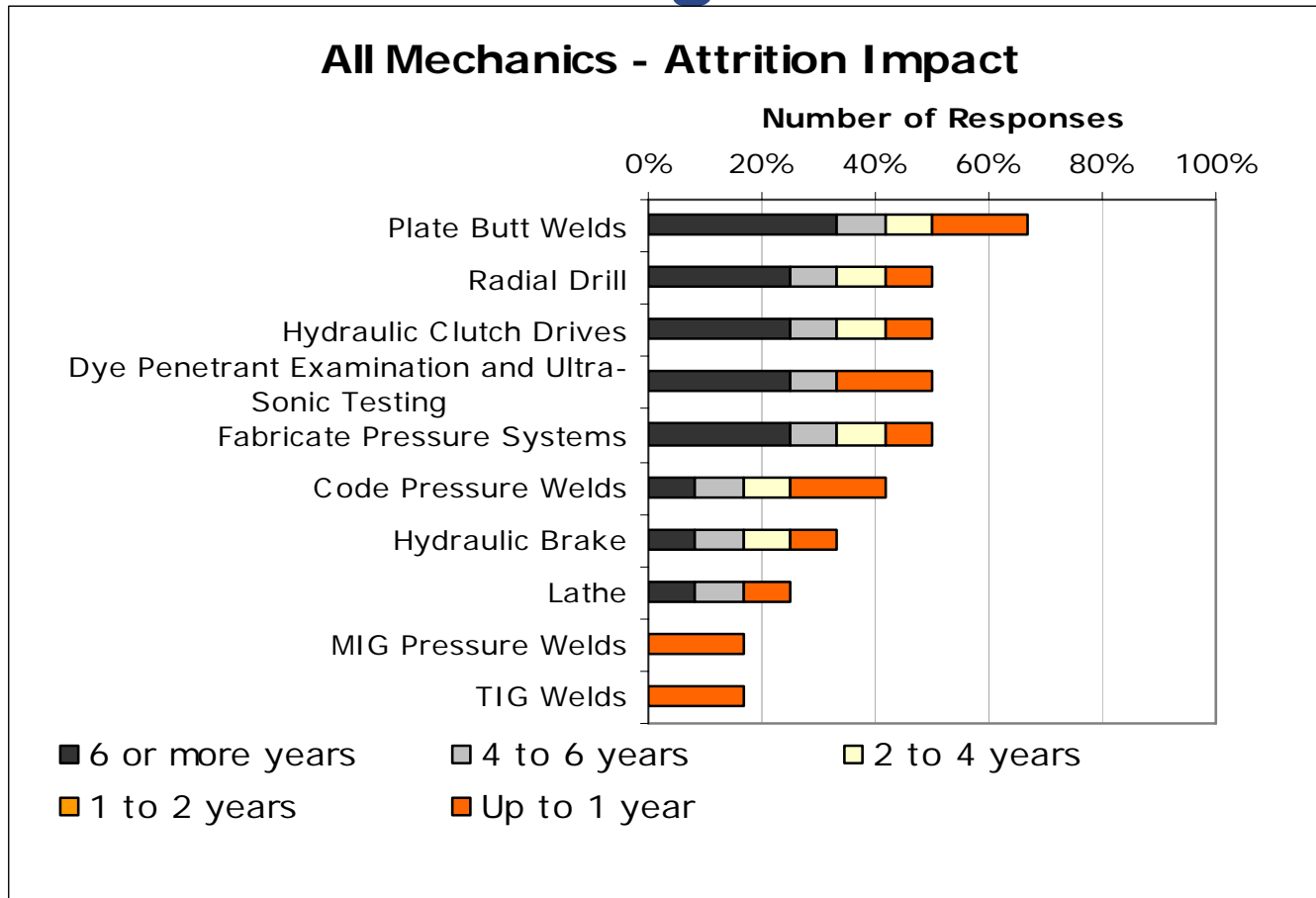


*Typical results of the workforce certainty analysis*

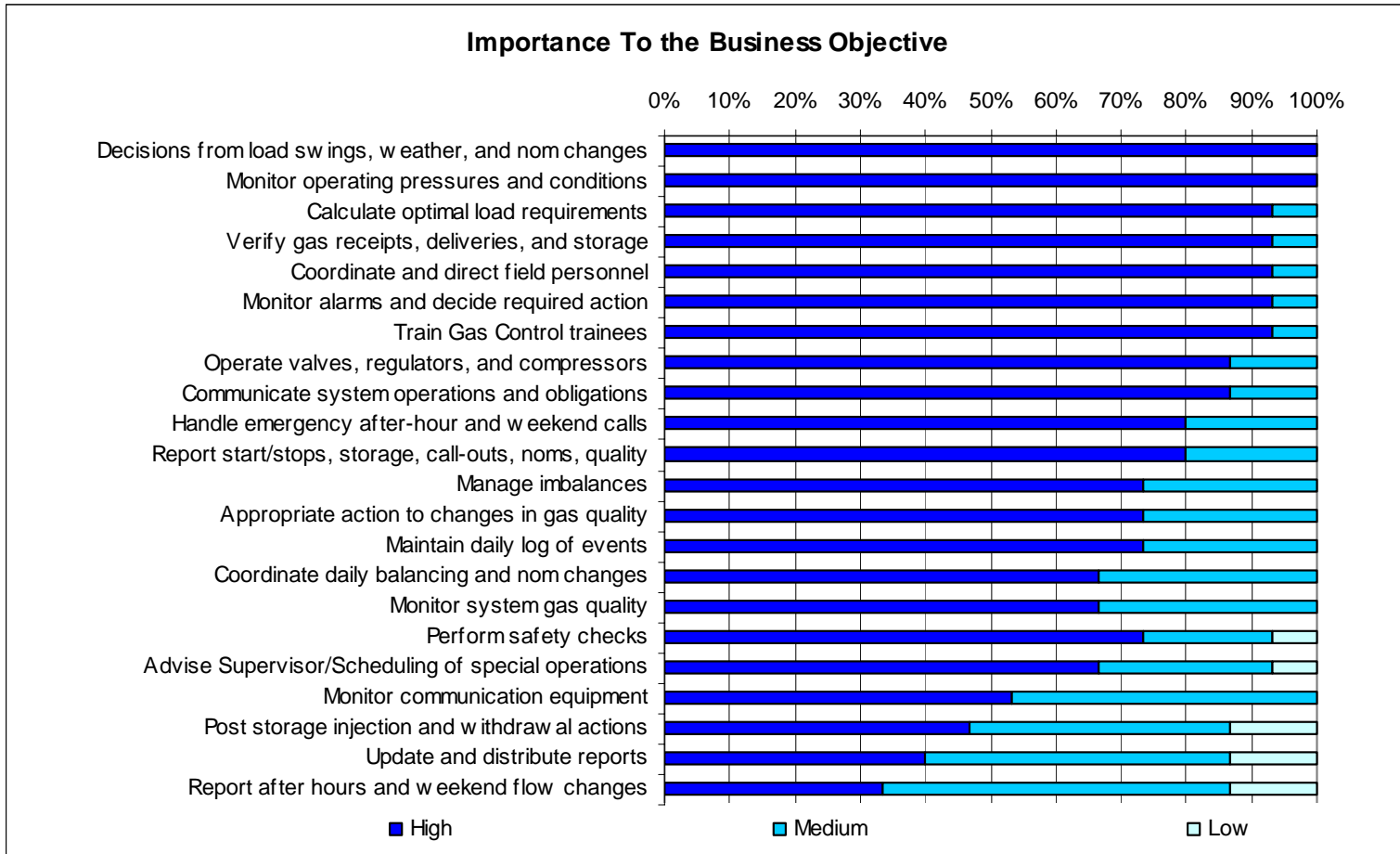
# Skill Self-assessment Reveals Areas of Limited Skill Depth



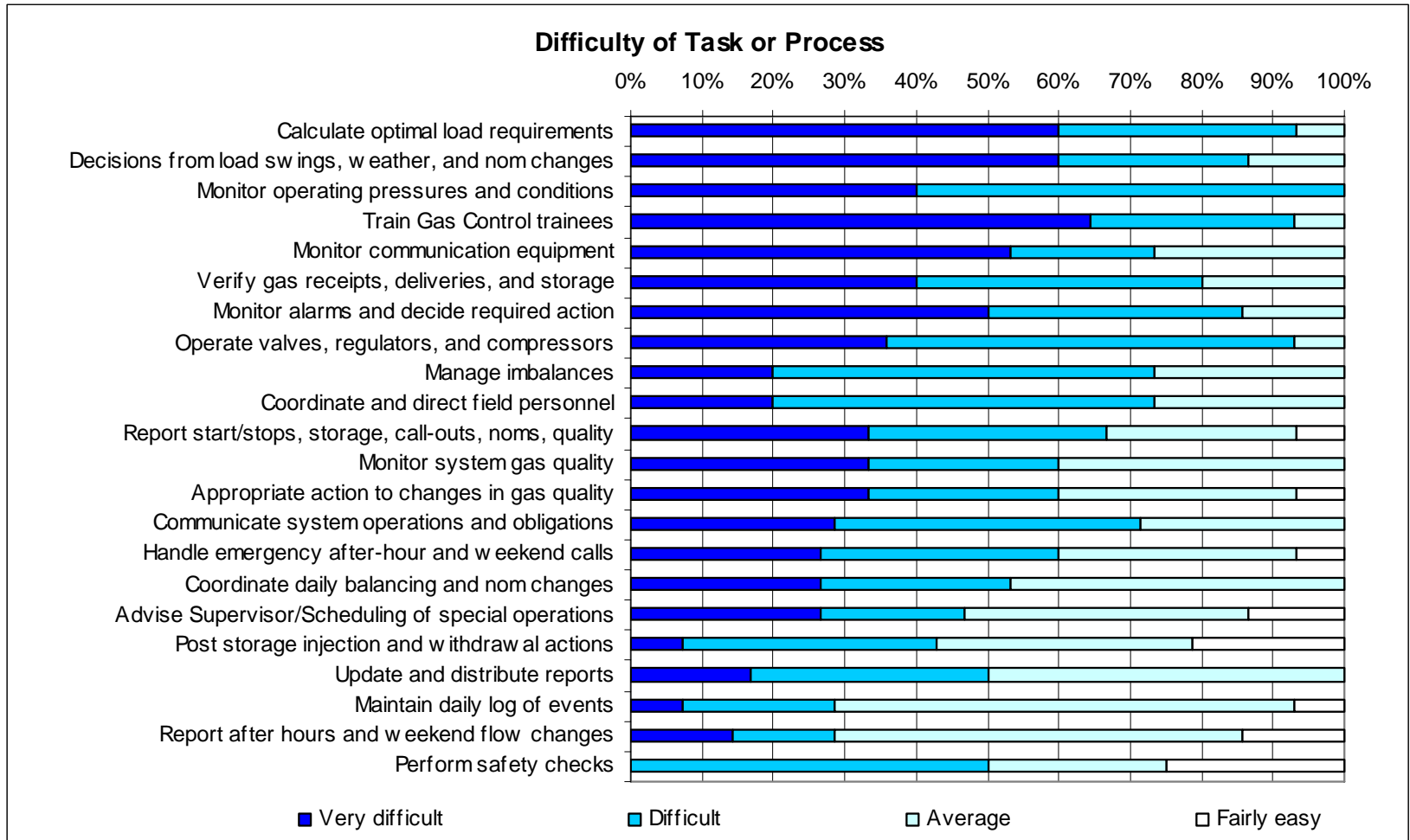
# Attrition Can Take a Large Portion of the Existing Skill Set



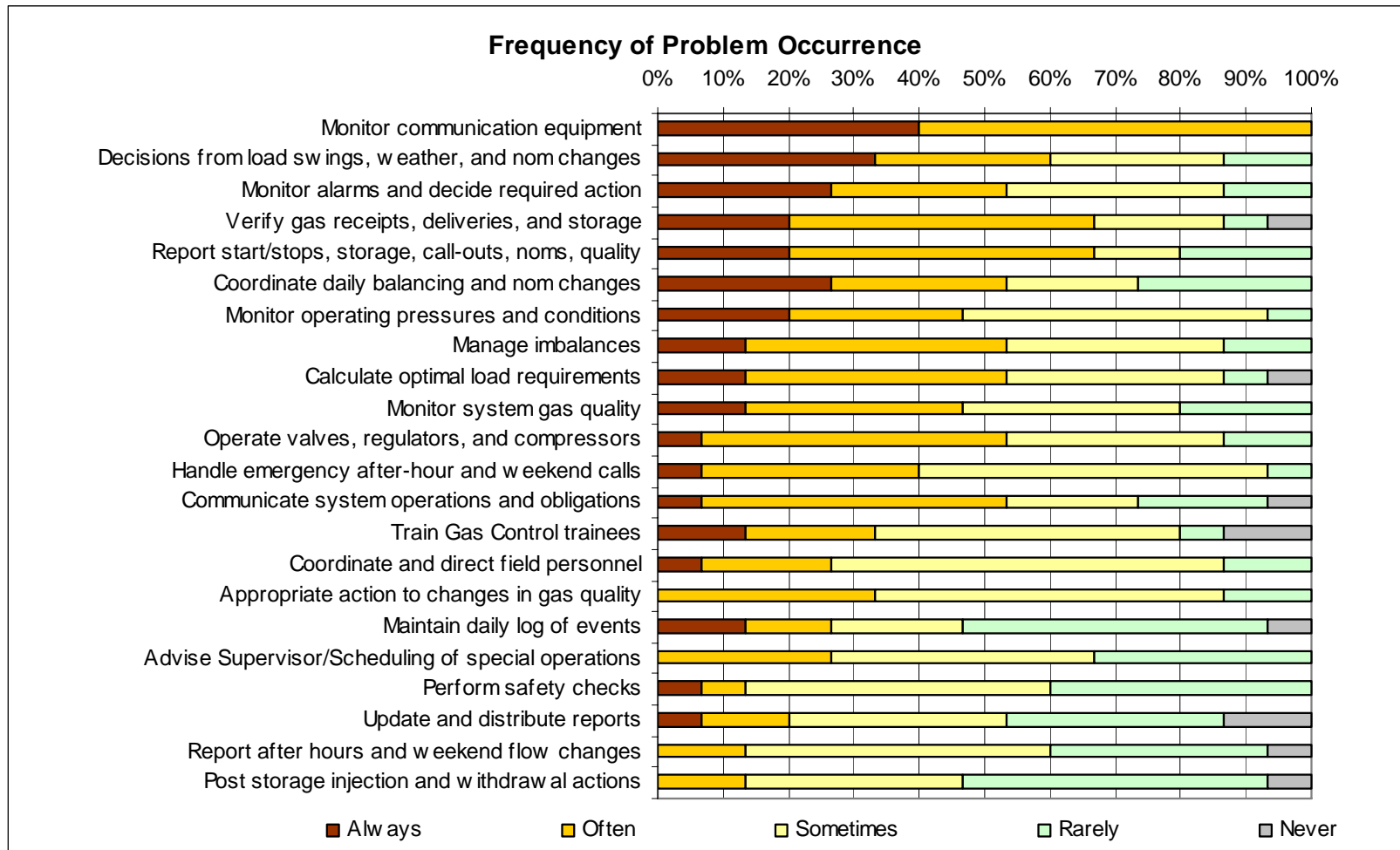
# Gas Controller Case Study



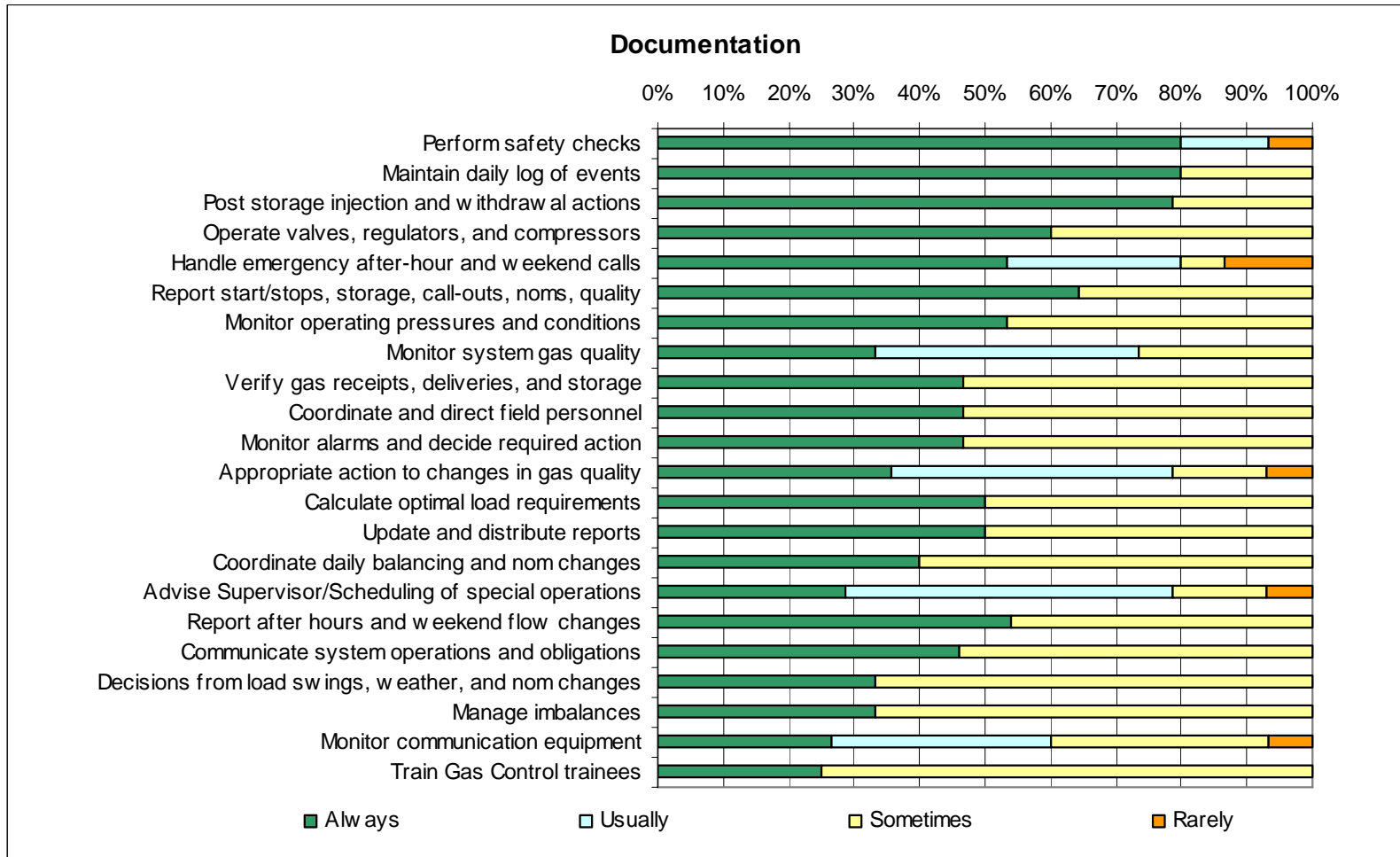
# Gas Controller Case Study (Cont.)



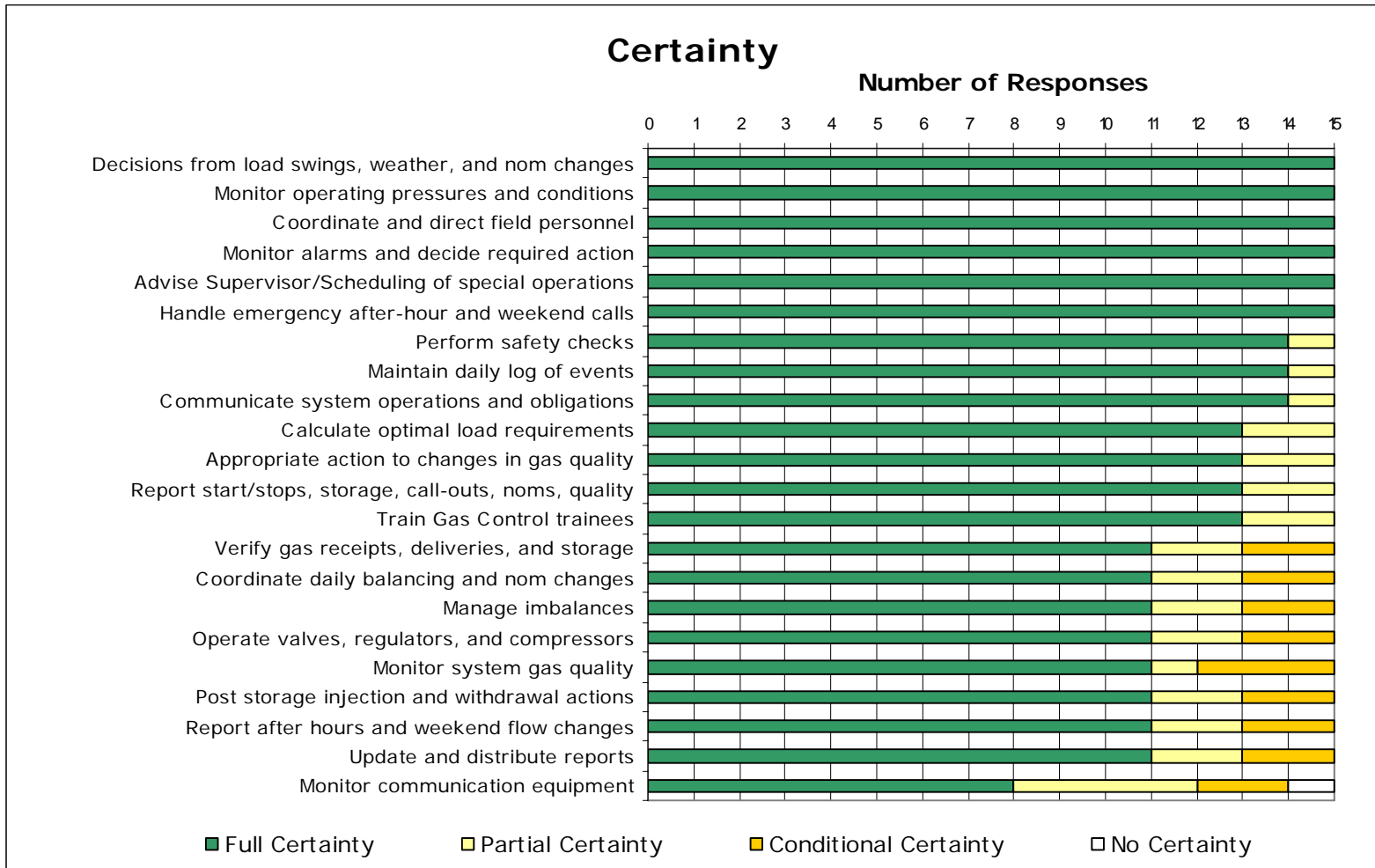
# Gas Controller Case Study (Cont.)



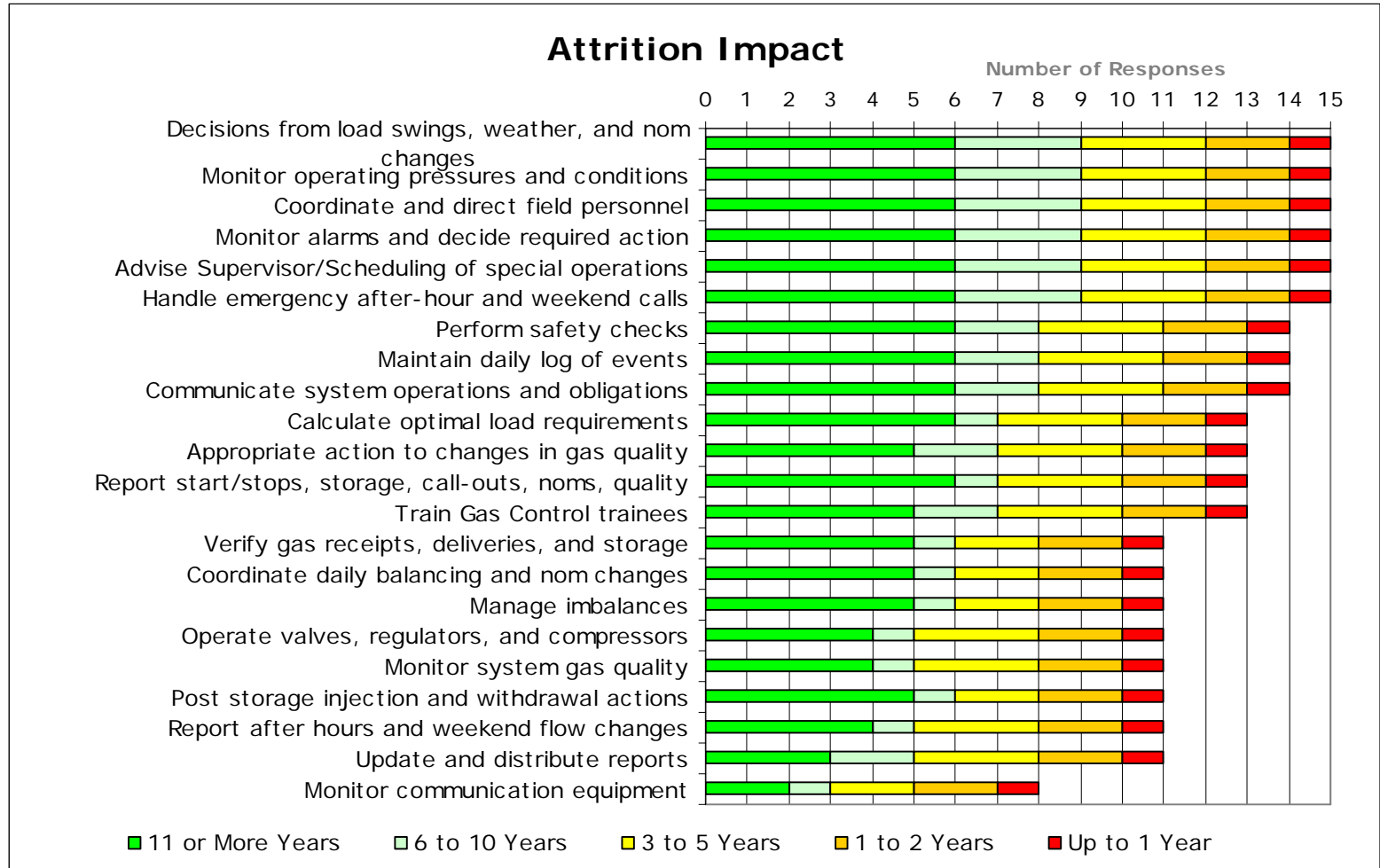
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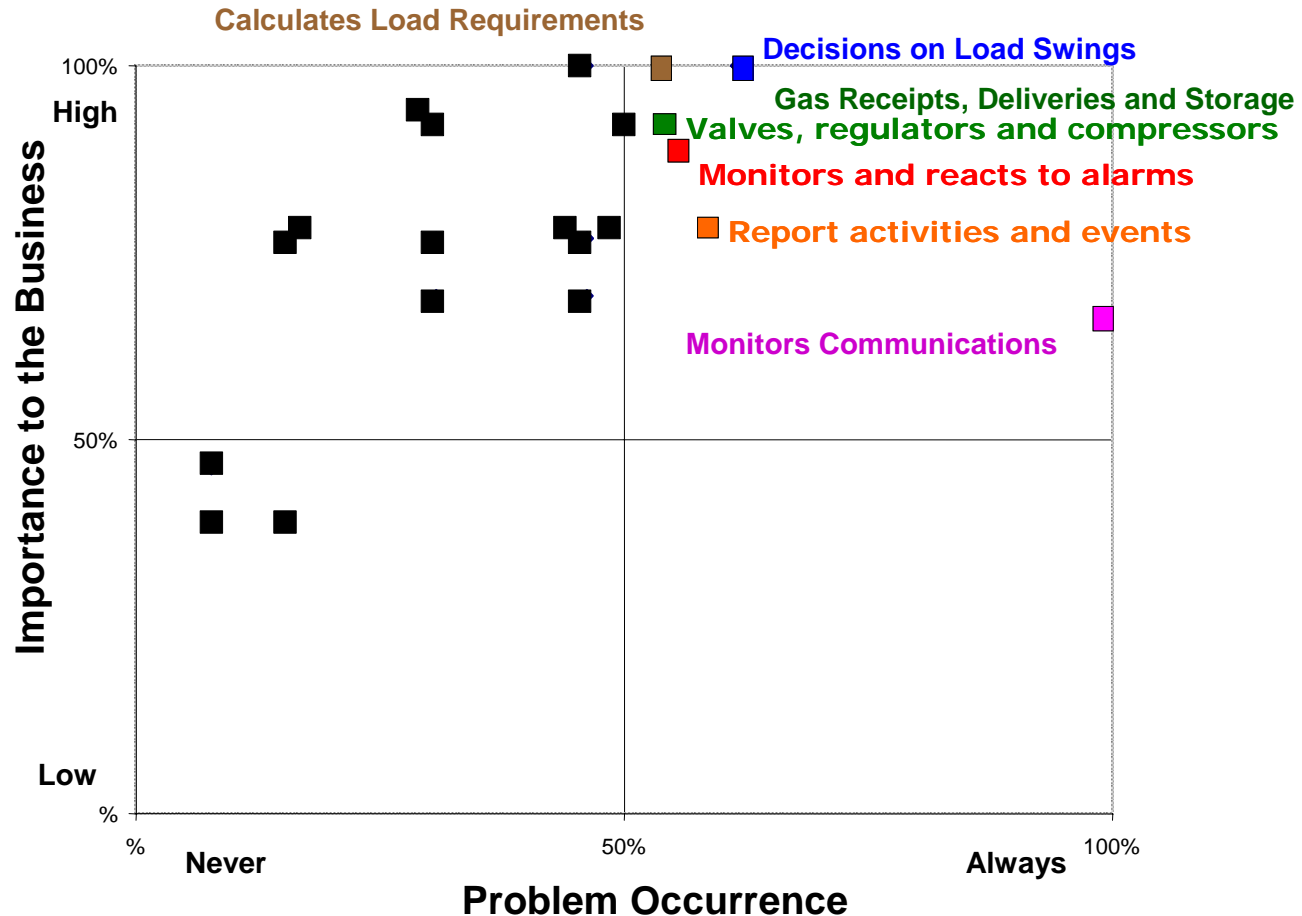
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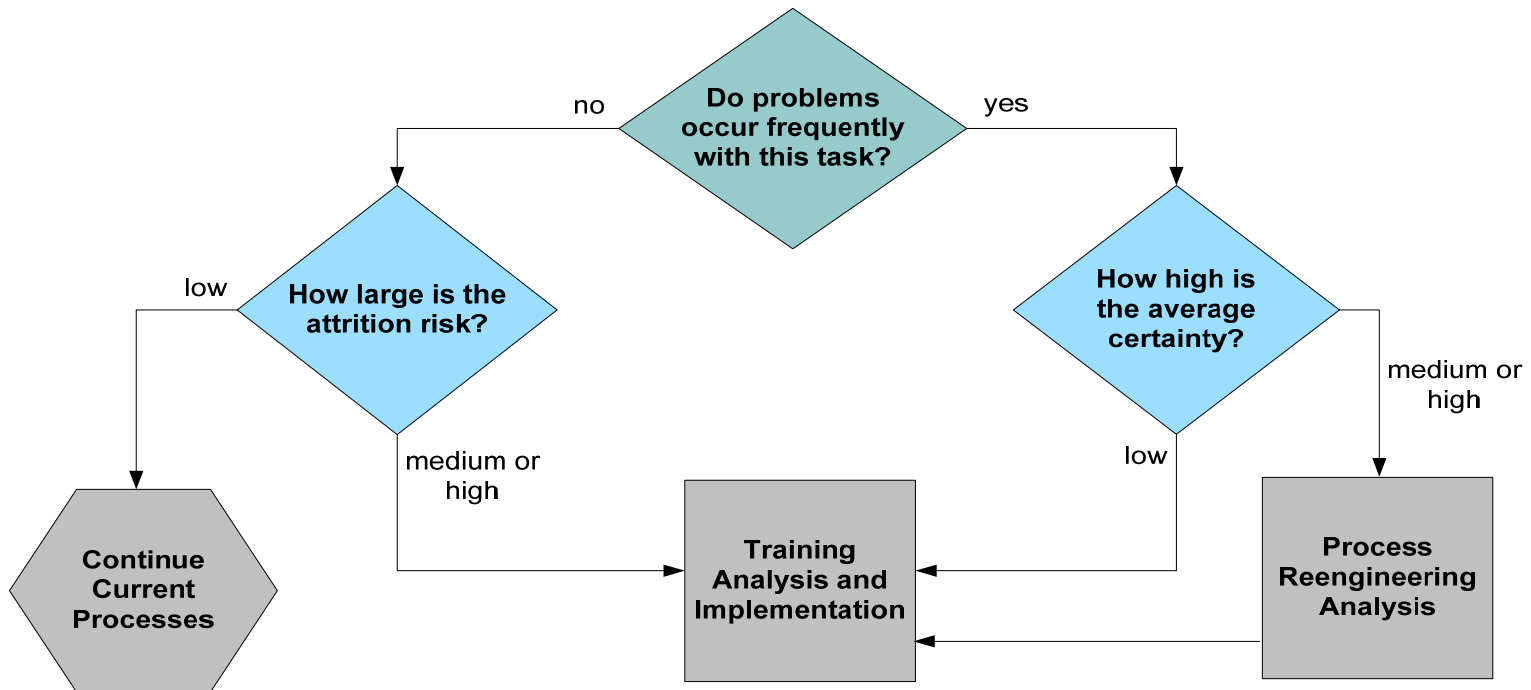
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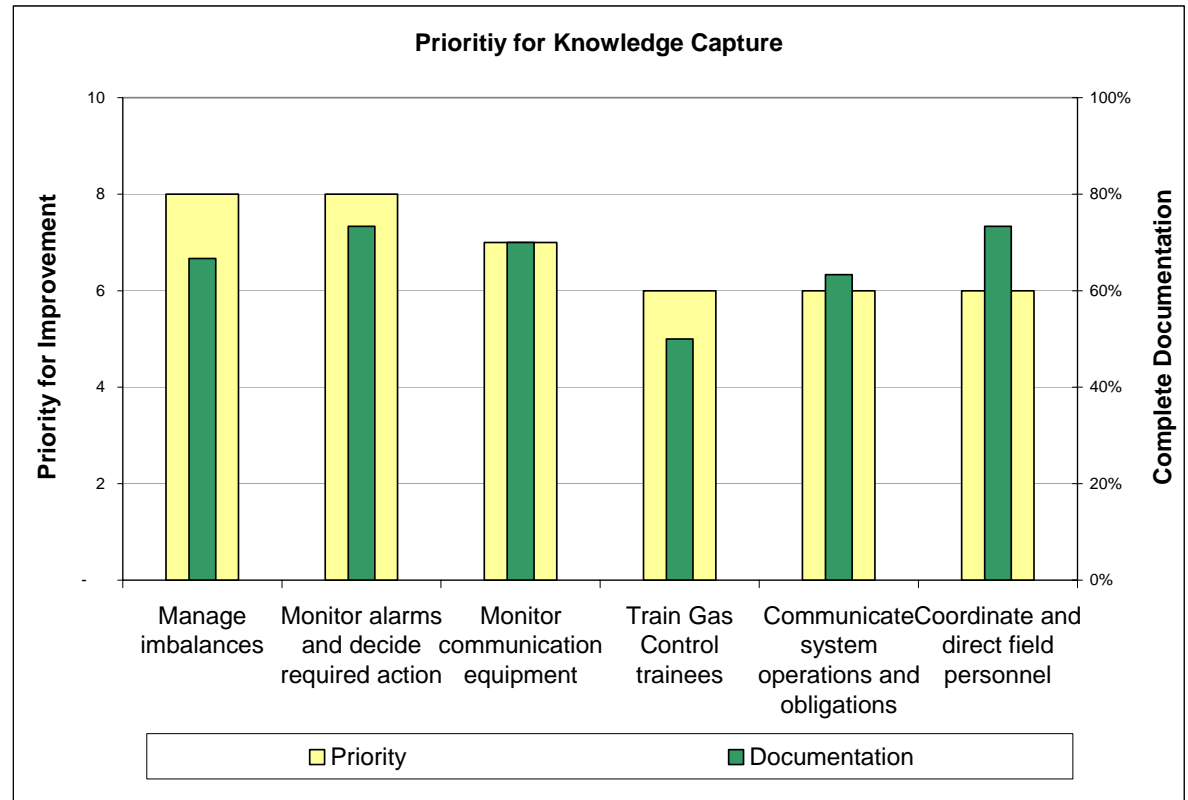
# Analyze the Data



# Knowledge Capture Priorities

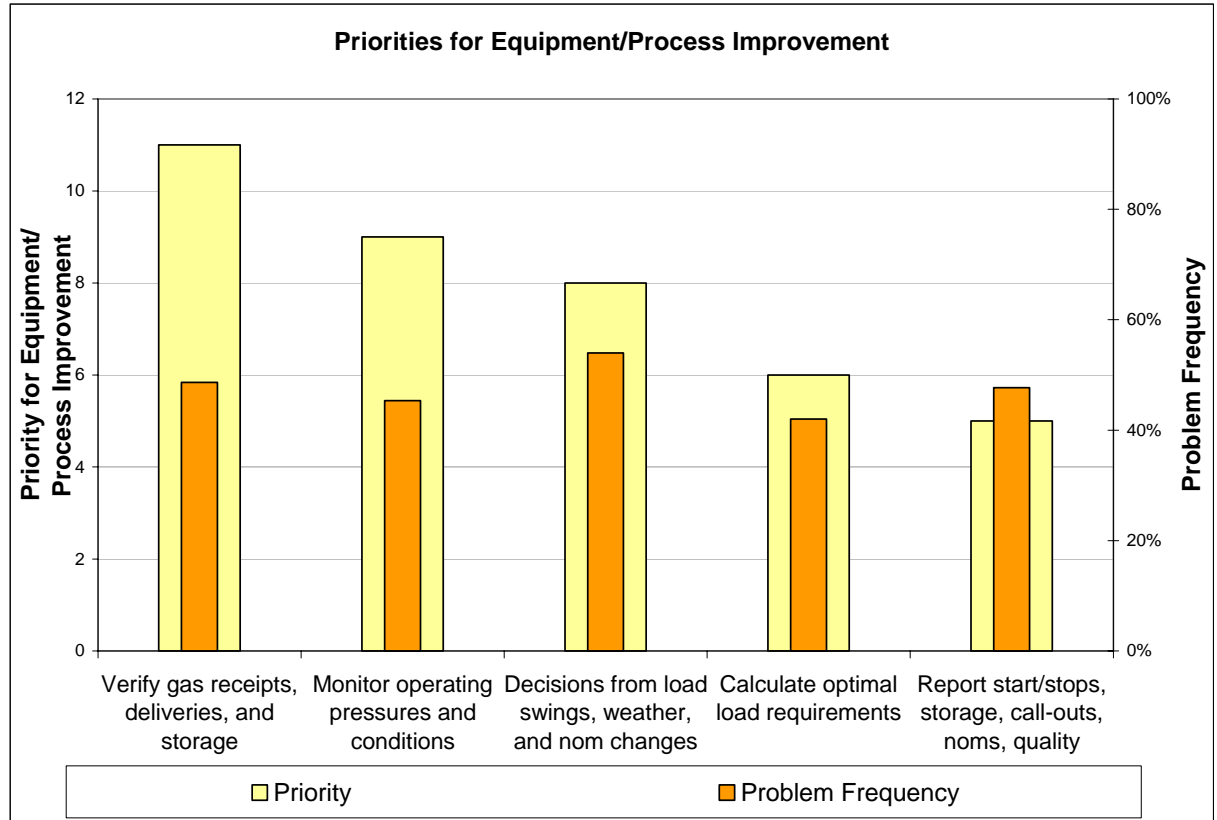
## ○ Priorities are based on:

- Level of present Standards
- Attrition Risk
- Problem Occurrence
- Business Importance
- Frequency of Task



# Priorities for Process Improvement

- Priorities are based on:
  - Medium or high level of present Standards, and
  - High Certainty, and
  - High Problem Occurrence



# Knowledge Types

## Explicit – 30%

- Articulated and encoded
- Visible knowledge such as procedure manuals, formal documents, etc.

## Tacit – 70%

- That which is known to you that is difficult to share with someone else
- Pragmatic and situation specific
- Gained through personal experience

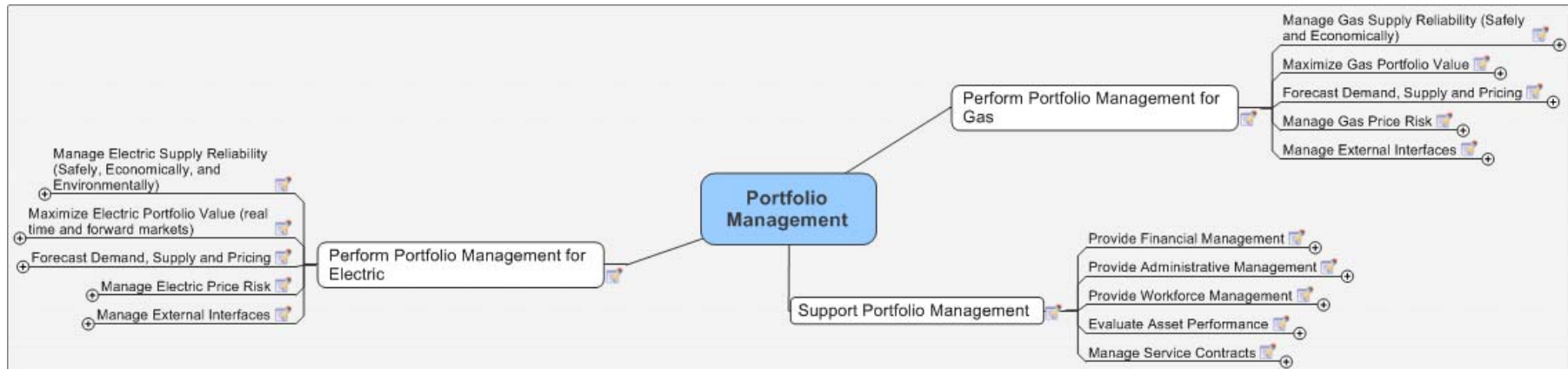
# Knowledge Capture: Codification

Taking what is abstract and putting it into a “congealed” form

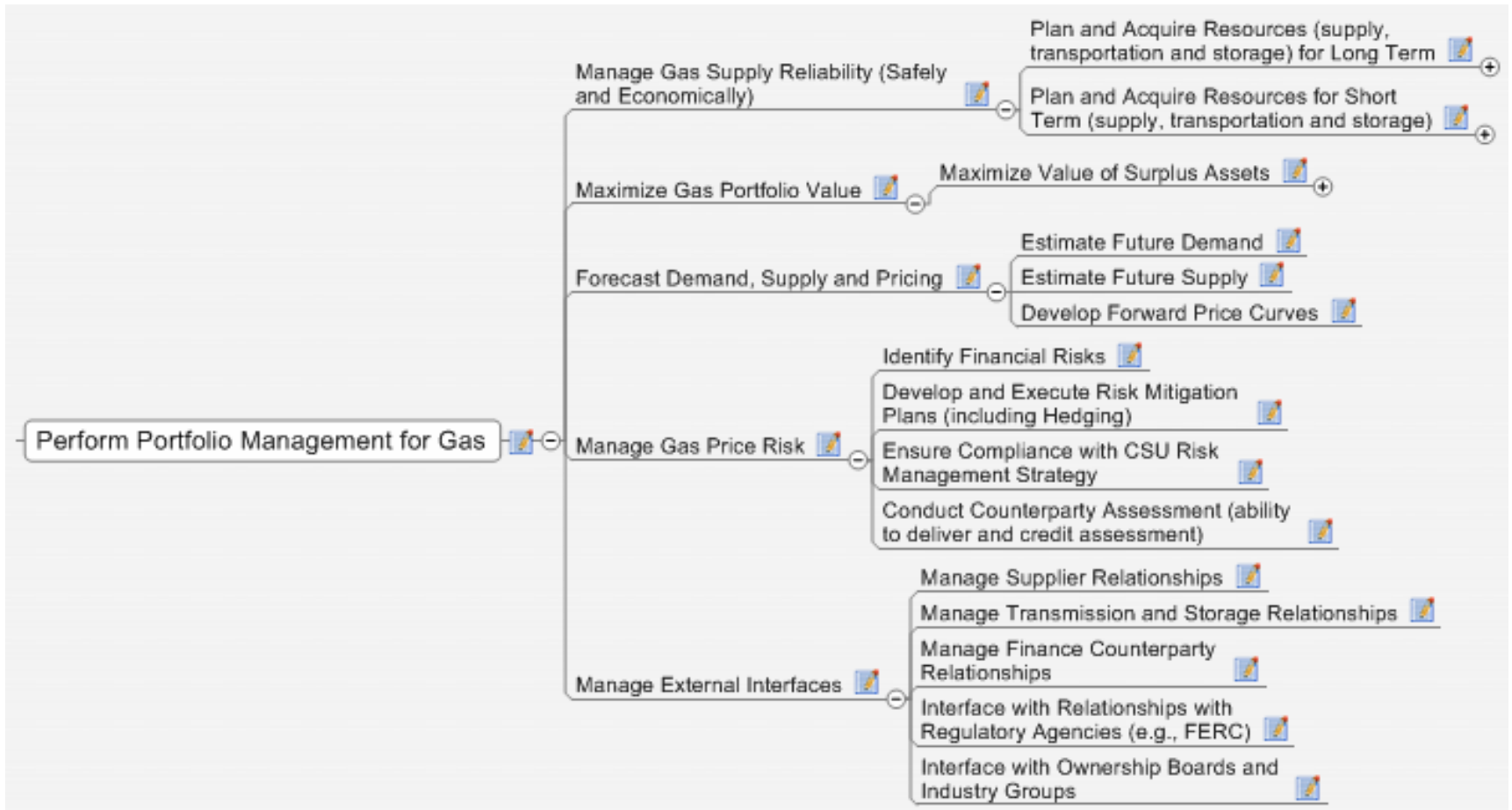
5% of what an employee knows is captured and made accessible to others

- Data mining & best practices
- Process flows and procedural documentation
- Performance support tools (Job aids, decision trees, etc.)
- Formal training
- Worked examples that illustrate thought process

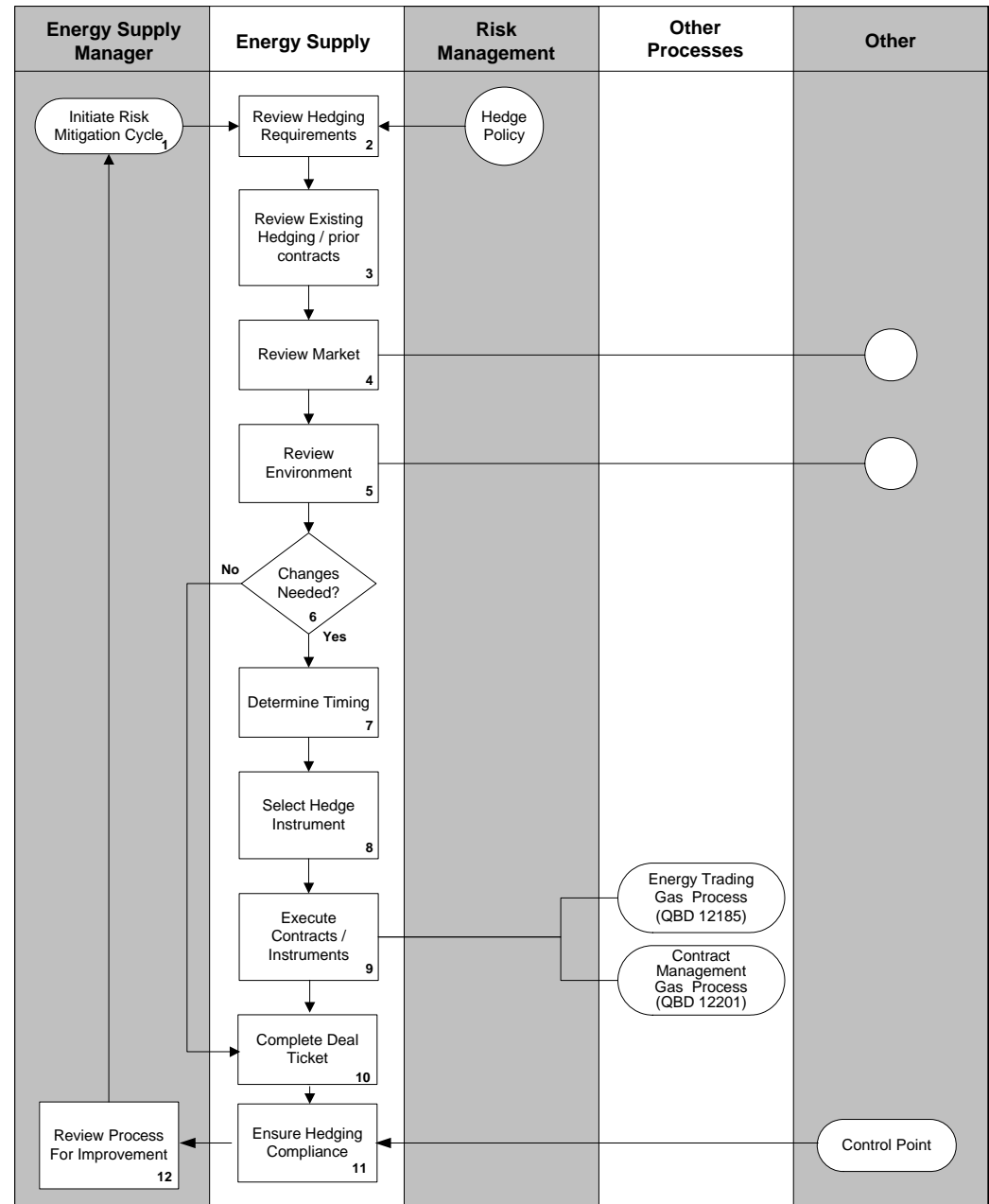
# Define What Areas to Focus On



# Process Identification



# Gas Supply Risk Mitigation Process



# Process Description Example

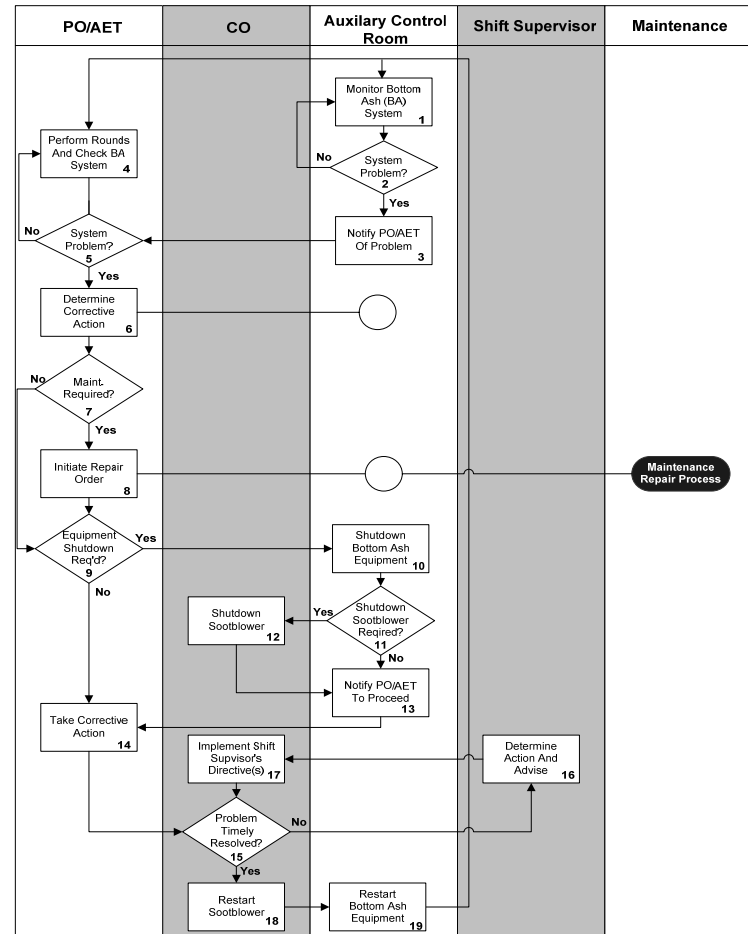
Step #	Process Step	Description
1	Initiate Risk Mitigation Cycle	<p>Energy Supply Manager:</p> <ul style="list-style-type: none"> <li>Initiate risk mitigation assessment cycle per the following:                             <ul style="list-style-type: none"> <li>Electric Risk and impact is assessed twice yearly (2X).</li> <li>Gas Supply Risk is assessed six times yearly (6X).</li> </ul> </li> <li>For Electric risk assessment and its impact on gas supply for generation, assume coal and hydro power generation resources are scheduled at maximum levels.</li> </ul>
2	Review Risk Policy	<p>Energy Supply:</p> <ul style="list-style-type: none"> <li>Review Risk Policy and determine the minimum levels of hedging required by the policy.</li> <li>Review the required hedging levels by time period.</li> </ul>
3	Review Existing Contracts (including hedging)	<p>Energy Supply:</p> <ul style="list-style-type: none"> <li>Review existing gas supply contracts.</li> <li>Review current hedging instruments.</li> <li>Determine existing hedging levels and additional hedging levels that may be required to meet minimum requirements.</li> </ul>

# Process Improvement Example

Before



After



# Process Analysis Example

Process Step	Issues	Impact	Recommended Solutions	To Be Implemented	Responsible Person	Due Date
1. Establish and Program Sootblowing Sequence	Operators do not understand automation logic of system.	Operators do not have easily accessible information on what area will be blown next.	1. Engineering needs to develop and provide the automated sootblowing system operations information to understand how the system operates.	Yes ___ No ___ Additional Investigation ___		
		Operators do not have a clear understanding on how to utilize computer screens and how to easily get to each screen.	1. Engineering to provide one-on-one training to the control room operators on system operations.	Yes ___ No ___ Additional Investigation ___		
		Operators spend more time on manual sootblowing from the local station.	1. Engineering to reprogram the “log” page to make it more user-friendly for both inputting and retrieving data.	Yes ___ No ___ Additional Investigation ___		

# Knowledge Transfer Methods

**Translating the codified description (Explicit) into experience or contextualizing its meaning (Tacit)**

- Demonstrations
- Action learning projects; problem finding, problem solving, innovation
- Communities of practice & project communities
- Job shadowing/simulation
- Mentoring & coaching
- Online decision support & peer review
- Storytelling and scenario-based learning

# Summary

- The successful organization recognizes that the number one asset they have is the skills and knowledge that is imbedded in its workforce and in the future will be proactive in addressing and meeting the challenges of:
  - The loss of skills and knowledge to the organization and the impact of this loss
  - Set in place specific strategies to address this loss of both skills and knowledge