

Plugging the “Brain Drain:” How the Power and Utilities Sector Can Use SaaS to Manage Mass Retirement and Knowledge Loss

Executive Summary

An imminent knowledge crisis looms before the utilities industry. By 2020, more than half of all experts in utility management roles will have retired, and studies predict that there will not be enough new blood to fill the gap. Why? The Baby Boomer generation currently managing electrical utility assets is on the brink of retirement, and fewer and fewer Millennials are entering the field. Younger hires who do opt for a career in utilities are eager to learn and grow professionally but typically expect an environment that fosters such development. Organizations can use a combination of interpersonal, organizational and technological strategies to recruit, train, develop and retain new hires. This white paper focuses on the use of Software as a Service (SaaS) tools to enable transitions, transfer knowledge and help those on the verge of retirement provide incoming managers with a launchpad for successful careers in 2020... and beyond.

The Brain Drain

HOW WILL NEW UTILITY MANAGERS COLLATE AND PRESENT THE VAST POOLS OF DATA ACCUMULATED OVER ENTIRE CAREERS?

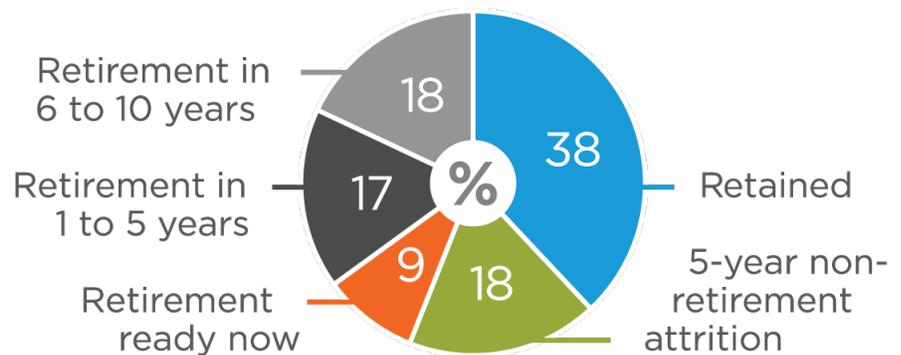
The consensus is clear: the utilities sector is facing a critical knowledge loss. The Power and Utilities sector expects a higher rate of projected retirement than the rest of the energy industry with an estimated loss of 52 percent of skilled engineers by 2020. The industry has managed to mitigate the impact of some of these losses (often termed “The Brain Drain”) through postponed retirements or by bringing retirees back to their former workplaces as consultants^{1,2}.

This model is, of course, unsustainable.

Who, then, will be the heirs to the utility management sector? How will new utility managers collate and present the vast pools of data accumulated over entire careers? How will new managers be effective in an ever-changing technological landscape? And, ultimately, how can utility managers plan to leave a legacy of effective management knowledge to an entire generation of new managers?

The Brain Drain is happening at a time of already significant change in the industry. National adoption of The Smart Grid and the Internet of Things—the interconnection between computers and objects that enables communication between devices—coupled with the switch to cloud-based report management software is transforming the way utility managers collect and process data about their assets³.

Figure 1: Forecasts suggest that 62% of the workforce could disappear by 2020



Source: *Gaps in the Energy Workforce Pipeline: 2011 CEWD Survey Results*

1. Pollack, J. (2012). Responding to an ageing workforce and the implications for engineering management. Presented at the 2012 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM) in Hong Kong.

2. Putting the Success in Succession: Power and Utilities Sector Edition. PricewaterhouseCoopers, 2014. Print.

3. Whitten, L. (2013, November). Cloud Computing 101: Need-to-know info for electric utilities. *Electricity Today*, 8-11.

A Substantial Shift in Workforce Demographics

WHAT IS THE DISTINCTION BETWEEN EXPLICIT KNOWLEDGE AND TACIT KNOWLEDGE?

While succession planning is indeed complex, this current transformation from file cabinet to cloud may actually be priming the utilities sector for its new wave of managers—Millennials.

It is important to recognize that there is a distinction between explicit knowledge and tacit knowledge. Explicit knowledge refers to codified and widely taught rules, best practices, and information about a skill or role. This form of knowledge can be learned through study and research. Tacit knowledge refers to the expertise that is found in the minds and practices of experts within a field that cannot be easily taught or written. Tacit knowledge is learned through trial and error, focused practice, and the observation and imitation involved in apprenticeships and mentorships.

Incoming managers may be able to study for many of the practical aspects of their new roles through explicit learning methods, but as Baby Boomers leave the workforce, much of their tacit knowledge and experience leaves with them. This net loss of tacit knowledge is the crux of the attrition problem.

Many utility management roles will be necessarily eliminated because the pool of potential recruits is so shallow. This unprecedented loss of expertise, coupled with the dearth of qualified replacements from within the sector⁴, means that management positions will probably be filled by outside hires—Millennials who will enter these roles through very different channels than those of their predecessors.

Mentorships and Web-based Initiatives

WHAT DO MILLENNIALS ENTERING THE FIELD WANT AND EXPECT FROM THEIR ROLES?

Retaining these new hires will be challenging if knowledge transfer is not intuitive to their learning methods. In fact, only 18 percent of Millennials in the utilities industry intend to stay with their current employer. Contrary to the myths about Millennials, members of the emerging generation of leaders do seek out challenging careers—and are prepared to work hard to succeed in them.

That said, new managers from outside the industry will almost certainly have a different approach to reliability than current utility managers. Millennials share an inherent knowledge of the internet and native understanding of cloud-based computing. Much of their secondary and tertiary learning has been focused on mentorship and pragmatic research. Figure 2 shows that they value professional growth and want to learn new skills as a means for promotion^{5,6}, and—much like previous generations—value training and the guidance of experienced mentors⁷.

The key difference between current utility managers and Millennials is that the incoming generation thrives on flexibility—they learn primarily through exploration and almost exclusively through web-based searches and applications. To ease transition and retain new blood, career preparation in the utilities field should include software that not only affords those benefits but also encourages customization.

Figure 2: Millennials entering the field have different needs and expectations than previous generations

UNDERSTANDING GENERATION DIFFERENCES

Baby Boomer	Generation X	Generation Y
Born 1946–1964	Born 1965–1980	Born 1981–1993
TV	PC	Internet
Have technology	Use technology	Raised on technology
Comfortable with print	Computer savvy; expect up-to-date technology	Believe all information is a click away
Value ongoing training to keep skills up to date	Value skill-development training and accumulating transferable job skills	Thrive on flexibility and space to explore
Want to feel needed; want to be recognized for personal contributions	Like immediate tangible rewards	Seek to make a difference; desire to be a hero
Willing to mentor younger workers, but expect younger people to “pay their dues”	Enjoy freedom to get the job done in their own way	Partner well with mentors
Are process-oriented	Desire flexibility	Value guidance

5. Zagenczyk, T., Gibney, R., Few, W. W., & Scott, K. (2011). Psychological contracts and organizational identification: The mediating effect of perceived organizational support. *Journal of Labor Research*, 32, 254-281.

6. Linden, S. (2015). *Job Expectations of Employees in the Millennial Generation* (Doctoral dissertation, Walden University).

7. Grice, A., Peer, J. M., & Morris, G. T. (2011). Today's aging workforce — Who will fill their shoes? 2011 64th Annual Conference for Protective Relay Engineers.

Legacy Systems: A Barrier to Knowledge transfer

HOW DO OUTDATED SYSTEMS LIMIT KNOWLEDGE TRANSFER?

Millennials entering the utilities industry will come prepared for a modern and technologically literate workplace. What they will find, however, is an industry mired in legacy systems and traditional methods of data processing. These outmoded processes are common, especially at the substation-manager level.

Dated or bloated software systems used for test data—if they aren't intuitive or customizable—are as challenging for new users to navigate as paper-based records. Purpose-built software from the early 2000s, for example, is not compatible enough nor customizable enough to compete with modern SaaS solutions.

For current managers to facilitate a timely, precise knowledge transfer, they must stop relying on legacy systems. As time passes, platform obsolescence and inherent incompatibility with newer systems will frustrate incoming talent. With limited tacit knowledge, and without the heuristics developed over a career of analysis and problem-solving, new managers may become overwhelmed by the mess of data. This could lead to attrition and resignations, or worse—critical errors may be missed, leading to system failures, significant downtime and some very expensive repairs.

WHY ARE SOME ORGANIZATIONS NOT INVESTING IN REPLACEMENT SYSTEMS?

There is resistance to replacing legacy systems with newer systems because the initial and ongoing costs involved in switching to a SaaS solution are perceived as too high⁸. But SaaS solutions are often much less expensive than traditional software products, and cloud-based software investments solve multiple attrition problems. In addition to simplifying mentor-to-trainee transitions for the monitoring of substations, sophisticated software simplifies working processes and reporting, filling the gap created when workers retire and are not replaced⁹. In other words, it may be possible to run a tighter ship if SaaS report management software does much of the analytical heavy lifting.

8. Sandborn, P. A., & Prabhakar, V. J. (2015). The Forecasting and Impact of the Loss of Critical Human Skills Necessary for Supporting Legacy Systems. *IEEE Transactions on Engineering Management*, 62 (3), 361-371.

9. Bishop, W., Jr. (2005, January 5). Preventing Knowledge Loss As More Utility Workers Retire. *Electric Light & Power*.

A Methodology for Data Management

HOW DO OUTGOING MANAGERS TRANSFER KNOWLEDGE TO INCOMING MANAGERS?

The transfer of implicit knowledge is notoriously difficult and involves mentorship and collaboration between mentors and mentees¹⁰, especially in the utilities sector. For utility managers, a clear knowledge of the fleet of electrical assets they manage can be the difference between a reliable operation and one facing shutdown due to unforeseen failure of a key component.

Transferring this expertise often requires a highly organized—and well documented—methodology for data management. The ability to observe trends in test data and analyze multiple reports is a component of long-term planning; long-term planning is an aspect of management expertise rather than a line item in an individual record. As such, many utility managers on the brink of retirement are utilizing third-party SaaS software to help the new wave of managers collate their data and manage their assets intelligently.

That said, SaaS solutions are not a panacea. Some of the expertise needed to manage substations can only be learned over the course of a successful career, and there are several tried-and-tested forms of human interaction that are required for successful succession management. The method of concept mapping, for example—diagrammatic explication of key processes, product knowledge and structures within a company—is especially useful as a baseline for new hires, and libraries of key documents are invaluable as reference banks¹¹.

10. Perjanik, N. S. (2016). Tacit Knowledge Capture and the Brain-Drain at Electrical Utilities (Doctoral dissertation, Walden University)

11. Schafermeyer, R. G., & Hoffman, R. R. (2016). Using Knowledge Libraries to Transfer Expert Knowledge. *IEEE Intelligent Systems*, 31(2), 89-93

Cloud-based Utility Management Software

WHAT ARE THE BENEFITS OF CLOUD-BASED ELECTRICAL ASSET MANAGEMENT SOFTWARE?

Substantial technological transition is not a new concept to the utilities industry, and utility managers on the verge of retirement will remember the introduction of computers in the 1960s and 1970s, which had a significant impact on data management in the field¹². The recent transition to The Smart Grid is mirrored, partly, by an industry-wide transition to cloud computing.

Utility companies are transitioning to cloud-based software to future-proof their assets and to prepare for the transition from an aging workforce to a young workforce. The switch is seemingly inevitable, and managers should commit to the switch to provide a legacy to their heirs and to continue to protect assets well into their retirement.

Cloud-based electrical asset management software affords:

- Inexpensive and continually updated access to powerful reporting tools
- Intuitive web-based platforms available from anywhere
- Interactivity with larger-scale data analysis that can benefit users
- Simple-to-learn interfaces and easy-to-read reporting for new hires
- Immediate notification when there is a fault or problem in the system

Recommendations

Electrical power management is a high-stakes endeavor. With the cost of equipment failure potentially resulting in crippling downtime for any organization, specialized knowledge transfer must be thorough and effective, and it is essential for utility managers to plan beyond their retirement to ensure that it is. There is nobody more qualified to mitigate knowledge loss than utility managers themselves if they embrace the challenge of mentorship and education as a significant aspect of their current role.

As the industry faces changes in the form of human capital and the moving target of evolving technology, there are three key considerations to managing knowledge transfer:

1. INTERPERSONAL CONSIDERATIONS

Emphasize the mentor/mentee relationship.

Conversations between experts and their proteges remain the most valuable way of transferring explicit knowledge, and myriad research on tacit knowledge emphasizes the many ways in which this can be effective¹³. Methods include:

- Emphasize mentorships as an essential component of the transition
- Plan regular and ad-hoc meetings with structured/phased succession requirements
- Use concept mapping, diagramming and modeling job role requirements
- Create access to SMEs and expert communities
- Provide digital access to knowledge repositories as well as reporting and testing software

1. ORGANIZATIONAL CONSIDERATIONS

Identify and nurture internal talent and create outreach programs.

As engineers retire and leave the industry, it becomes increasingly important for companies to commit to developing internal expertise. Company directors recognize this need, and many are already testing succession planning strategies that focus on developing leadership internally¹⁴. Organizational promotion and recruitment methods include:

- Focus on long-term workforce needs
- Recognize young talent early
- Create interest in the field by participating in mentorship programs
- Sponsor senior design projects
- Emphasize mentorship programs
- Attend career fairs

13. Perjanik, N. S. (2016). Tacit Knowledge Capture and the Brain-Drain at Electrical Utilities (Doctoral dissertation, Walden University)

14. Putting the Success in Succession: Power and Utilities Sector Edition. PricewaterhouseCoopers, 2014. Print.

3. TECHNOLOGICAL CONSIDERATIONS

Implement fully customizable cloud-based SaaS utility management software.

Managers switch to using intuitive software to:

- Eliminate paperwork by replacing paper records with critical data
- Simplify the transition process by providing intuitive, searchable and digitally available data, records and reports to new hires immediately
- Allow new hires the capability of running immediate sophisticated analyses
- Provide a safety net for new managers without the decades of utility management experience
- Leave a legacy of reliability by bringing the operation up to speed with current cloud-based technology
- Collate disparate elements of reporting data that would otherwise be difficult to categorize and recover

Summary

Successful succession management is essential for knowledge transfer. Without a strategy for replacing half of the utility management workforce by 2020 with competent, capable new hires, there is the potential for a crisis in the utility sector. By instigating interpersonal, organizational and technological considerations to address the problem, young replacements for the current group of experts will continue to manage substations and electrical assets effectively.

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