

The Importance Of Capturing Knowledge

Integration Objects

Knowing how to collect and manage the necessary information is where meta-knowledge becomes useful, because ultimately, data and information is valueless unless it is acted upon.

As the global economy begins to recover and competition increases, companies are more stressed than ever due to increasing complexity and plant incidents. Adding to the stress are the continuous departures of experts from the industry. A strong majority of the existing workforce will be eligible for retirement in the next 10 years, predict experts, leaving a large vacuum of needed professionals in the energy industries where there are already shortages.

As such, it has never been more important than now to capture the knowledge from these professionals and make it readily shareable before the expertise of their experience is lost forever.

Not only is it important to preserve the knowledge, but the real value is derived from applying it in decision support applications to enhance the role of the organization's personnel in the event of abnormal conditions. The U.S. National Institute of Standards and Technology (NIST) estimates that the inability of control systems and operating personnel in the process industries to control critical conditions costs the U.S. economy at least \$20 billion a year.

By making operational intelligence available, companies striving to better manage these conditions can minimize plant incidents primarily caused by human intervention due to insufficient knowledge, procedure, and operator errors.

Expertise required during times of need from the most qualified staff is not always available and is diminishing as a result of retirements and the lure of lucrative consultancy engagements. Over the next 5 years, approximately 45% of engineers in the electric utilities industry will be leaving the workforce, creating a void of 7,000 power engineers.

Michael Ohadi, interim president of the Petroleum Institute in Abu Dhabi, predicted in 2008 that the majority of employees are considering retirement, where up to 50% could potentially retire within 10 years. The average age of professionals in the oil industry is close to 50, there is already a 38% shortage of skilled petroleum engineers and geologists in the Middle East region, and countries each year are already investing billions of dollars on training and preparing its oil and gas workforce for the future.

In addition to the process and operational knowledge capture, another very important component is the information used by the engineers to construct the original plant and subsequent additions. Much of this information is available from

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the applications used in design and construction, but little attention has been provided to make it available after construction. Most would agree that this type of information and knowledge is of the utmost value.

So how can the priceless knowledge of these experts be captured and made readily available during an abnormal situation or to the benefit of incoming generations of operators? What types of knowledge are required and how can it become operational intelligence? Let's take a look at knowledge, the importance of meta knowledge, and their integral links to effective plant operations.

Operators, shift supervisors, production superintendents, operations managers, and engineers all make decisions that impact operations. However, many of them do not have access to the needed information in an optimal format. This can be especially obvious when quick response is required. Delays generated by multiple access points to obtain data and information can interfere with decision-making and problem resolution. The result is that operations personnel are not always fully empowered to make timely decisions to either prevent an abnormal condition or take advantage of an opportunity.

People and computer applications both depend on data and information, but effective decision-making requires more than merely data and information aligned in workflow processes. Rather, knowledge is the key ingredient. A classic figure describing the essential associations between data, information, and knowledge is shown below:

The ultimate goal is to obtain knowledge to assist in decision-making actions. This goal can be reached by building meta-knowledge, which is defined as "knowledge about knowledge," or as the understanding about the mechanisms necessary to acquire knowledge. Two examples of the need for meta-knowledge management are featured below:

Example 1 - Statistical Regression Models: Statistical regression model development requires knowledge of how to build the model and to directly introduce data into it

Example 2 - The Scientific Method: Knowledge is needed to propose a theory such as a model, testing the model against historical data and information, and inventing new experiments to test the theory.

Knowing how to collect and manage the necessary information is where meta-knowledge becomes useful, because ultimately, data and information is valueless unless it is acted upon. Actions are derived from the decisions needed to improve or correct operations. Finally, it is the meta knowledge of operational and manufacturing intelligence that enables effective or good recommendations for decisions. The timeliness and quality of these decisions will directly impact the bottom line.

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KnowledgeNet is a new generation of decision support technology that enables end-users to transform massive amount of data and information into actionable decisions timely to boost the bottom line and avoid any abnormal events. Users can build knowledge into the system so that KnowledgeNet can become the operations expert as it quickly identifies opportunities for operations improvements. It identifies root causes of problems when they arise and swiftly guides the end user in making the most effective decisions. Knowledge can be modeled and executed using KnowledgeNet's graphical rules, root cause analysis trees and workflow engines. Operations Managers use KnowledgeNet to detect and predict overall plant performance deviations, and identify the actual root cause so timely corrective action can be taken.

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