

UNLOCK TECHNICAL KNOWLEDGE

to Address the Energy Industry Knowledge & Experience Gap

Oil and gas companies, already challenged by fluctuating oil prices, rising capital costs and increased regulations, are confronting enormous demographic and experience shifts as older workers exit the business leaving a void of senior management and experienced engineers.

To maintain safe, efficient and reliable operations while also boosting innovation and profitability, oil and gas and other energy companies are seeking better ways to tap and leverage their organizational knowledge – and looking both within the industry and across other sectors for knowledge management tools and best practices.

At CERAWEEK 2017, international energy industry executives and leading members of the policy, financial, industrial, and technology communities, as well as leading institutional investors, gathered to discuss “*The Pace of Change: Building a New Energy Future.*” A cross-industry panel met to discuss “*The Race for Knowledge*” and exchanged ideas and lessons learned in the area of knowledge management.

Panelists Nabilah al-Tunisi, Chief Engineer with Saudi Aramco; David Meza, Chief Knowledge Architect with NASA; Jeff Patterson, Chief Operating Officer with ASME; and Michele Trogni, Executive Vice President with IHS Markit, identified common knowledge challenges shared across their industries including:

- › the need for readily accessible information
- › consistency in how information was gathered and stored
- › keeping up with technological advances; and
- › obtaining support for knowledge management.

Panelists recognized the direct impact of knowledge loss on a company’s bottom line and also underscored that executive leadership was more apt to champion proactive knowledge management when knowledge loss demonstrably impacted finances and/or productivity. In the oil and gas industry, up to 75% of offshore



drilling costs are due to engineering productivity constraints, such as frequent and last-minute project change orders and “broken learning curves,” according to McKinsey.

OIL & GAS KNOWLEDGE CHALLENGE #1: The Big Crew Change is sapping the industry’s corps of experienced engineers

Knowledge management has long been a central component of competitive strategy for companies across industries, but for oil and gas companies the need to discover and repurpose engineering expertise is particularly acute. Up to 50% of the existing workforce is anticipated to retire within the next seven years, thus “the Big Crew Change.” In addition, the oil and gas sector anticipates adding 1.2 million jobs over the next 13 years, requiring a significant transfer of knowledge.

Studies show that it can take up to eight years or longer to get a new worker up to speed and making nonstandard, original technical decisions. In the meantime, new engineers spend an inordinate amount of time hunting and pecking for information to help them make decisions. The cost for this inefficiency is staggering: PetroSkills estimates that \$35 billion is wasted, annually, in exploration and production due to The Big Crew Change.

Strategies to reduce project delays, minimize risk and prevent knowledge loss

OIL & GAS KNOWLEDGE CHALLENGE #2:
Technical knowledge remains scattered across the enterprise

Organizations waste up to 30% or more of their engineering and R&D resources duplicating work or repeating past mistakes.

To improve engineering productivity and efficacy, oil and gas companies must provide tools and knowledge that help engineers and other technical staff build upon past projects and lessons learned to solve problems faster and better. Despite significant investments in content management, Enterprise Resource Planning (ERP), and other enterprise systems, engineers continue to struggle to pinpoint the information they need. Finding and accessing information stored in repositories scattered across an organization is difficult at best. Yet, this knowledge is critical in an increasingly complex environment, where information from past projects is often buried in decades-old, non-integrated enterprise systems.

In fact, engineers can spend 40% or more of their time searching for information, often scouring a dozen or more systems to find the answer they seek – or worse, failing to find information critical to the project or task at hand.

Knowledge management initiatives can help engineers get at the information they need, when they need it, so that they can solve problems and deliver projects faster.

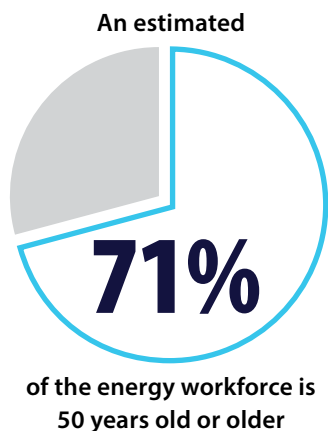
TYING VALUE TO KNOWLEDGE MANAGEMENT INITIATIVES

CERAWeek panelist David Meza shared how access to relevant information saved NASA two years and \$2 million because it kept engineers from having to reinvent the wheel; nearly one-third of all R&D resources are wasted redeveloping existing solutions. Nabilah al-Tunisi explained that knowledge management saved Saudi Aramco at least 20% of project costs when data was readily accessible and usable to project teams. Jeff Patterson of ASME concurred, and emphasized how their standards are essentially best practices—based on project experience—and designed to be easily accessible by organizations. All of the panelists elaborated on how advanced knowledge discovery technologies should be implemented to capture data and make relevant technical knowledge easily discoverable.

KNOWLEDGE CHALLENGES LOOM FOR THE ENERGY INDUSTRY

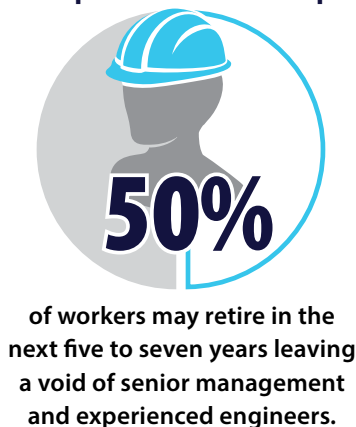
Oil, natural gas and petrochemical industries are facing skills shortages in the recovering market.

Demographic Gap



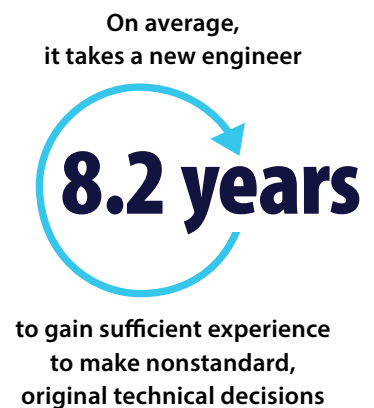
Source: American Petroleum Institute

Experience Gap



Source: American Petroleum Institute

Knowledge Gap



Source: SBC's 2012 human resources benchmark study for the oil and gas industry

DRIVING SUPPORT FOR AND ADOPTION OF KNOWLEDGE MANAGEMENT SOLUTIONS

CERAWeek panelists unanimously agreed that information and technology were inherently viewed differently by older and younger workers. To date, companies have invested millions of dollars in tools, platforms and information databases—yet their engineers and scientists still can't find the information they need when they need it. Younger employees expect data to be readily available through phone applications, intranet and internet sources. Clearly, technology needs to be able to uncover relevant knowledge wherever it resides.

To address the challenge of getting employees actively involved in the knowledge management program, Saudi Aramco established key performance indicators (KPIs) to measure and tie knowledge management to organizational and employee performance. Other organizations tapped into gamification to encourage employees to actively participate in knowledge transfer and mentoring.

To date, companies have invested millions of dollars in tools, platforms and information databases—yet their engineers and scientists still can't find the information they need when they need it.

Another unanticipated byproduct was the ease with which younger employees adopt new technology. What once was limited to the use of spreadsheets had become a real technology issue for companies, as younger employees take it upon themselves to create their own programs for accessing and sharing knowledge. Standardizing general parameters, for example, helped most companies maintain accessibility of the knowledge databases. For example, NASA limited the programming language used and established standards for how to embed documentation within

Benefits of Knowledge Management to Oil & Gas Industry

- ▶ More rapidly develop new and improved processes to retrieve and process reserves
- ▶ Reduce costs and improve operations for better ROI on capital assets, sites, and technologies
- ▶ Mitigate loss of graying workforce through capture and reuse of internal expertise
- ▶ Enhance technology solutions to stay ahead of competitors and deliver greater differentiation
- ▶ Minimize risks by ensuring compliance and not repeating past mistakes

the programming language. This allowed for easy transfer of information when an employee left the agency, retired, or moved to another department.

OIL & GAS INDUSTRY MUST ACT NOW TO MITIGATE THE IMPACTS OF KNOWLEDGE LOSS AND SKILLS GAPS

Knowledge management is a vital and substantial long-term asset to an organization's growth. There is a genuine concern that lifelong experience will leave as a large section of the workforce retires. As such, it's time to implement good knowledge management.

Leading oil and gas companies are implementing knowledge management initiatives and the latest knowledge discovery technologies to:

- ▶ **Reduce project delays by targeting** the single biggest use of an engineer's time – searching for information.
- ▶ **Minimize risk by avoiding duplication** of efforts and finding tried and true solutions vetted internally.
- ▶ **Transfer knowledge effectively** to more junior engineering staff, new project, and program members; hedging against knowledge loss and slow ramp up.

Capturing best practices, lessons learned and project data and ensuring it is easily accessible and relevant are the keys to reducing adverse effects of the Big Crew Change and ensuing brain drain, while also decreasing the learning curve for new engineers. 