Digital Transformation Of Operations & Maintenance – How Will It Shape The Oil And Gas Industry In India 2020?

India is poised at a transformational stage currently and with the dawn of 2020; our nation will be taking a new path in its journey of becoming the largest technology hub. As a result of an integrated action across our country's core competencies and technology advancements, Industry 4.0 is expected to deepen its roots in India 2020 and provide robust growth opportunities to key industries, including Oil & Gas industry, in the country. The current metamorphosis of digital technologies and its expedited implementation will force the entire Oil and Gas industry to shift its focus on advancing manufacturing methodologies that could reduce costs and improve efficiency.

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Operations and maintenance in the Oil & Gas infrastructure is highly critical to ensure safe and efficient plant management. There is a crisscross maze of thousands of miles long pipelines, facilities and pumping stations located at remote as well as hostile sites. About 40% of the plant budget is used for maintenance of infrastructure and gets even higher in case of breakdowns & replacements. The traditional operations and maintenance methods are logistically and economically puzzling for many Oil & Gas companies, considering the hazardous environments, they operate in. It becomes important to remain competitive while reducing financial excesses, ensuring safety and reliability of plant operations.

As it becomes tougher to get new sources of oil, there needs to be sufficient exploration and innovation to cope up and maintain the existing oil fields and plants. The Oil & Gas industry is now looking at embracing high-yielding technologies for a better and smarter future.

Key Challenges Faced by the Oil & Gas Industry in Operations and Maintenance

No other industry operates in more physically and politically perplexing environments on earth than the Oil & Gas industry. And unless the operations and maintenance processes are tight and thorough, it can become next to impossible to get around these discrepancies without doing a course correction. Adding to this, equipment malfunction can threaten the operations of any O&G company and create a slowdown in the exploration or production processes resulting in huge loss. Remote locations and unskilled labor, unsafe processes, inspection timelines, lack of visibility and stiff targets make it even more complex.

- **Challenging data collections from remote locations –** Consistently collecting assets and equipment related data is essential to derive operations and maintain insights as well as knowledge. Without the right data, it becomes difficult to analyze or deploy preventive or corrective measures.
- **Lack of mechanism for optimizing plant/ equipment availability –** Preventive scheduled maintenance plans are based on designer's initial assessment. Availability optimization which can happen based on near real time data and trend analytics, and most traditional industries do not have a system in place.
- **Reducing maintenance cost –** Most Oil &Gas companies have preventive maintenance schedule which is not optimum and new predictive methods can reduce both maintenance cost and OPEX.
- **Time consuming and exhausting training processes –** Since the Oil & Gas industry deals with large and complex machinery, it becomes difficult to train resources to fix field issues especially if the plants and oil wells are located in hostile territories.
- **Lack of standardization for documentation –**

Many plants face challenges in terms of non-updated documentation due to lack of information. These documents or activity logs are highly important for the smooth functioning of the plants.

- Safety and compliance issues – Security and regulatory compliances also need to be taken care of in a timely manner to avoid legal and governing concerns without fail.

Powering up operations and maintenance with digital solutions

Emerging technologies are enabling the Oil & Gas industry to increase safety, efficiency and speed of operations by creating smart oil fields. Today, operational data is mostly collected from multiple sources with the use of sensors and sensor networks such as vibration, acoustic sensors & thermal imaging; and this data is used by experts and sophisticated algorithms to analyze systems. The data also offers unprecedented visibility and clarity into operations, for analysts to come up with insights decision making that is easier and strategically correct. Digital enablers such as robotics or automation also help optimize operations and achieve business objectives such as cost savings, safety and efficiency.

Digitalization offers the opportunity to recognize full potential and to transform field data into actionable insights that improve operations many folds.

- **Pipeline hydrostatic/pneumatic pressure testing -** Hydrostatic testing with tracer or fluorescent dyes to the liquid enhance cracks and leak detection capability
- **Oil & Gas drone inspection solution -** Supported by back-end data analysis and processing capabilities, inspection drones are a useful tool for managing risk by making informed decisions on the maintenance requirements and frequency of inspections. Drone inspection is highly effective in cases of high-rise & high-risk stack inspections.
- **Robotic pipe scanner/pipeline inspection gauge (PIG) -** As a multi-sensor platform, robotic pipe scanners and PIGs carry a variety of condition assessment tools inside the pipeline in a single deployment which provides live video to aid in detecting anomalies (corrosion, crack & erosion) within the pipe.
- **Remote monitoring capabilities -** With various Geographical Information Systems (GIS) to monitor geographically spread assets, it becomes easy to combine spatial data and layered information in GIS, along with real-time critical data from the sensors to monitor and ensure equipment health and performance.
- **Predictive maintenance -** With the help of the data collected through remote monitoring using sensors, and analytics companies can plan predictive measures to reduce downtime and ensure the plant operations are not hindered while also regularizing (scheduling and planning) shutdown and craft maintenance.
- **Vision analytics -** Along with AI, surveillance machines can enhance safety measure compliance

by resources stationed at hostile locations. Trace identical elements and help keep track of access to continually improve monitoring.

- Photogrammetry - 3D panoramic view of the entire refinery, captured by drones to allow operators to have close monitoring options for machines and equipment while in operation. The end goal is to replace the complete visual inspection that is so far manual.
- Training and maintenance - Augmented Reality (AR) technologies can improve training programs in plant facilities and bridge the skills gap while also allowing easy repair functions. AR can provide a step-by-step procedural guide, operator set-up, as well as changeover instructions, processes, workflows and more.
- Data collection & analysis - During complicated drilling (mud, cement engineering and wireline, completion) activities and downstream operations, real-time and continual (collected through the help of digital solutions) as well as legacy data can be analyzed for streamlining and improving plant, product and process efficiency.

The Way Forward

As a global product engineering and lifecycle services company, QuEST Global is equipped to contribute significantly towards the technology advancements in the country. With the digital revolution in its peak, the Oil and Gas industry has the opportunity to redefine its boundaries through state-of-the-art innovations.

QuEST Global offers an exhaustive list of Engineering Services for the Oil & Gas industry that will cover the 360degree plant operations including solving challenges in product design and development, manufacturing, supply chain management, product sustenance, operations and maintenance optimization, asset management and pipeline integrity management. QuEST Global's deep domain knowledge in the oil and gas industries, and engineering expertise in Mechanical, Electronics, Software and Digital Technologies help drive business outcomes for equipment manufacturers and operators.

About the Aithor

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Srikanth is working as Technology Solutions Leader in Technology Excellence Group, at QuEST Global providing solutions to customers along with operations team. He has 23 years of experience in Design and Detail Engineering of Process / Piping for Process Industries & Auxiliary system of Power Plants. He has handled new customer engagements from the stage of understanding the customer requirement, preparation of proposal, estimation and project execution. He is responsible to setup "Plant Design and Engineering" Center of Excellence and also supporting new programs for establishing processes. He is conversant in ASME, API, EN and JIS standards.