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From Concept to Value Realization: The Journey of Digital Twin Implementation for Upstream Asset Performance

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Abstract

The advancement of digital technologies has revolutionized the way industries manage and optimize asset performance, with digital twin technology emerging as a global game-changer. In this transformative landscape, OQEP is at the forefront in Oman, being among the first to explore and evaluate industrial digital twin technology within the energy sector. Consequently, recognizing the complexity and significance of integrating such advanced technology, our journey represents both the courage to pioneer new solutions and the dedicated effort required to ensure that the technology is deployed precisely. Every step is carefully planned to maximize effectiveness and mitigate risks. This submission explains the journey, detailing the comprehensive process and key phases involved in the implementation of digital twin technology for upstream asset performance. It covers the foundational steps necessary for adopting digital twin technology, including assessing readiness, developing detailed system requirements, and customizing solutions to address specific operational challenges. Additionally, it addresses the go-live process and system evaluation, provides insights into the ongoing process of value realization, and outlines the planning for scaling up the digital twin implementation to incorporate advanced technologies such as machine learning and artificial intelligence. Aiming to provide valuable insights into the practical application of digital twin technology, demonstrating its potential to drive significant improvements in asset management. Highlighting the challenges encountered during the implementation process and offering a comprehensive understanding of the journey toward digital twin implementation for upstream assets.

Keywords
Asset Performance, Digital Twin, Digitalization, Oil and Gas, Upstream

Biography
Khulood Al Maawali is a Reliability Engineer currently serving in the Reliability Management team at OQ Exploration and Production (OQEP). In her role, she is responsible for managing asset performance across the onshore, offshore, and processing sectors of the oil and gas industry. She holds a bachelor's degree in Electronic Instrumentation and Control Engineering from Sultan Qaboos University and is currently pursuing a Master's degree in Industrial Engineering from the same institution. Khulood is a Certified Maintenance and Reliability Professional (CMRP), a Certified Asset Integrity Professional. In addition, Khulood is certified in TapRooT-root cause analysis and TUV Functional Safety, and is trained in Reliability Centered Maintenance (RCM) Facilitation. Since 2021, she has been spearheading the implementation of digital twin technology for asset performance, playing a pivotal role in advancing the industry's capabilities in this area.