In the modern era as markets become competitive, leading organizations place a lot of emphasis in reducing operating costs. Asset centric companies such as Oil & Gas companies are progressing and making great efforts to constantly monitor and correct the performance of underlying assets through newer technologies. By reducing asset downtime with the help of technology, a company can withstand huge losses which in turn can affect its market position. With the advent of Industrial IoT, the process of asset management can now become smarter & more effective. This article highlights the convergence of Information technology (IT) and Operational technology (OT) with new generation technology enablers such as Industrial IoT and Big Data Analytics that enables Integrated Asset Performance Management Solution for Oil & Gas industry.

Oil & Gas Industry Challenges in Asset Performance Management:
One of the biggest challenges facing the Oil & Gas Industry today is to reduce asset downtime and improve the utilization of assets. These challenges are further intensified by the fact that such assets are distributed at multiple locations and require data to be monitored by multiple users at different levels. Consider this typical operations scenario: An Operations Head would be interested in knowing the Productivity Forecast, the Plant Manager would require the data to be consolidated at Plant level, the Site Engineer will look for operations data and finally the Maintenance Engineer would require preventive and corrective data. Operational Data is available in multiple operational technology applications (OT) such as SCADA & Data Historian and Maintenance and Productivity data is available in information technology (IT) applications which need to be accessed in multiple systems by varied stakeholders which makes it difficult to manage critical assets and make informed business decisions. Effectively the problem statement is to have a real-time intelligence platform that can manage business excellence on all aspects.

Integrated Asset Management with convergence of Industrial IoT and Asset Management applications
Industrial Internet of Things (IIoT) combine sensors and information technologies (Cloud, Mobile, Analytics) to enable assets to interact with monitoring, analytics and control systems over Internet networks. According to a recent survey by ARC on Industrial Internet of Things (IIoT), top business drivers for adoption are reduced machine asset downtime, more rapid service response and improved process performance (figure 1.1). Convergence of operational technology (OT) like SCADA or Data Historian with information technology applications like SAP-PM along with asset maintenance strategies lay the foundation for successful integrated asset performance management solution for asset centric industry verticals. In an era of challenging business times, optimum risk management by use of technology can go a large extent towards cutting down uncertainties and potential vulnerabilities. IIoT is fast emerging as the remedy for this as it plays the role of a technology enabler in convergence with IT-OT landscape.
IIoT is fast emerging as the remedy for cutting down uncertainties and potential vulnerabilities, as it plays the role of a technology enabler in convergence with IT-OT landscape to address the industrial pain point from asset management perspective.

Integrated Asset Performance Management:
The above diagram depicts a typical Integrated Asset Performance management (iAPM) solution framework. The key IIoT drivers along with relevance of each element on the metrics serves as a reference point for the key departments of Maintenance, Operations and Sales. It provides an integrated solution architecture where Industrial IoT devices are connected to conventional assets for real-time condition monitoring. (Fig 1.2) Integration of real-asset information from Industrial IoT platform with Enterprise Asset Management and portal applications provide asset-insights to key stake holders enabling and empowering them for informed business decisions.

Smart Assets enabled with sensors capture various operational parameters and are sent via IOT Gateway to the IOT Platform on Cloud. Some examples of modern digital platforms are L&T Technology Services' homegrown UBIQWeise platform, General Electric’s Predix framework and PTC’s Thingworx. The frameworks enable integration of OT systems and applications such as control systems, SCADA/Historian and IOT Platform with Enterprise IT applications such as Enterprise Asset Management, Enterprise Resource Planning and portal applications such as CoreSight.

OSI PI Asset Framework provides an enterprise data infrastructure which enables Asset Context mapping, and integrates to IT and OT applications.
Business Benefits of Integrated Asset Performance Management

**Strategic**
(increased asset utilization, improved performance and highest economic return on assets)

**Financial**
(reduced both operational and maintenance costs)

**Operational**
(reduce downtime, adherence to business process, improve quality, asset performance)

**Reliability**
(reduced risk, early warning of impending equipment failures)

**Engineering**
(decision support, less-time analyzing and more time acting)

**IT**
(assets data quality, integration, real-time context & insights with Analytics)

with Industrial IoT platforms and Analytics tools for asset insights. iAPM framework leverages convergence of IT-OT applications and new generation IIoT platforms

- **EAM** products such as IBM Maximo, SAP PM Etc. – to automate the work order generation.

- **APM** products such as Meridium for defining asset strategies, RCM and RBI functions

- **Visual Analytics** products such as QlikView, Tableau, OSI PI CoreSight etc – to provide real-time Asset insights through visual dashboards.

- **Statistical Analysis tools** such as Hadoop, SAP HANA, R etc – to provide Predictive/Preventive Maintenance insights.

- **Geo Spatial Applications** such as ESRI GIS and GE Small World for providing geo spatial asset coordinates.

High level business benefits of implementing iAPM solution are highlighted in Figure 1.3

**Business Benefits**

Informed decision-making had never been so precise and razor sharp till the technology-driven integrated asset performance management came into prominence. Also, Predictive analytics improves asset management and reliability of modern machine learning algorithms positively impact the Oil & Gas industry. Technology enablers such as IIOT thus add more value to convergence of IT-OT applications.

**Abbreviations used in the article**

EAM: Enterprise Asset Management

APM: Asset Performance Management

IIOT: Industrial Internet of Things

FSM: Field Service Management

SAP-PM: SAP Plant Maintenance

IT: Information Technology

OT: Operational Technology

SCADA: Supervisory Control and Data Acquisition

GIS: Geospatial information System

CIS: Customer Information System

ERP: Enterprise Resource Planning

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