VIEW POINT

TRANSFORMING OIL & GAS WITH DATA: THE COMPETITIVE EDGE

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Introduction

The rapid digitalization of industries is forcing organizations to rethink traditional business models. Companies must adapt by integrating disruptive technologies like Artificial Intelligence (AI), Generative AI, and Robotic Process automation to optimize operations.

To gain a competitive edge, we must address these two pivotal questions about our transformation initiatives:

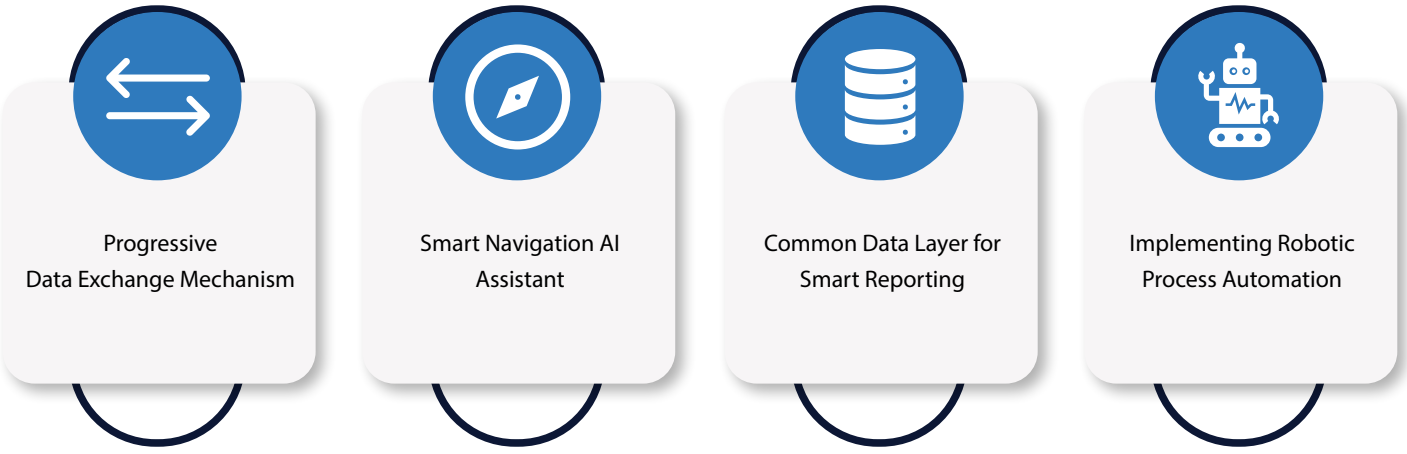
1. To what extent is the transformation initiative characterized by intelligence and strategic foresight?
2. How relevant and specialized is the transformation to the specific industry context?

In our previous paper, we demonstrated how oil and gas majors can unlock the potential of their legacy information, transforming it into a valuable digital asset - the "New Oil." This paper explores the strategic digital transformation of Engineering Information Management, focusing on its relevance and alignment with current trends to drive competitive advantage.

Few Smart & Strategic Transformations to focus on Engineering Information Management Space

Now we will delve into few intelligent and strategic digital transformations that oil and gas companies should seriously consider adopting, harnessing the power of cutting-edge technologies. These transformations are meticulously designed to not only address and alleviate the critical pain points faced by end users but also to appreciate the perceived value of the Engineering Information Management solutions currently implemented within any firm. By integrating advanced analytics, AI, and real-time data processing, companies can optimize their operations, improve decision making, drive efficiency across all levels of the firm. These transformations can lead to enhanced safety protocols and increased sustainability efforts. These agile and forward thinking will not only position those firms as leaders in the industry but also create a more resilient and responsive operational framework. This paper explores four key strategic digital transformation opportunities for Oil & Gas companies to gain a competitive advantage in Engineering Information Management.

1. Progressive engineering data handover platform to ensure timely data and documents exchange to the Information Management solution.
2. Addressing the pain of navigating multiple platforms to search key data, tags, functional locations etc. by building a Smart Navigation AI assistant.
3. Reducing duplicated efforts of custom reports by building a common data layer for end users to consume curated datasets from data lake and build configurable reports.
4. Switching document controller efforts from few redundant and manual Information management activities to strategic areas using Software robots.

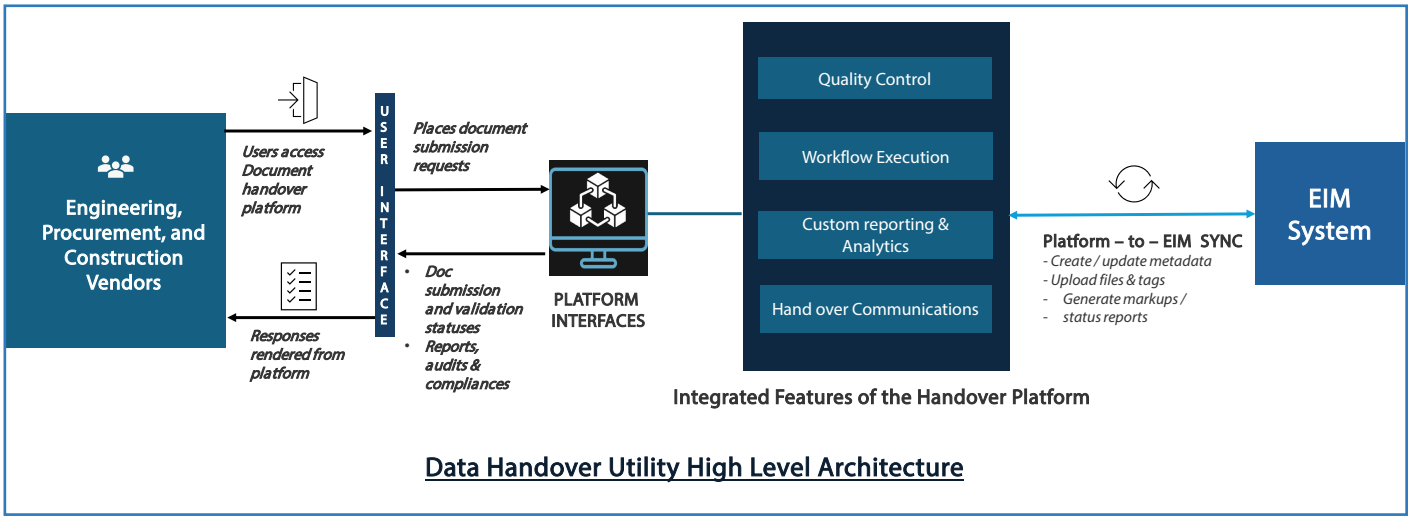


Progressive Data Exchange Mechanism

Data Handover Platform – Addressing Irregular data exchange

Oil and gas majors frequently collaborate with different engineering contractors, EPC vendors, all of whom are tasked with the critical responsibility of transferring project documents, metadata, files to the Engineering Information Management (EIM) solution. The significant challenge arises from the fact that many of these contractors lack access to the system, necessitating adherence to complex and often cumbersome document handover processes. This inefficiency not only slows down the data, files, and tag exchange but also introduce irregularities that could potentially create safety risks.

One Integrated data exchange utility incorporating multiple features will simplify and streamline the process. This efficient and reliable system for data exchange helps companies to mitigate safety risks, enhance operational efficiency and ultimately drive better project outcomes. We have provided a prototype of High-level architecture of any Data handover platform which should be platform agnostic. Even if the source systems or target system change, minimal customizations will be required to make this platform fit for the new systems.



Data Handover Utility High Level Architecture

Benefits

Multiple Intuitive User Interfaces for data handover

o This platform can be customized to provide multiple intuitive user interfaces to the Engineering Procurement, and Construction (EPC) vendors to submit data and document handover requests for loading to the EIM system

o The different interfaces which could be developed are:

- Web application portal hosted in cloud
- Desktop applications installed in vendors' systems
- Consumable Application Programming Interfaces (API)

o This will not only speed up the data, files, and tag exchange but also eliminate irregularities that could potentially create safety risks.

AI-Driven Data validations

o While implementing this platform, organization should also focus on inducing the AI-driven data validation utilities to ensure the quality data enters in the EIM system. Some of the data validations could be targeted are:

- Coversheet validations
- Metadata validations
- List of Values (LOVs) checks
- File format validations
- Missing values checks
- Prescriptive recommendations on corrections required on failures

o Manual efforts of document controllers could be switched from these to some strategic activities.

Automated workflows

o Some of the standard document lifecycle management workflows could be automated like:

- Automated document reviews
- Automated document approvals
- Email alerts on review and approval

Analytics & reporting

o Stakeholders can monitor different KPI metrices, document handover analytics from the in-built dashboard

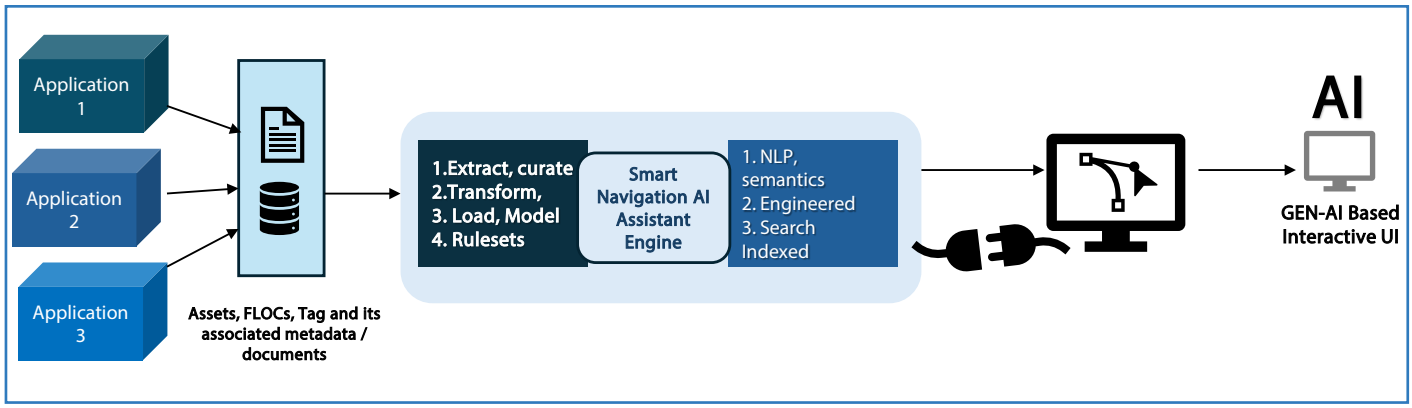
o Audit & compliance element will help document controllers to identify the EPC vendors who defaults on document transfers.

Smart navigation AI assistant

Multi-system Navigation Challenge

Business users encounter challenges retrieving information of assets based on functional locations, tags from multiple systems. The complexity is compounded by the persistent issue of identifying a master system that can serve as a reliable source of truth. The phenomenon of data residing in silos is indicative of poorly interconnected systems, which not only hinder operational efficiency but also results in the squandering of valuable time and resources. The lack of a unified view of asset information becomes a significant impediment.

Addressing the pain of navigating multiple platforms to search key data, tags, functional locations etc. should be one of the key strategic transformations in Engineering data space. The objective is to develop a smart navigation AI assistant for end users. End users will interact with a Generative-AI based UI to post their requirements. The AI assistant engine will process the requirements and navigates to the applications linked to it and generate the results for the end users with additional recommendations. We have provided a prototype of High-level architecture which should be platform agnostic.



Smart Navigation AI Assistant High Level Diagram

The sample query process workflow is also highlighted in the below image.

Smart Navigation AI Assistant Sample Process flow

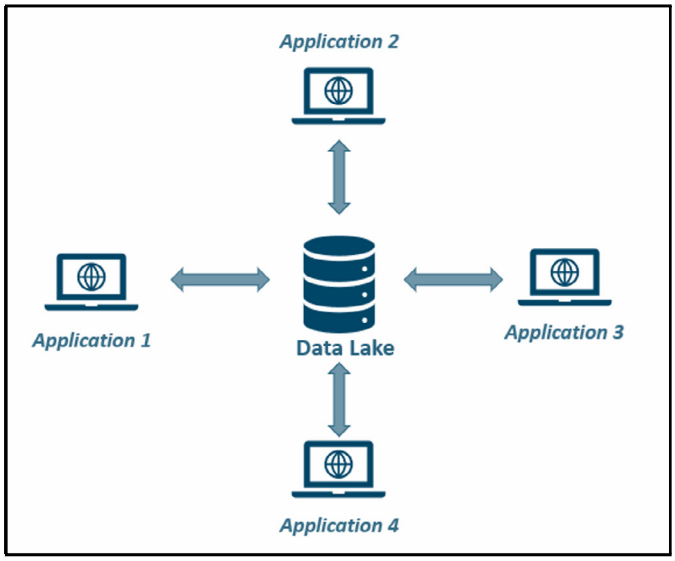
Benefits of AI Assistant

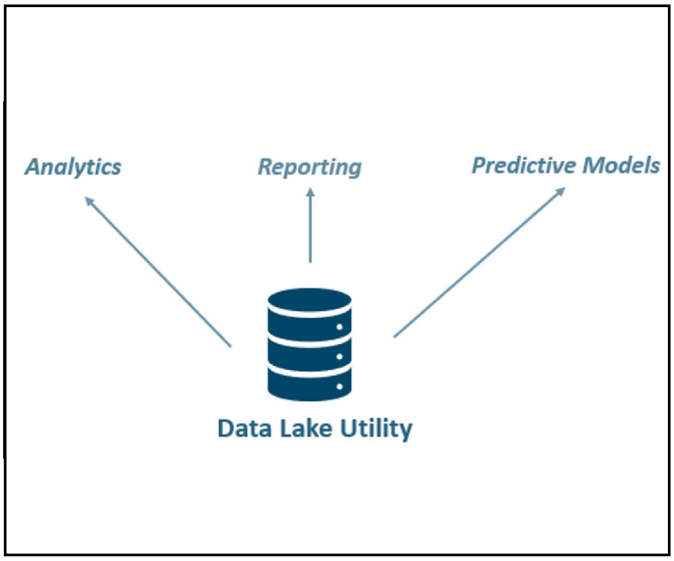
- This will be a generative AI (GEN AI) enabled web-based search, embedded with human interactive bots (using Natural language processing)
- End user doesn't need to navigate multiple systems rather just post their requirements to the bots. The bots will navigate and collect all metadata, physical documents, tags, assets information etc. from multiple systems
- Customizable to provide features such as downloadable reports, usage metrics, analytics
- Quick recommendations based on user queries or requirements entered.

Common Data Layer for Smart Reporting

Addressing data complexity and redundant reporting

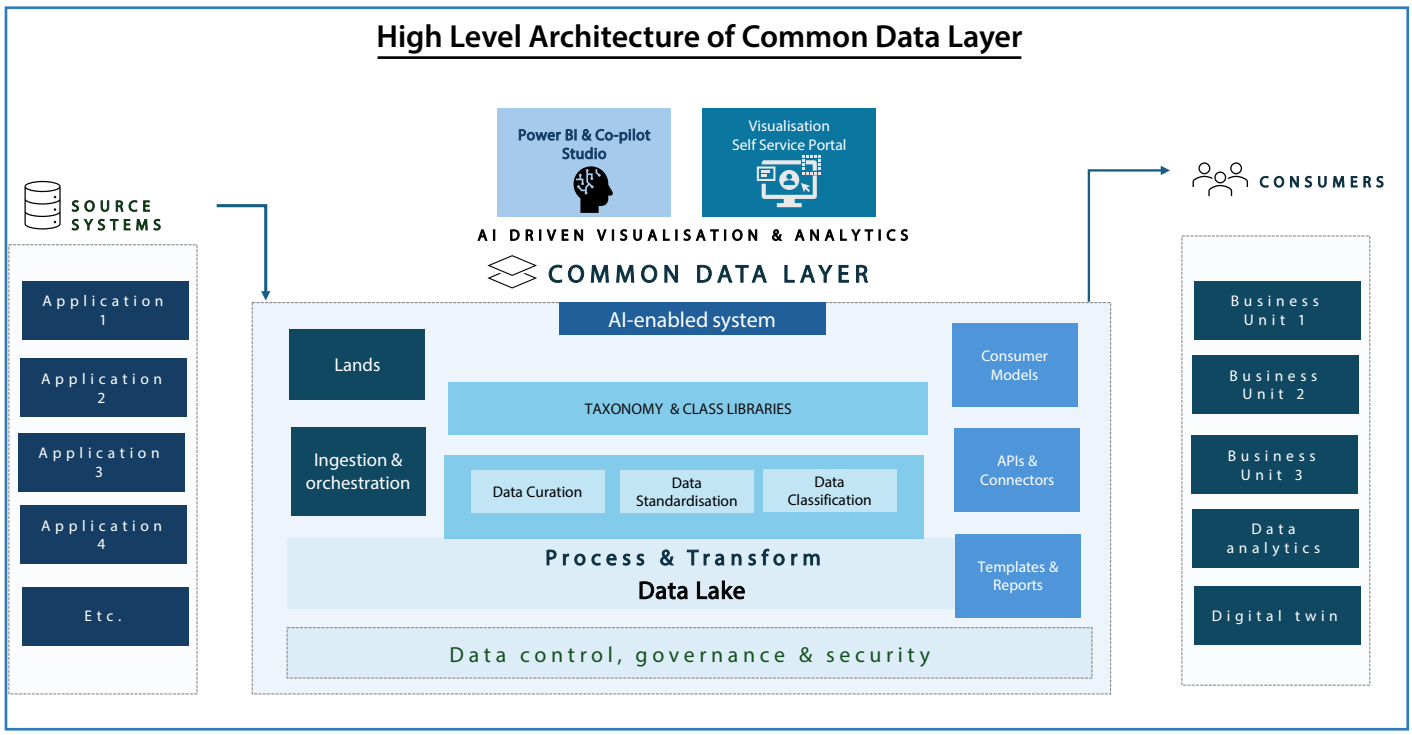
The concept of Data Lake has become the backbone of the oil and gas firms across all the space. The firms are consolidating data from the different applications to this data lake. Instead of doing point to point integration, Data Lake has become the one common integration point for the different applications. Suppose there are 4 strategic applications in place. The data flows from these applications to the Data Lake as shown in the below image. The Data Lake acts as a Singular Data Source for all the engineering applications which helps in further data analysis, building prediction models etc.





One of the primary utilities of a data lake lies in its ability to facilitate the creation of diverse analytical reports. However, business users often encounter confusion when attempting to navigate the complex data available within data lake tables. This confusion can ultimately hinder their ability to construct insightful reports.

To address this challenge, oil and gas firms should prioritize developing a Common Data Layer. This layer would consist of curated datasets that are ready for consumption by end users, thereby streamlining their access to relevant data. In summary, establishing a Common Data Layer is essential for transforming the data lake raw data to consumable data which would become a powerful resource for analysis and decision making.



Benefits

The centralization of engineering data from diverse sources creates a single, reliable access point for all users, eliminating the confusion often associated with multiple data repositories.

With access to consolidated data, users can conduct quick analysis and swiftly identify trends and patterns. This capability not only accelerates the decision-making process but also facilitates informed, data-driven choices.

Power BI-enabled self-service portal empowers users to generate engineering data reports with remarkable speed. It reduces duplication in custom reporting efforts and reduction in storage costs for the same. This new system enables users to perform their own data analysis, thus reducing reliance on custom reports and dedicated assistance from support team.

Using Copilot studio, users can consume its built-in-analytics, KPIs, customizable metrices. Integrating Copilot studio with Power BI helps users to create more visually attractive and interactive reports.

Implementing Robotic Process Automation

Robotic Process Automation (RPA) is a software technology that makes it easy to build, deploy, and manage software robots that emulate human actions interacting with digital systems and software. –

Reference - Https://uipath.com

Automating Repetitive Document management tasks

In today's rapidly evolving digital landscape, leaders across various industries are increasingly turning to software robots to automate repetitive and mundane tasks. This strategic move not only leads to significant savings in operational hours but also offers the capability to operate continuously, around the clock. As a result, the volume of tasks completed within a given timeframe experience a marked increase, enhancing overall productivity.

Deployment of software robots in EIM space of oil & gas sector will handle routine document management activities and organizations could achieve substantial savings in Operational hours and costs. Some of the repetitive tasks of document control team in EIM lifecycle are:

- Bulk metadata and file submissions using metadata registers to the target system.
- Accepting and validating document transfers from 3rd party contractors.
- Validating Project Information Management standards.
- Quality control checks on Cover sheets
- Metadata validations
- List of Values (LOVs) checks
- File format validations
- Missing values checks
- Automated document review and publishing
- Bulk application of code stamps in documents.
- Automated transmittals back to Originator.

Benefits

Achievement of substantial savings in Operational hours and costs.

This approach not only streamlines workflows but also allows human resources to focus on higher-value tasks requiring critical thinking and creativity. It will help organizations aiming to remain competitive in their respective markets.

Conclusion

This paper explores strategic digital transformations for oil and gas companies within Engineering Information Management. These transformations aim to improve the relevance of information, adapt to industry trends, and assess the value of digital information. While we provide examples, these solutions aren't universally applicable, Oil and gas companies must prioritize their specific challenges before implementing them. Leadership teams must systematically identify and prioritize their specific challenges before undertaking any transformation. A careful assessment of their unique circumstances will allow them to pinpoint the digital transformations with the highest potential for value creation. By focusing on these key areas, organizations can become digital leaders and gain a competitive edge, recognizing information as a key digital asset - **New Oil – Information, a digital asset.**

About the Authors

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Pranav has 23+ years of professional experience in Business Consulting and Program Delivery. He is working in Oil and Gas domain for more than a decade and brings lot of experience in Engineering Information Management and Data Visualization. He has helped numerous customers in their Digital Transformation journey.

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Abhijit is working as a consultant with 3.5 years of experience in Engineering Information Management space for an Energy major. He has rich experience in working as Senior Business Analyst for engineering data migration to SaaS solution. He helps his clients to bring value to the program. He is currently leading a DevOps project in this EIM field.

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