iPoint Case Study

National Oil Company Wellbore Log Repository

Ikon SCIENCE

Introduction

A National Oil Company wished to improve the awareness, access and utilization of its wellbore and petrophysical data stores in geoscience and engineering workflows. The company had significant involvement in over 25 assets globally with over 5000 wells worth of high value logged data.

As part of the organization's overall refinement of its digital strategy they had reviewed the existing data flow through the business and identified the major bottlenecks and restrictions. Summarized, these were:

- A manual and overly involved loading process for all data types regardless of complexity or variation
- Over-reliance on subject matter experts to appraise data quality prior to distribution to the business
- Lack of integration ability with other systems and internally developed applications and processes
- Lack of web-enabled user-friendly accessibility tools

These restrictions had led to user workflows which created silos in standalone applications and user environments, reducing the spread of data and knowledge in the organization and ultimately slowing down the decision making process. Auditing how decisions were made and integrating work from partner operators or consultants was also difficult to manage. A reliance on manual loading and QC tasks resulted in data bottlenecks but also introduced subjectivity into data appraisal which was incompatible with newly developed machine learning workflows.

As a result of these challenges and impacts a new solutions was scoped and implemented, one which required solving the challenges of new data coming into the system, but also migrating across existing data from legacy stores. This new solution was to act as a platform for innovation, powering both conventional workflows and new machine learning derived algorithms.

After an extensive RFI and POC process, this new solution was chosen to be built around Ikon Science's iPoint software.

Existing Data Situation

The existing data situation in the operator consisted of multiple disparate sources of information. Gaining access to these repositories required navigating internal ownership and management channels. Once granted access little information regarding the provenance and quality of the information available was easily accessible by the end user. This led to users developing their own ways of handling data – which whilst useful for them, led to a disaggregated data landscape with multiple competing records of input and processed data. Ultimately this led to ineffectual workflows in the exploration and production departments with too long spent finding data and assessing quality.

The existing stores fell into 3 main categories:

Databases – existing corporate repositories existed for a number of data types. Each of these required separate management and access rights. An ongoing integration project existed in the operator to increase the flow of data between these repositories and into end-user applications and portals. The existing log database was a commercial software built on a proprietary data architecture – this meant integration was very difficult and the data in the system was underutilized as a result. Migrating this database into the new system was a priority of the implementation team.

Applications – technical teams utilized their value add applications as data stores. Due to the nature of these systems and the cost of licensing these that resulted in few individuals being aware of the data in these projects and limited the ability to share this knowledge between disciplines. A key goal of the new system was to be able to house this information and open it to a wider community.

File Systems – much of the data stored in the operator was delivered by vendors and partners in flat files – either industry standards such as LAS and DLIS or in formatted spreadsheets. Documents in PDF and DOC formats were also routinely provided and stored. In file systems it was considered difficult to manage the permissions of access and modification across the userbase and there was general disconnect between the documents and the raw data provided. Moving this data into a managed and searchable repository was a primary goal of the operator.

Creating an integrated, accessible single source of truth was the key driver for this project and the selection of the iPoint system.

Technical Architecture

In order to facilitate increased access and utilization of wellbore data across the organization, the scope of the system was to utilize automation and integration to overcome many of the existing data bottlenecks.

The system was mapped out around the iPoint software and was focused on three primary components[1] :

- Data Population – the process of bringing data into the iPoint system
- Data Storage and Access – storing of the data in the iPoint system and providing access through the web-based and desktop applications
- Data Distribution – using the iPoint database as a source to feed into extended workflows and applications

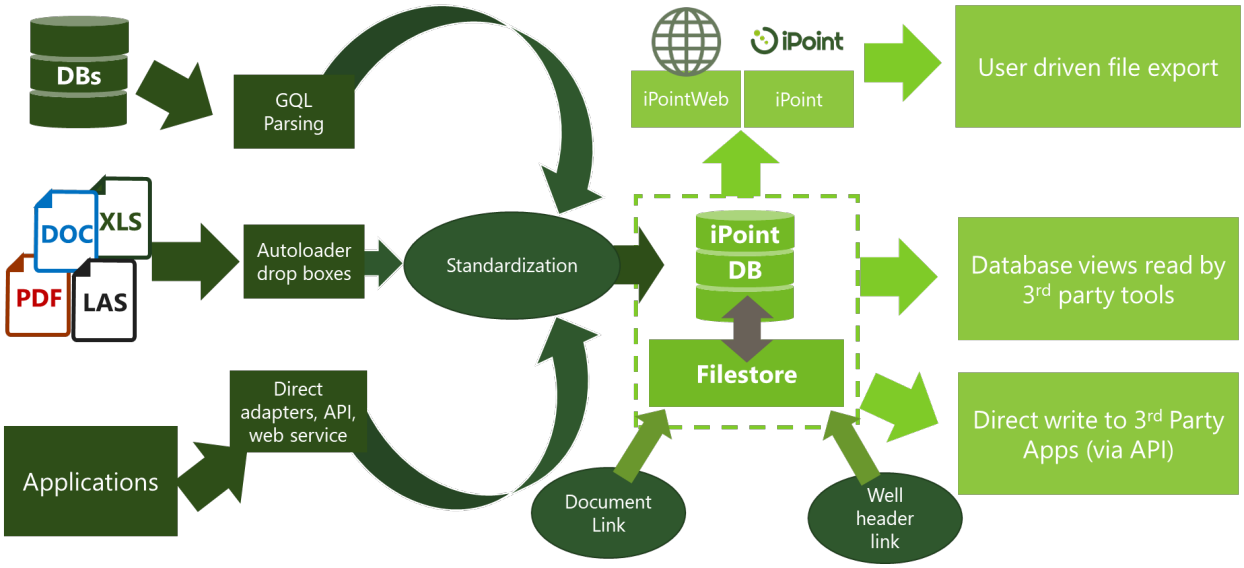

Figure 1 Overview of the technical architecture employed at the organization

Data Population

Flat file and incremental loading

The data loading process in the previous systems had caused bottlenecks and also resulted in inconsistent data quality and standards applied.

To improve this situation flat files were to be loaded through the iPoint autoloader tools. These tools utilize a drop-box system to allow users to drag data into a folder, and the system processes the data according the business rules set up by the organization. This introduces a level of standardization and governance to the data during the loading process, increasing data quality. It also opens up the data loading process to a wider audience, reducing the reliance on one or two key individuals.

Data migration

The decision was made during the commercial process to retire some existing datastores and move that data into the new solution. The largest of these undertakings was that of the existing log data management tool where data was to be migrated whilst either maintaining or improved data standards as required.

The existing solution had two datastores built around a proprietary structure. One of these datastores contained the raw documents and reports, the other contained data extracted from these files and loaded into the internal database of the tool. Both were required to be loaded into the new system.

An API was provided by the previous solution vendor, from which the Ikon Science Technical Services resources were able to build a 'mirror' database with an open structure. Our proprietary GQL tools was then able to extract, transform and load the data into our own database – applying data standards enhancements in the process. Once provision of the API was secured, the mapping and migration process took less than a month for over 6TB of data, including spot testing for data quality.

Data integration

Whilst some datastores were retired and the data migrated, others were to be kept online and to feed the new solution with quality information. This was the case of the wellhead management platform, which was to remain managed and populated by a separate part of the organization.

The key implementation here was to ensure that as new wells were added to the system they took in the most up to date and relevant metadata from the wellhead management tool. Also required was the ability to run scheduled comparisons against this management tool to ensure all data in the iPoint database remained relevant and updated.

Data Storage and Access

Data Storage and Security

Storage of data in the new system utilized a two-part datastore:

The filestore was home to the documents and raw data, although it could also be configured to create hyper-links to these documents in their existing location without any migration taking place.

The database stored the extracted data from these files and after application of business rules and data governance on loading. A link between the raw data and the loaded data was maintained to ensure users were able to compare the differing versions of data simply.

Security of the data was provided through integration with the operators Active Directory service, ensuring that user groups were populated and maintained in accordance with the

corporate IT listings. User permissions were then managed internally using the iPoint security tools that enable restrictions on who can access, edit and load data on various levels.

User Access

A hybrid approach to user access was employed by the operator. A variety of desktop licenses were employed to assist with data loading and QC. The iPoint desktop tool allows a number of value add workflows to be employed which assist with the data and business QC rule verification. Subject matter experts were able to utilize the visualization and charting capabilities of the tool to ensure the data loaded provided an accurate representation of the subsurface.

Access to the wider organization was provided through the iPointWeb tool. This web-based tool provided corporate licensing resulting in maximum data access across the organization whilst helping to manage costs. This platform focused on providing search capabilities and interrogation tools to enable users to take advantage of the QC and knowledge provided by the subject matter experts, maximizing confidence in the data stored in the system.

Data Distribution

In addition to access of the data through the iPoint system, data was required to be made available to a variety of additional applications, portals and processes.

Database Table Views

Table views were provided to a range of applications that had very specific requirements in the data they utilize. These either involved combining several tables in iPoint into a single display or performing some kind of alteration to the data prior to consumption.

Database table views enabled the data contained within the iPoint database to be accessed by these systems without needing to access the database itself. A scheduled process ensured the data in these views remained up to date as these views were utilized to drive a number of machine learning and conventional workflows.

API Implementation

Other tools in the operator consumed data in a much more generic format. These applications enable us to utilize our API to feed their workflows. The iPoint API exposes all data items within the database to be consumed by the various applications and processes. Developers and users of these systems now have an virtually limitless ability to utilize this data in their workflows as they look to gain further insights into the area that this organization operates.

Summary

The client for this project had a clear vision of the solution they required but need to partner with an experienced and competent partner to achieve their goals.

Through a combination of Data Solutions consulting, software and integration development and service deliveries, Ikon Science were able to provide a solution which revolutionized how log data was stored, accessed and utilized across the organization.

Since the initial roll-out of this project, additional data types have been added to the system resulting in excess of 2 million curves worth of information stored within the database. This work continues to be ongoing and shows how a solution for one part of the business can have positive outcomes for neighboring disciplines.