Integrated E&P Platform – Optimizing Data Usage within the Organization.

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Abstract

Geoscience data is critical for decision-making in the oil and gas industry, but the process of gathering and utilizing this data can be complex and time-consuming. To address this challenge, Eneva and Katalyst Data Management worked together to create a fluid environment that streamlines data compilation and improves access to geological and geophysical data, as well as providing tools to support decision-making.

In this paper, we will focus on the experience of the exploration group and discuss the importance of gathering and certifying information, establishing a permanent access policy, and implementing workflows to benefit a broader group of users.

Introduction

Eneva is an integrated energy company that traces its E&P history back to 2009, when it acquired Working Interest in 7 exploration blocks on the Parnaiba basin. Since then, the company has made significant strides in the industry, with multiple gas fields integrated into local natural gas power plants by 2014. Today, Eneva has drilled over 200 wells, acquired over 50,000 km of seismic data, and developed an extensive GIS database through various basin studies.

However, managing geoscience data can be a challenge, as the company deals with different types of data such as seismic, well data, drilling reports, environmental licensing, prospect ranking and evaluations documents, and dynamic dashboards/reports. Furthermore, the constant flow of new information generated by on-going drilling programs and seismic acquisitions and geotechnical studies needs to be properly catalogued, distributed, and consumed.

To address this challenge, an ideal solution requires a GIS-based environment, technical data preview and interpretation capabilities, entitlements controls to make access easy for as many users as possible. In this paper, we propose a workflow that integrates multiple data sources from day-to-day documents into a geoscience interactive platform that is used as master data repository, integrator and working tool for multiple departments within the company.

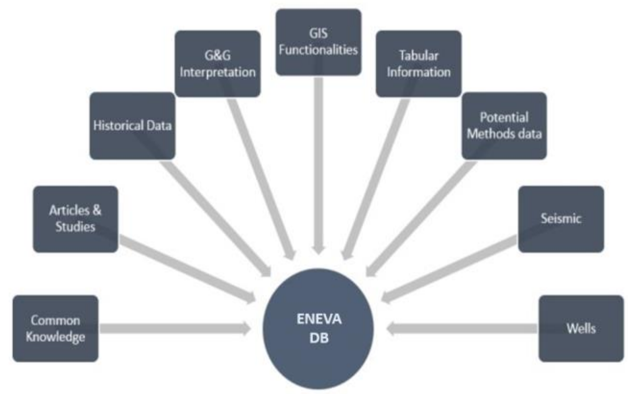

Figure 1: Diagram of data integration and information available in the cloud environment.

Platform Description

Eneva's integrated E&P platform is a continuously evolving process that integrates data from multiple sources into one user-friendly interface. Users can easily navigate between technical data, documents, and geographical features through the platform's various functionalities. The platform's scope includes:

- **Map Environment:** GIS interface that connects and displays proprietary content combined with public data and allowing people to navigate in a fluid and interactive way between different functionalities.

- **Seismic:** Every seismic line (and attributes) from Eneva's database is on the portal. As new data arrives, it is automatically versioned and grouped with its previous versions if necessary. Pre-stack and post-stack seismic data are both available, and external connections can be made using Geopost's API services.

- **Wells:** Well related data such as time-depth charts, well tops, digital logs, drilling reports and core data can be integrated into a composite/mud log. Lithology and log tracks, together with all depth-indexed data can also be plotted on a seismic profile.

- **Field Activities:** The platform provides daily synchronization of dynamic field activity reports, which enables users to understand the status of ongoing seismic acquisitions and receive their corresponding data sets.

- **Environmental Licenses:** Geographical layers for drilling and seismic acquisition licenses are generated from internal documents located on a shared directory. This data is connected to the platform reflecting changes real-time.

- **Data Submission:** Service providers are registered into the systemand are responsible for submitting their data into the platform, connecting geotechnical, IT and administration activities during the delivery process.

- **File Indexing:** The platform indexes spreadsheets, documents, and technical data stored in the internal network, and any changes made are automatically reflected across all environments including maps, seismic data, well data, and dashboards.

- **Dashboards:** APIs services are automatically generated for every data loaded onto the system, as well as for certain system activities. This creates a unique source that can feed dynamic dashboards for various purposes, such as data coverage, quality control, and performance indicators.

Methodology

The methodology for implementing the platform is based on an understanding of how data flows into the company, including primary external data sources, which sectors are responsible for generating derivative products, and how these products can be used in different areas.

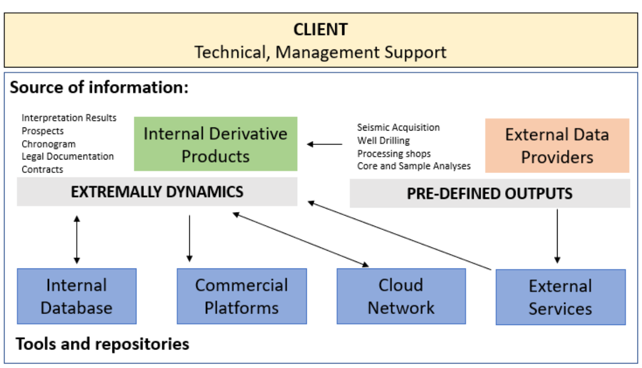

Figure 2: Chart explaining client needs and the flow of information within organizations, focusing on the repository and usage.

The implementation process is divided into multiple phases:

Phase 1 – During this phase, the first step is to identify all internal and external data providers and consumers. This includes identifying what data they need, how they use it, and how they currently access it. This information is used to create a map of data usage and identify any gaps or inefficiencies in the current system.

Once this information is gathered, the next step is to define the data storage approach. This includes identifying the most appropriate and secure way to store and manage the data. This may involve using a combination of cloud providers and internal servers to create a hybrid solution that balances security and cost.

Finally, it is also important to identify any potential risks or challenges related to data storage and management. This includes issues related to data security, access control, and data backups. These risks and challenges should be addressed as part of the overall implementation plan.

Phase 2 – Organizing and adding value from the backlog:

Every new platform must understand, organize, and extract as much value possible from the company's backlog. For this purpose, we consider the backlog as an external data source, freeze it, and transfer it into its proper database. It's important to ensure the quality of the data by applying data management tools and extracting necessary indexes to make it easier to search and retrieve relevant information.

Phase 3 – Integrating internal dynamic sources:

Some types of information constantly change by natureFor instance, production data must be updated daily, drilling schedules weekly, licensing processes monthly. These "live" sources must be identified within the company and plugged into the portal functionalities. This way, the platform can become increasingly dynamic and useful.

Phase 4 – Managing inputs from external data providers:

Once the external sources are mapped, workflows must be defined and agreed upon by all parties to guarantee data integrity. Whether working with well analysis labs, seismic acquisition companies or imaging companies, strict guidelines are established regarding taxonomy and how to deliver (upload) the products.

Phase 5 – Providing tools for data usage:

As part of the implementation process, tasks that benefit from the complete acess to the integrated database are identified, and tools are developed to support those tasks. The platform leverages the integration between seismic interpretation and Eneva's private AI attributes (R&D project between Eneva and Tecgraf) to reduce the risk associated with gas prospects. Tools like these are designed to increase the efficiency and accuracy of decision-making processes.

Workflow Examples

Seismic: The first step to manage Eneva's seismic library was uploading all the data acquired up to date onto the system while also mapping information such as local file directories, doing quality control checks, and renaming the lines according to internal proposed rules.

In order to stay up to date with the constant flow of new seismic originating from processing and reprocessing, some workflows and guidelines needed to be established between Geopost and imaging companies.

First, a set of file naming rules provided by Eneva was implemented. Those are extremely important, because with them, it was possible not only to apply automatic attribute identification, but to also set up an automatic versioning system.

Employees from the imaging company were trained to load new deliveries straight into Geopost through an Admin Panel already pre-filled with the company's default parameters (coordinate bytes, trace byte, datum shift, etc.).

The files are renamed and moved to an organized directory in a cloud and after this process, all key personnel receive an email with a list of uploaded lines and attributes, a map image, and a link straight to Geopost's seismic viewer. The API containing information from all seismic uploads is updated and reflects on a dynamic dashboard for monitoring purposes. All of that is automatic and has no human input.

Employees responsible for the upload receive a warning if any of the attributes auto-match fails due to unconformities with the naming rules or if anything interrupts the process. They can also immediately access a map with the plot lines and the SGY preview. Seismic interpreters can immediately access the new data and provide feedback to the imaging company, if necessary, and start interpreting the data directly in the system. All files are properly indexed, organized, stored and easy to recover.

Well: Well data it begin by mapping all existing wells on Eneva's database and their respective composite and/or mud log, as these logs are used as the backbone where other data is connected to. All available time-depth charts and well tops were synchronized from interpretation softwares and associated to their corresponding composite log. With that, it is already possible to plot this basic information on the seismic (lithology and formations).

After that, an assessment was made to gather all useful data related to the wells (core descriptions, drilling reports, petrophysical analyses, etc.). Every single file was indexed, given a category, a well associated to, and a depth interval if applicable.

With everything well-structured and correlated, we can easily pull core photos or PDFs, for example, straight from the composite log or from a seismic profile, while seeing where the data is located depth-wise. On top of that, every well has a folder on Geopost's File Manager, with

subfolders for each category. More complex data that can't be previewed on the system can be retrieved and downloaded with ease.

A dynamic dashboard was also created to give users a broader view of data availability, and to help them locate specific information more efficiently.

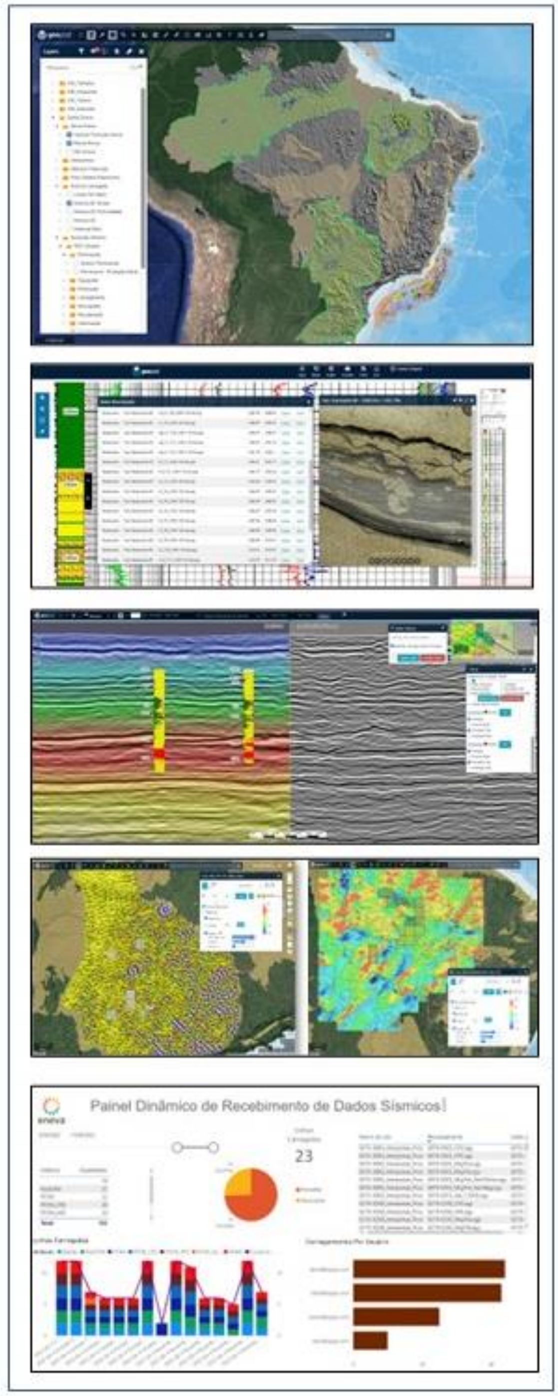

Figure 3: Example of system outputs, possibility of accessing digital maps, combining seismic well interpretation and cores, and using APIs to feed dashboards.

Field Activities: While acquiring field data, an operational daily report is generated on the platform, displaying the development of the different stages of the seismic acquisition on the map. |To achieve this, the acquisition company received an FTP to upload the source files used on the daily report, straight from the field

Every time new data is transferred to the FTP, it triggers an automated process that creates map elements based on coordinates contained on such files, as well as different styles based on specific attributes predetermined previously. An automatic email is sent to the responsible person, to that can detect any upload errors due to unconformities on the file format that might happen.

Apart from visualizing the acquisition progress on a dynamic map environment, users can also combine this data with all other geographical layers already loaded onto the platform.

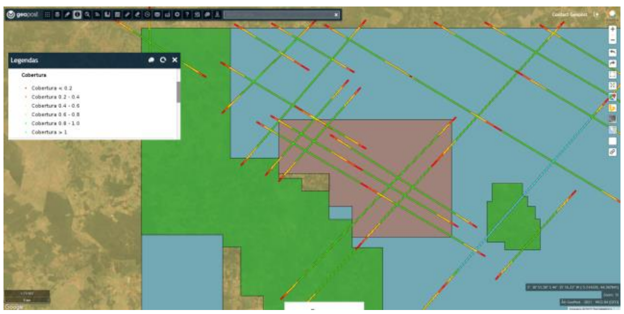

Figure 4: QC of field acquisition with coverage maps, and quality indexes.

Environmental Licenses: This is another type of information that is constantly developing, with licenses expiring, new ones being applied, renewed, coordinate adjustments and so on. To keep track of all these changes and stay always up to date, a data scrapping routine is set straight to the “official” sheets used internally.

In order to do that, safety protocols were defined so that these files could be accessed inside Eneva’s network with no exposure. A web crawler was set to monitor the “last modification data” multiple times a day until it detects a change. When this happens, another automated process is triggered, this time re-generating the geographical layer of these licenses with all the modifications. One of the layer attributes indicates the last time it was updated.

Other workflows that can be automated by the platform include building performance/summary dashboards using API services and working around drilling schedules and rig logistics associated with an exploration campaign. These activities can be seamlessly integrated into the system without adding a significant workload to the current group activities.

Results

Eneva's integrated E&P portal has been operational for the past two years and has been initially focused on subsurface data, including composite logs, seismic, and shapefiles. Over time, the platform has gained popularity and currently boasts approximately 200 registered users from various sectors within the company, mainly from the exploration department, who utilize the platform to support their daily activities. The platform enables users to track deliveries and feeds dynamic management dashboards.

It contains all the company's proprietary subsurface data, which users can preview and analyze without consuming any software licenses. Additionally, public seismic and well data from all onshore basins in Brazil are also included in the platform and integrated with dynamic cultural data that is updated daily .With this setup, users can easily search and access well data such as cores and reports, download them, or preview them, without having to navigate through numerous folders.

Conclusions

Overall, the implementation of such solutions allows for better collaboration and knowledge sharing among users. Additionally, automated workflows help to streamline data operations, increase efficiency, and reduce the likelihood of errors.

Operating as a master repository with lots of connectivity capabilities contributes to a unified data source, with reliable quality assurance, efficient data storage and recovery, and the potential for integrated data analyses, improving the decision-making processes across multiple areas of the company.

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