The OSDU® Journey at PETROBRAS – Phase 1: Breaking Paradigms in the Geoscientific Data Environment

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Abstract Summary

The OSDU® is an open-source data platform maintained by The Open Group. Its goal is to standardize, integrate, and centralize subsurface data (such as seismic, well, and geological data) into a single, transparent, and interoperable environment. The motivation behind its creation was to solve a common industry problem: data fragmentation across closed and incompatible systems.

Phase 1 of the OSDU® journey at PETROBRAS aims primarily to provide standardized access to data generated on platforms with proprietary formats, accelerate the work of interpreters by facilitating integration between applications from different vendors, enable an environment conducive to the use of Artificial Intelligence and Data Science, and optimize both the time and volume of data copied and transferred between platforms.

Introduction

PETROBRAS has historically worked with the main applications and tools available on the market, always aiming to achieve the best possible results and productivity gains. However, this scenario also brings complexity to the environment, especially regarding the data loaded and the results generated.

In the past, several plugins were developed to facilitate the exchange of information between applications. These required extensive management for updates and constant investment in customizations to ensure integration could occur with minimal impact. As a result, the same type of data was often copied repeatedly whenever it needed to be loaded into each application.

According to The Open Group (2025a), the OSDU® was created precisely to address this type of complexity by introducing a standardized language that can be adopted by any vendor or operator. This facilitates all workflows that require collaborative efforts and data exchange between applications.

Theory

At PETROBRAS, the OSDU® is not a traditional methodology in the sense of a linear process, but rather a set of practices, definitions, and architectural principles aimed at standardizing, integrating, and supporting data governance. It represents an evolution in how subsurface data (such as seismic, geology, wells, faults, and horizons) is organized and accessed in a standardized way. Because it is open-source and has an integrated data structure, it can be implemented by any company.

According to The Open Group (2025b), the OSDU® is based on a unified data standard, the separation of data and software, open APIs (Application Programming Interfaces), specialized services, collaboration, and innovation. This brings independence in the development of new solutions that work with data, since we have a platform storing this information using a language, format, and access method that are known to everyone.

Results

In this Phase 1, Petrobras focused on processing key information required for loading projects into the interpretation platforms used by the company's geologists and geophysicists—such as wells, wellbore, well logs, trajectories and seismic data. The data loading into OSDU®, also known as data ingestion, was carried out through the integrated database, where the data is automatically ingested into OSDU® following the platform's standards.

With the adoption of the OSDU®, the architecture at PETROBRAS (Figure 1) becomes simpler and more optimized in terms of data flow, collaboration and interoperability. Previously, each seismic interpretation software required its own copy of the data. With the OSDU®, the data is loaded once into the platform and from there becomes available to any environment that uses its APIs, with no need for additional copies.
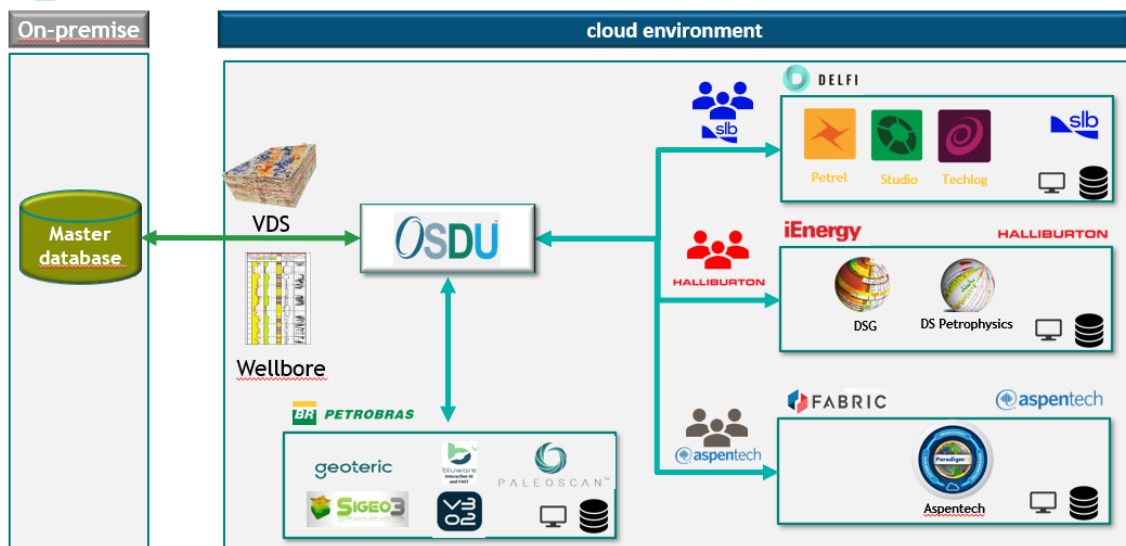

Figure 1: A diagram of the OSDU® Architecture at PETROBRAS, displaying the main environments used as interpretation platforms and their respective data ingestion and delivery workflows.

As a cloud-native platform, one of the first important decisions—given it involves the heaviest data flow—was to define the seismic file format to be used in OSDU®. This led to a technical and strategic decision by the company to adopt the VDS (Volume Data Store) format.

The seismic files received in SEGY format—an older but widely used industry standard—had to be converted to the VDS format, as SEGY is not optimized for cloud environments. This conversion brought significant improvements in loading performance and storage efficiency. It also enabled the use of streaming, where data is retrieved on demand as needed. In contrast, with SEGY, the entire dataset must be transferred and loaded onto the machine, regardless of size. With VDS, only the requested portions are loaded, making the process much more efficient.

PETROBRAS is pioneering the implementation of the platform as an environment for interoperability and collaborative work between applications (Figure 2). As a result, this phase also involved engaging partner software companies to adopt OSDU® standards, enabling the consumption of ingested data, including compatibility with reading VDS files (Figure 3). Several attribute adjustments and access refinements were necessary to ensure that this information could be properly interpreted across all interpretation platforms.
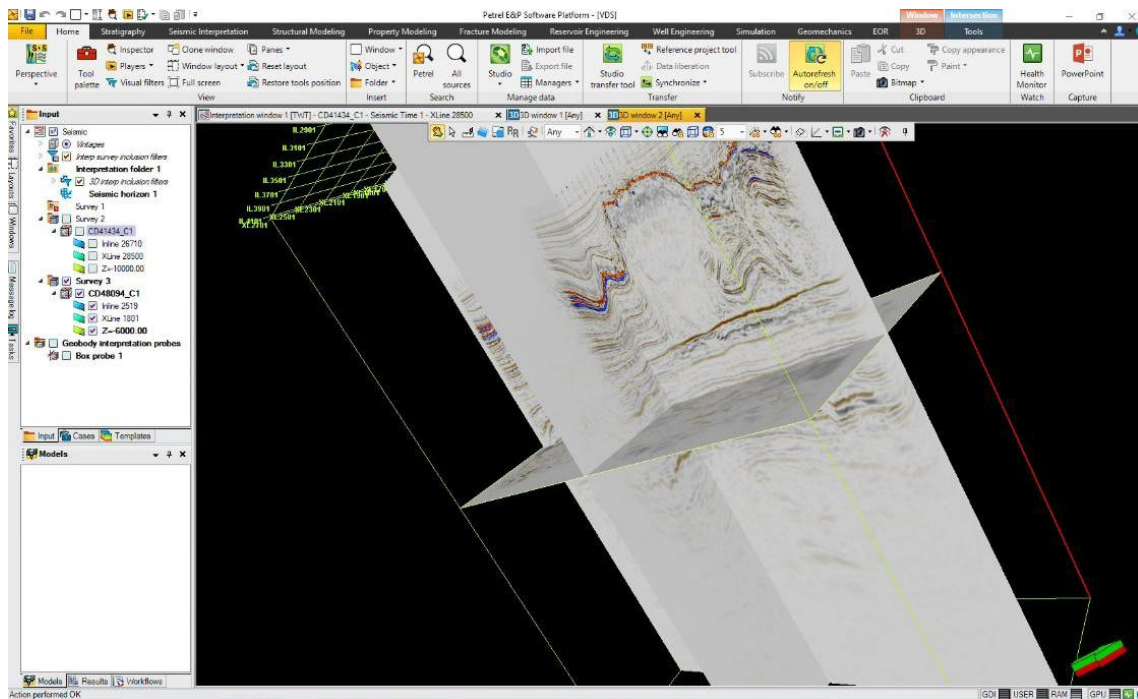
Figure 2: Petrel in the DELFI environment reads VDS files from OSDU® and converts them into the Petrel project using its native format.
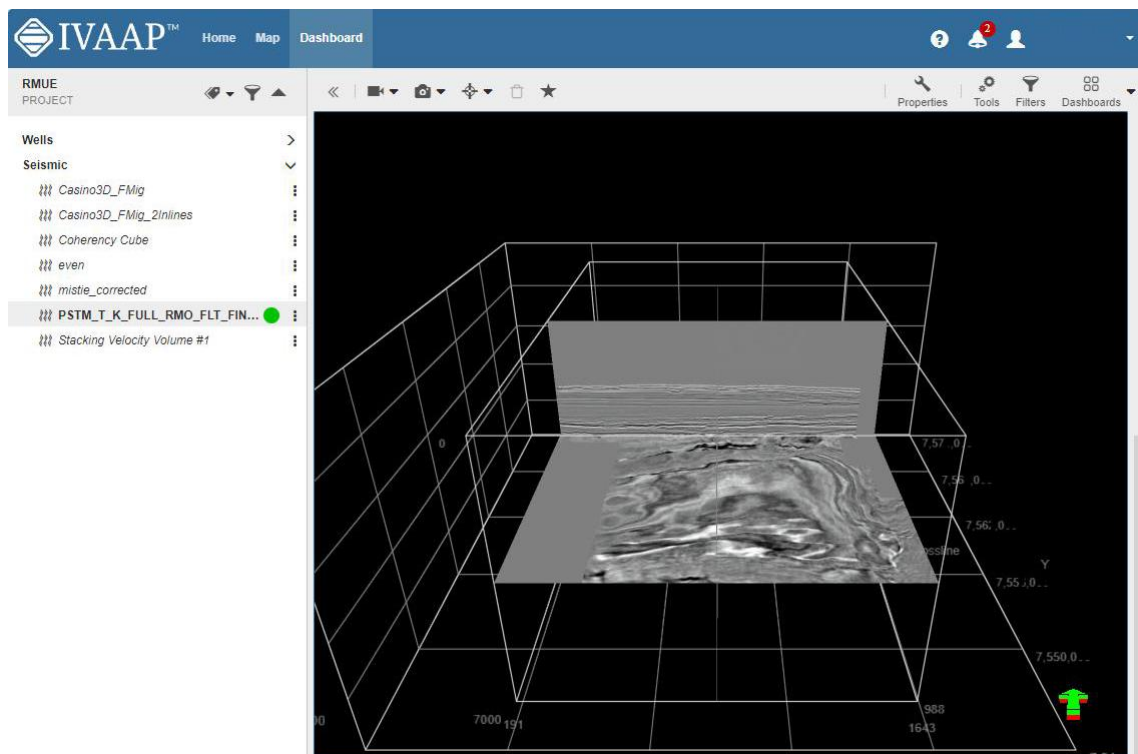
Figure 3: The IVAAP displays the same seismic dataset retrieved from OSDU® and previously accessed by Petrel.

Conclusions

The OSDU® journey at PETROBRAS is currently in Phase 1, where the focus is on providing the key data required to start an interpretation project in a standardized and unified way. The goal is to optimize the time spent on data loading, searching, and copying. Looking ahead, PETROBRAS aims to expand the OSDU® environment by integrating additional partner applications, enriching the data with attributes essential to various workflows, and incorporating critical geological and geophysical elements—such as faults, horizons, and property grids—generated within interpretation platforms. These data types are not yet centralized or accessible across different software solutions. Furthermore, the roadmap includes extending the platform's capabilities to support parts of the reservoir simulation workflow, reinforcing PETROBRAS's commitment to building a robust, interoperable, and data-driven subsurface environment.

References

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