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Centralization of Pertamina's Drilling and Well Intervention Database with Dreamwell Application

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Abstract. One of the major issue in Pertamina Subholding Upstream is there is no centralized drilling database. Most of the data spreads in several different applications and is collected without further analysis. Seamless synergy in SHU can be aided by centralized data and daily drilling reports in a database system to aid in the effective and efficient integration of data management. Pertamina DreamWell Drilling Database is a website-based application that aims to centralize data consisting of drilling program, Authorization for Expenditure (AFE), daily drilling report, lesson learnt and Final Well Report. The offline version is also available in JSON format in order to anticipate the lack of internet network on some locations. Data can be accessed based on the role management system in the DreamWell app, by both SHU, region and zone Drilling Manager, Drilling Engineer, and Company Man. DreamWell app is supported by a Single Sign-On (SSO) system that is integrated with the email database in the Pertamina server, so it can be mapped based on the role management system. DreamWell app will generate output in the form of an interactive dashboard, well data, single well, and reports. Some examples of output results are well profile, GIS map, well schematic, time vs depth, drilling parameters graphs, PT/NPT pie chart, benchmark, lesson learned, etc.

DreamWell app has additional features of drilling tools, including stuck pipe handling, well control, and economic fishing time worksheet. DreamWell app is a real-time application and also features a user-friendly display that allows the top management users to monitor data output efficiently, efficiently, and easily. Drilling data will be centralized in the application for analysis, which might serve as an early information source to aid in decision making during specific occurrences or situations that need decisions or policies (decision support system). Furthermore, this application aids in the collection of reliable data, allowing the suggested drilling program to be derived from the database's data assessment findings. Dreamwell is equipped with evaluation of cost and drilling performance monitoring. It is expected that drilling operations would run in accordance with the investment project's objectives or targets, in terms of on schedule, on budget, on scope, and on return (OTOBOSOR).

Keyword(s): Drilling; Database; Data Management; Realtime Database; Decision Support System; Web Based Database.

1 Introduction

Daily reports of drilling operations are received by Subholding Upstream (SHU) regularly (daily drilling report) from several regional with diverse formats, taking a lot of time to manage data. Therefore, in an effort to accelerate these needs, the creation of the DreamWell Drilling Database application is carried out to create a standard daily report format for drilling operations so that data management can be done effectively and efficiently.

Pertamina DreamWell Drilling Database application is a website-based drilling database application whose data consists of programs, daily drilling reports, time versus depth charts, NPT graphs and data output in several types of graphs. The DreamWell app can be accessed anywhere and anytime, as long as the internet is available. The DreamWell app is also available in offline mode with JSON format to anticipate if there is a remote area that is still constrained by the internet network.

Data and report centralization in Dreamwell database system can support the creation of synergy between DWI Subholding Upstream (SHU), Regional, and Zones. DreamWell Drilling Database application has visuals that are easy to understand (user-friendly) for all users. Daily drilling data (summary, depth, and hours) inside the database, provides output so that it can provide relevant references. Here are the purposes of creating the application:

- Built by internal Pertamina, improved software infrastructure to support planning, evaluation, and provide technical assistance / support for drilling activities, especially engineers both in the office and in the field.
- Build a database system according to Pertamina's needs that is integrated to meet the need of engineers and management.
- Provides a general information structure which is easy to understand by stakeholder, so it will be more organized in creating databases.
- Interactive dashboard with form of graphics and text, for accountable decision making.

2 Method

Pertamina DreamWell Drilling Database has several features such as :

A. Access Security

In accordance to company regulation, security policy including user log-in, access, and use of information in the system, Pertamina Dreamwell Drilling Database adapts server access control system such as Rule Base Access Control and Identity Base Access Control. User access validated through SSO (Single Sign-On) method managed by the company

B. Role Management System

Dreamwell adapts Principle of least privilege. User access should be limited according to the principle of least privilege, which means setting the most precise privileges possible so that the user can successfully do their job based on his/her task. Pertamina DreamWell Drilling Database role management access system, automatically categorized users based on organization hierarchy, job position and work locations which create specific access and authority. DreamWell users categorized as follows :

B.1. *Subholding Upstream (SHU)* and Regions

As Subholding Upstream (SHU) and regions, user allowed to monitor both program and actual data from any drilling and well intervention operations in region(s). Data displayed in dashboard based on daily, weekly, monthly, and annual report.

B.2. Zone Drilling Manager

The Zone Drilling Manager user has a role to review and approved drilling and well intervention planning and daily operation report which created and submitted by its subordinate (field). As the results of information appears on Dreamwell output for this user shows in the form of graphs and text to allow quick respond. Since actual data are well profiled, trajectory, time vs depth & cost, DDR, BHA details, daily cost, drilling parameters (WOB, RPM, average flow per day, SPM, torque, average of SPP, ROP, depth per day, cumulative cost per meter), and PT & NPT pie chart in each section deliver in authentic data, analysis and decision can be made accurately.

B.3. *Zone Drilling Engineer*

The Zone Drilling Engineer user has a role to create well data both program and actual, consist of general well info, times vs depth & cost, drilling hazard, plan formation, hole & casing data, rig data, bulk items, program directional survey; AFE data; and Contract data. He/she also has a role to review and approve daily operation activity report created by zone company man

B.4. *Zone Company Man*

With program data already created by zone drilling engineer The Zone Company Man has a role to input daily drilling report including rig activity, progress depth and NPT duration; and daily cost report data in accordance

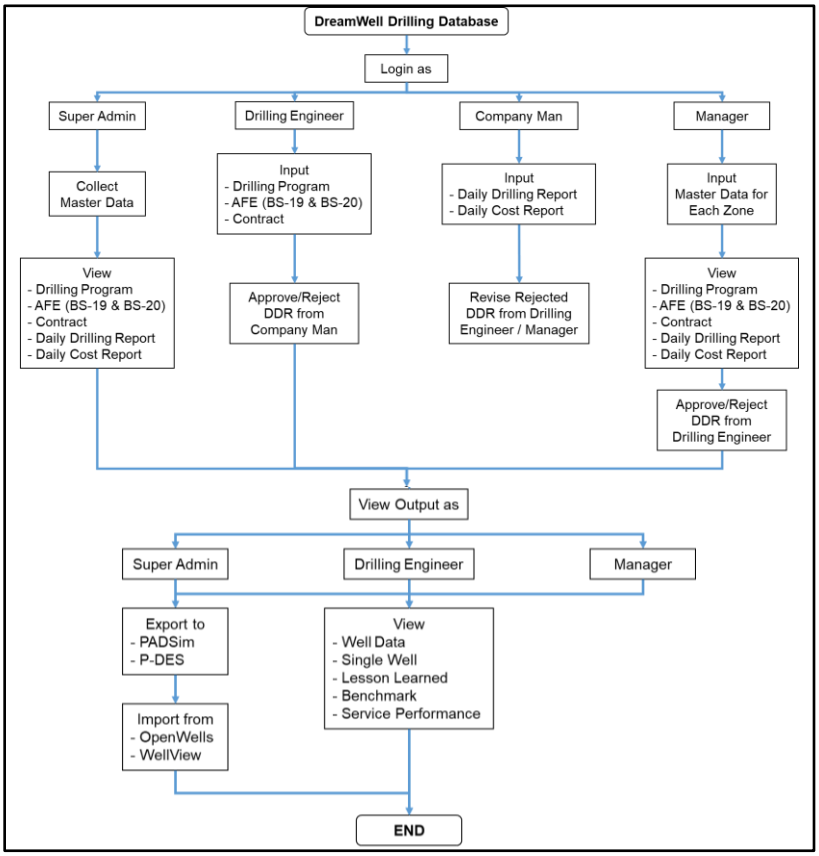

Figure 1. Dreamwell Drilling Database Application Work Flow
(Dreamwell Team, 2022)

3 Results

Dreamwell is a web-based application that does not require a license but users can be automatically filtered by SSO log-in company system. As user inserting new data in the system, automatically updating pertamina catalog in Master Data Dreamwell which beneficially in designing next drilling and well intervention operations.

Dreamwell also act as a tool to standardize the reporting formats that describe the company's identity (Pertamina), standardizes the use of the well datum, unit of measurement (UOM) and the calculation of service performance from well operations through PT/NPT calculations based on IADC standards. Dreamwell integrated with ArcGIS geo positioning system, and made interactive, smart, and data-driven mapping system as location intelligent for further analysis.

Using data stored in the system, DreamWell can also perform static calculations by using static page stuck pipe, well control, and economic fishing time features to support engineers in the field to be more effective and efficient. And also, with machine learning method implemented to the system, Dreamwell can predict ROP value and used as reference to design next well effectively.

In addition to enhance the user experience, Dreamwell dashboard display the plan and actual cost and services performances (PT / NPT) of the Region - Zone - Work Area - Field - and Well in accordance with the role hierarchy and work area of each user made interactively. Well Data menu is a menu of program data processing and actual results of each well. Data output consist of well profile, trajectory, time vs depth, DDR, BHA details, daily cost, and plan time vs depth & cost.

Output data on the well data menu which is the result of processing program and actual data.

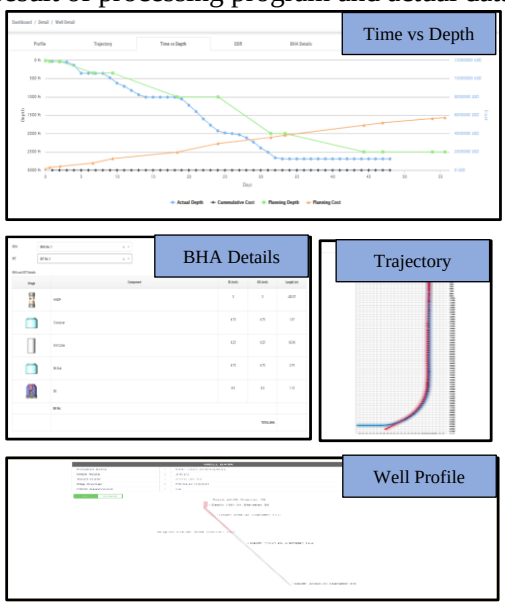

Figure 2. Time vs Depth, BHA Details, Trajectory, dan Well Profile
(Screenshoot of Dreamwell Drilling Database Application, 2022)

Output data on the single well menu which is data from each well.

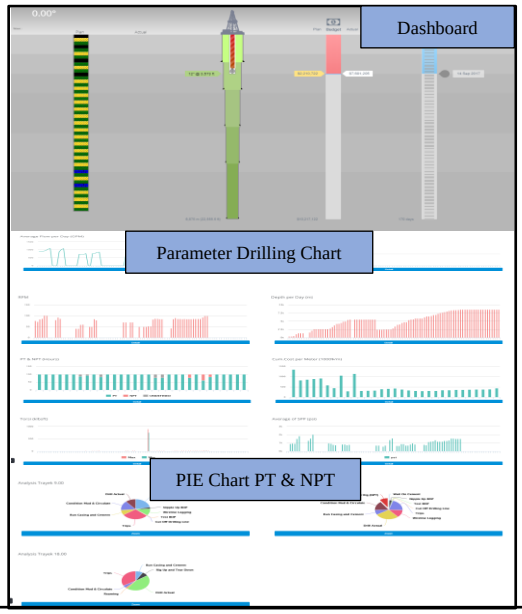

Figure 3. Dashboard, Parameter Drilling Chart, and PIE Chart PT & NPT
(Screenshoot of Dreamwell Drilling Database Application, 2022)

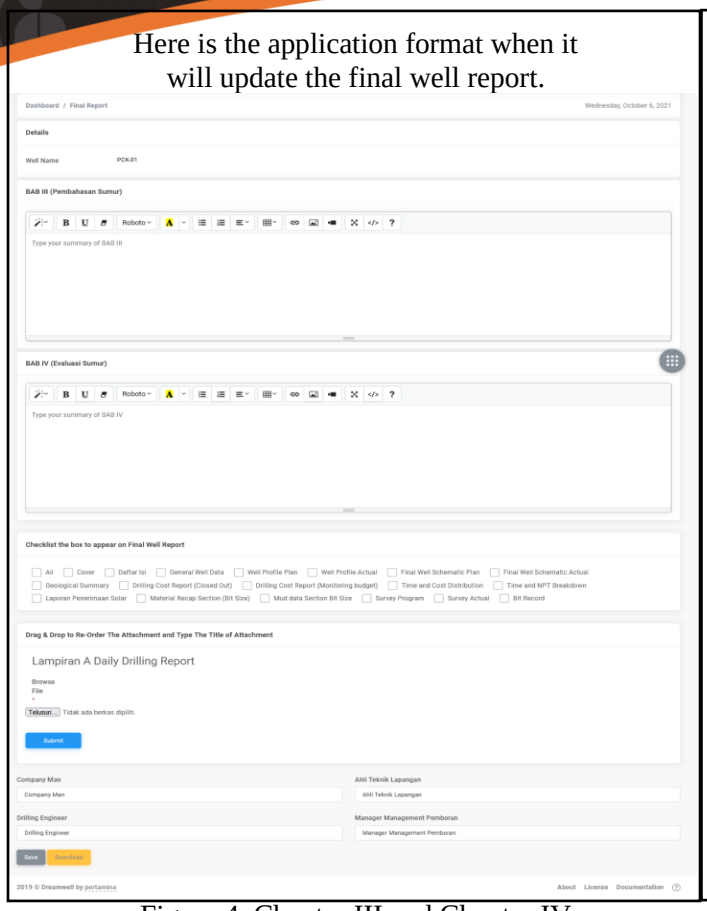

Figure 4. Chapter III and Chapter IV Filling Formats in Final Well Report (Screenshoot of Dreamwell Drilling Database Application, 2022)

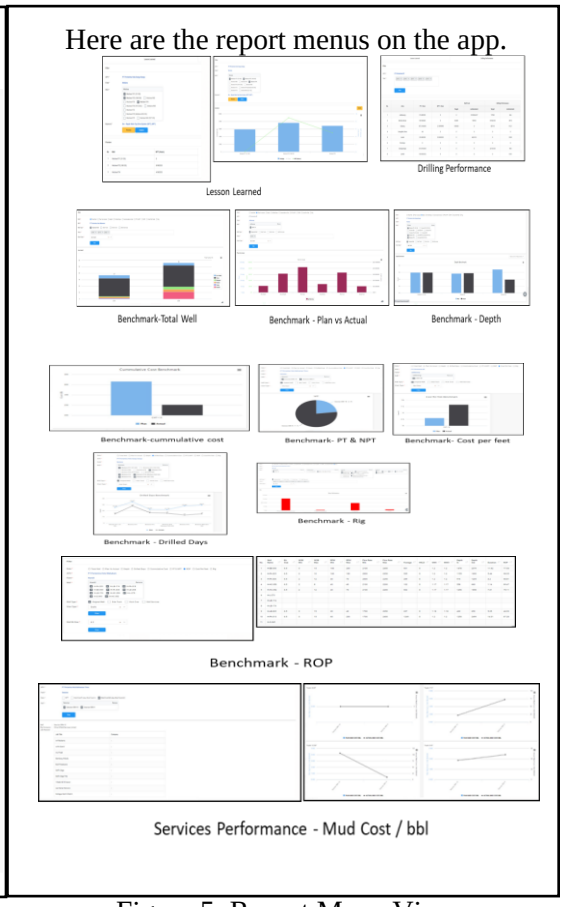

Figure 5. Report Menu View (Screenshoot of Dreamwell Drilling Database Application, 2022)

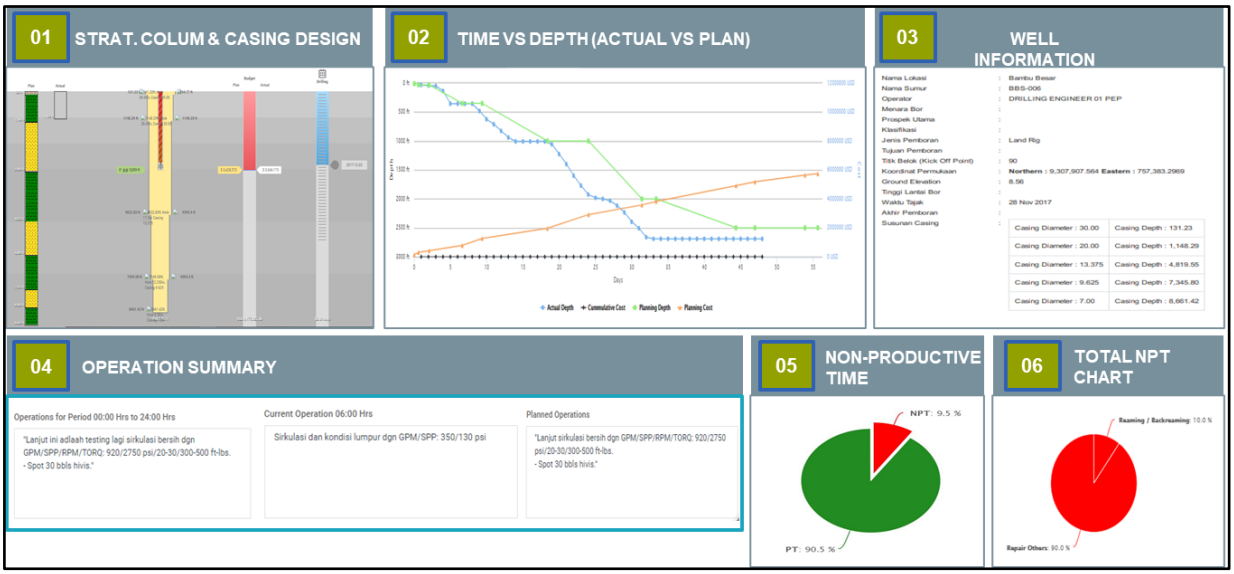

Figure 6. Dreamwell Drilling Database Application Dashboard (Dreamwell Team, 2022)

4 Conclusion

In line with transformation digital strategy in Pertamina, Dreamwell Drilling Database is not only transforming business process to digital but also a road to holistic transformation (process, type, and technology). Dreamwell integrate big scale of upstream business process from subsurface to drilling. Dreamwell gives the opportunity for Pertamina as a database and tool to manage the big data for better operation and drilling performance. Dreamwell is also a tool to combine the databases which vary in multiple fields of Pertamina in Indonesia. This integration between technical, operational, organizational and also module application acting as robust method.

As the business growth, development of Dreamwell continue improving its features related to big data optimization using machine learning for geomechanics dashboard, and combat loss advisory.

References

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