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Tapping into a well of Big Data

An ambitious approach to the big data problem is paying big dividends for Indonesia's largest and most successful oil and gas producer.

With a determination to increase productivity and enhance safety, oil and gas producer Pertamina Hulu Mahakam implemented a one-stop-shop for its operational big data. In the process it has provided greater protection for the environment and local communities, while delivering millions of dollars in savings each year.

Client in focus

Oil field in Mahakam area was discovered in 1972, located onshore and offshore of East Kalimantan. In January 2018, the Pertamina Hulu Mahakam acquired the Mahakam oil and gas block. The block is expected to produce 48,271 barrels of crude oil and condensate per day and 1,110 million standard cubic feet of gas per day.

The challenge

Pertamina Hulu Mahakam's (PHM) oil and gas block in East Kalimantan is one of Indonesia's largest blocks. Stretching over a vast area of nearly 6,000 square kilometres, the field's production facilities consist of around 860 well platforms and 2,450 wells onshore and offshore. It can boast more than 2,000 kilometres of pipeline and 41 Gathering Testing Satellites, all controlled via six processing hubs. Scores of oil rigs and barges help drill up to 100 wells each year, while operations also require the coordination of a fleet of more than 300 vessels.

Managing these assets and ensuring the company's activities are productive and safe presents an enormous challenge. In emergency situations, a clear understanding of its operations is even more critical.

To monitor and control its operations, PHM runs hundreds of software applications, managed by a variety of different business units scattered in often remote areas across the Mahakam site. This approach generates a significant amount of big data that, until recently, was effectively isolated in information silos, making it difficult for units to compile, share and analyse it efficiently and effectively.

The solution

At the heart of PHM's solution is a web-based, enterprise mapping portal that provides access to operational data for thousands of users across the Mahakam site.

By incorporating information from each of the company's core business units – including safety, environment, geoscience, construction, drilling, logistics and security data – the webmap gives personnel a comprehensive view of the entire Mahakam operation. Being accessible from a web-browser, it can be viewed from remote locations on a range of mobile and fixed devices without the need to install a specific desktop application.

The portal displays a variety of information that supports everyday decision-making and planning, such as:

- The precise location of pipelines and valves throughout the site.
- The real-time position of every vessel in PHM's fleet.
- Detailed descriptions of the type of operation being undertaken at various wells, and by specific equipment and operators.
- Critical environmental data that covers bio-diversity, water quality and real-time weather conditions.
- Socio-economic data on surrounding communities, such as population numbers and the location and condition of public facilities and social infrastructure.
- Exhaustive information on local fishing industries, including individual business locations and seasonal activity.
- Topography overlays to provide additional context.

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Novandy Ritung
Head of Data Management & Mapping Services, Pertamina Hulu Mahakam

Since the portal was introduced, it has recast our emergency response. Our crisis management teams are now given real-time access to mission-critical information from their desktop or even out in the field.

Novandy Ritung
Head of Data Management & Mapping Services, Pertamina Hulu Mahakam

The portal has been used to support and bolster productivity and safety in virtually all PHM's Mahakam business operations.

For example, barriers to access points can now be identified and mitigated or avoided, vastly increasing production; while safety officers can now examine the impacts that production, inspection, construction and other work undertaken on the same site have on each other and better allocate work permits.

In the case of an oil spill, or other emergency, management crisis teams are now given real-time access to mission-critical information for analysis and decision-making. Without leaving their own specific locations, members of the team can use the portal to conduct simulations of the spill, identify safe stand-by locations for assets and determine which areas of the local population have been, or are likely to be, affected.

The innovation

In developing a one-stop-shop for all its Mahakam operational data, PHM is demonstrating to the region's oil and gas sector how the use of geospatial technology can drive productivity and safety advancements. By combining a disparate range of big data that is spread across a vast geographical area and held throughout many diverse business areas, the company has pushed the envelope in what can be achieved.

The company has also revolutionised the industry's approach to emergency response. By providing decision-makers with real-time access to comprehensive information as a crisis unfolds, PHM can limit the impact of oil spills on the surrounding environment, communities, other local industries and its bottom line.

PHM is continuing to expand its use across the enterprise and is dedicated to finding new and innovative uses for the technology that will continue to increase ROI.

The outcomes

Throughout PHM's Mahakam oil and gas operations, the adoption of its enterprise-wide portal has resulted in faster and more comprehensive information sharing, analysis and access. This has resulted in productivity gains estimated to be worth more than 20-25 million standard cubic feet per month, in gas volume. It has also significantly enhanced safety and ensured the company is meeting its strict environmental obligations. Other related outcomes include:

- **A simpler and more efficient visualisation** of the company's emergency response strategies that includes evacuation, mobilisation, deployment and socio-economic and environmental impacts.
- **Greater coordination and collaboration with external parties**, such as government, industry stakeholders and the local community.
- **Improving environmental management** in the areas of air dispersion and environmental and biodiversity monitoring.
- **Increased data security, reliability and accuracy.**
- **A shift to paperless processes** that both lower costs and reduce the company's environmental footprint.

Solution mix

- ArcGIS Server
- ArcGIS Online

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