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Safe and Sustainable Operations Augmented by Digitalization

Two use cases are described where digital transformation has tangibly benefitted PGS HSEQ management: A HSEQ Categorizer tool to reduce the time and effort historically spent on reactive incident management, and another tool to analyze and manage free-text and metocean data related to small workboat activity.

Verdantix Innovation Excellence Awards

Verdantix is a research and advisory firm that acts as an essential thought-leader for world-enhancing innovation. The purpose of the Verdantix Innovation Excellence Awards is to identify innovations and technologies that can help the EHS (Environment, Health, and Safety) and ESG (Environmental, Social, and Governance) community improve processes, management and reporting. The awards, which celebrate the technology pioneers that are defining best practices through applied innovation, attracted a record number of global entries in 2022, with companies from as far afield as Vietnam, Australia and India taking part.

Award winners and nominees are users of technology not vendors of technology. Reflecting the prestige of the awards, previous Verdantix Innovation Award winners include Volvo Cars, EDF Energy, DHL, Johnson Controls, Kinder Morgan, Nestle, Total and Walmart.

PGS won **Safety Performance Improvement** with its incident management tool that utilizes AI (artificial intelligence) to identify trends, automate alerts and proactively prevent incidents. The development of this tool, described below, was precipitated by learnings from an incident in West Africa that highlighted how easily key information is lost in traditional data collection systems.

HSEQ Categorizer: A Smarter Way to Monitor and Categorize Safety Issues

As a global marine seismic acquisition provider, PGS must strive to be a leader in health, security, environment, and quality (HSEQ) management. An ambition of zero injuries to people—including employees, contractors, anyone involved in operations, and people visiting the company's sites—necessitates continual revision to best practice methods.

Problem	
	Inability to act on information from 7500 observation cards per year
	Inability to discover trends from scattered observations
Feature	
	Automated report presenting statistics on different HSEQ categories
	Email alerts based on thresholds
Value	
	Proactive prevention of incidents
	Demonstrable commitment to HSEQ
	Improved vessel-office communication

In the past, PGS crew members logged actual and potential safety issues into a card-reporting system. With between 6 500 and 7 500 issues logged annually, it can be difficult and time-consuming to analyze all the data and extract insights. Ideally, it would be possible to identify and track trends, and see how the prevalence of certain issues has changed over time.

In February 2020, PGS experienced a safety incident off the coast of Angola. Subsequent investigation showed that some of the equipment involved had issues reported in various observation cards scattered around the fleet in the time leading up to the incident. That key insight was hidden in the ocean of free-text data. A smarter way of monitoring and categorizing safety issue reports would help PGS improve crew safety and take a more proactive approach to incident management.

Building a Tool in Cognite Functions

Together with our partner Cognite, PGS worked together to ingest observation cards from the reporting system into Cognite Data Fusion™ and sort the different observations into larger categories. Based on input from PGS' HSEQ Manager, PGS developed an application called HSEQ Categorizer to sort and categorize the free text based on keywords. HSEQ Categorizer is hosted on Cognite Functions, a service enabling users to deploy Python code to Cognite Data Fusion™ that can be called on-demand or on a scheduled basis.

The organized data is then visualized in a Power BI dashboard, which enables users to set up alerts and be proactively notified if, for example, reports concerning small boat operations increase. The application looks for the presence, exclusion, or combinations of certain words. For example, if a card contains the words "smoke," "fire," "sprinkler," "overheated," or any other similar keywords in a group of more than three dozen, the observation is classified as a fire hazard.

PGS can extract knowledge about trends that are monitored in a large number of reports, without spending many hours of manual work. Automated alert notifications, if issues are raising with the areas of concern, are then brought up on the safety meetings with the vessels (discussion on the observed trends is now a formal part of the ship-to-shore meeting agenda) and proactive actions taking place.

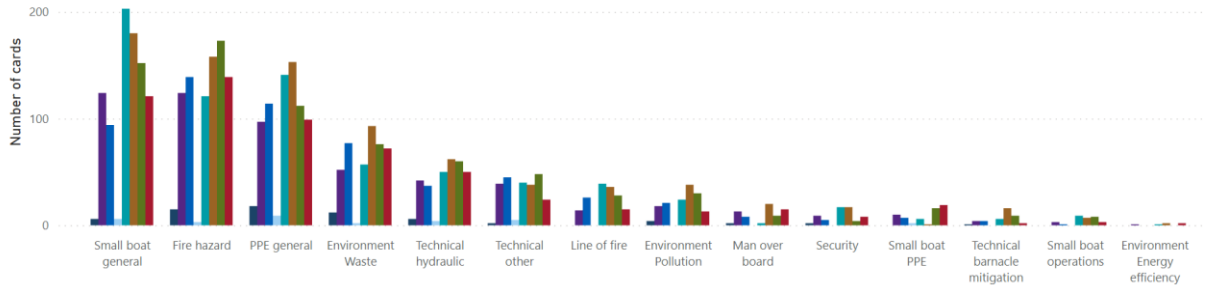

Figure 1. Number of observational safe cards over a 12-month interval color-coded by vessel. Statistics can be analyzed by vessel or category, used in trend analysis, and used to initiate automatic notifications. Text-based reporting is systematically tracked, along with immediate actions taken, and recommended mitigations.

An example of this working in practice is related to PGS' Personal Locator Beacons, PLBs. The unit is attached to the lifejacket and aids in locating any crew falling into the water. Several observations related to PLB appeared from different vessels and spread in time – meaning, the trend would be very difficult to notice without the system in place. These findings were brought to the attention of the supplier, who in turn decided to change the design of the PLB. PGS expects this will improve crew safety from now on.

The system is also used to monitor the target numbers of safety observations filed by each vessel. If numbers fall over a 30-day period, the vessel is alerted, and causes are discussed.

Business Impact

With proactive prevention of incidents in place, PGS is reducing the time and effort spent on reactive incident management. Using digitalized outputs, the company has become more responsive to the vessel crews, can act faster when issues arise, and is able to demonstrate its commitment to safety more transparently to customers. Digital management of HSEQ data shows it is possible to set up an automated analysis of large amounts of text as live data. Quantifiable improvements include high rates of user adoption, reduced LTIR (Lost Time Incident Reporting), and cost savings.

Other PGS departments have noted the system capabilities and are working to expand the scope to include technical categories such as the monitoring of trends in equipment-related issues reported as observations.

New benefits are continually identified, including an example where follow-up actions to a security-related observation prevented possible GDPR implications.

Small Workboat Risk Mitigation

Small workboat activities represent a daily component of marine seismic operations and present a high-risk exposure. Where feasible, PGS sought to reduce workboat exposure hours, but had no systemized overview of usage, reasons for workboat activity, or associated trends. All historical data had to be manually accessed, filtered, and analyzed. Data quality was not monitored either, which made data collection rather informal. With easier access and visualization of relevant data, PGS expected that insights and learnings derived could improve our safety levels and avoid potential incidents or exposure.

Problem	
	There was no means to easily visualize and analyze significant workboat activity each year
	Small boat operations are associated with serious historical incidents
	Small boat activity was being logged but not being analyzed
	Quality of data entered was not monitored
Feature	
	Automated report documenting usage per individual workboat
	Automated data collection
	Overview of maintenance jobs per part affected
Value	
	Accurate resource planning for workboats
	Save on maintenance by ensuring equal usage of workboats and appropriate change intervals
	Identify opportunities for exposure reduction

Working again with partner Cognite, PGS worked together to ingest the data from the relevant reporting and maintenance systems, including metocean data, into Cognite Data Fusion™.

PGS can now identify and track trends and see how the prevalence of certain issues has changed over time.

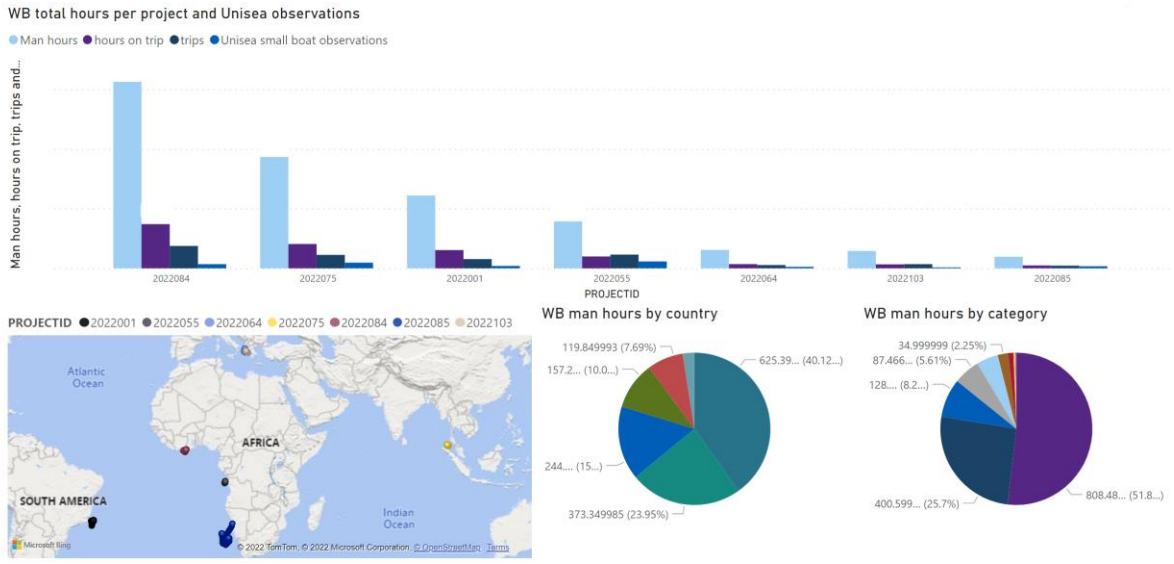

Figure 2. Example dashboard used to analyze comparative workboard project statistics and usage.

Business Impact

Through analysis of small workboat activity such as work duration or maintenance information, PGS has been able to better determine critical spare part levels for vessels going to remote or difficult areas such as Brazil where there are challenges with the importation of spare parts and a high workload on the small boats.

Comparative activity of each small workboat across the PGS fleet can now be analyzed to ensure there is a balance in usage of each asset. Differences in workboat exposure between vessels and operations can be understood, translating to better asset utilization, avoidance of technical downtime, better inventory management, and less exposure to the crew.

The workload of the coxswains and crew is now better managed to ensure sufficient manning through better awareness of conditions where additional personnel may be required, before the seismic vessel arrives on a project

location. Unnecessary cost and exposure can therefore be avoided. Furthermore, workboat statistics are also being used to create meaningful business value for other technologies under development and identifying new ways of working offshore. Automated report generation is now practical, and PGS is progressing towards automated data collection.

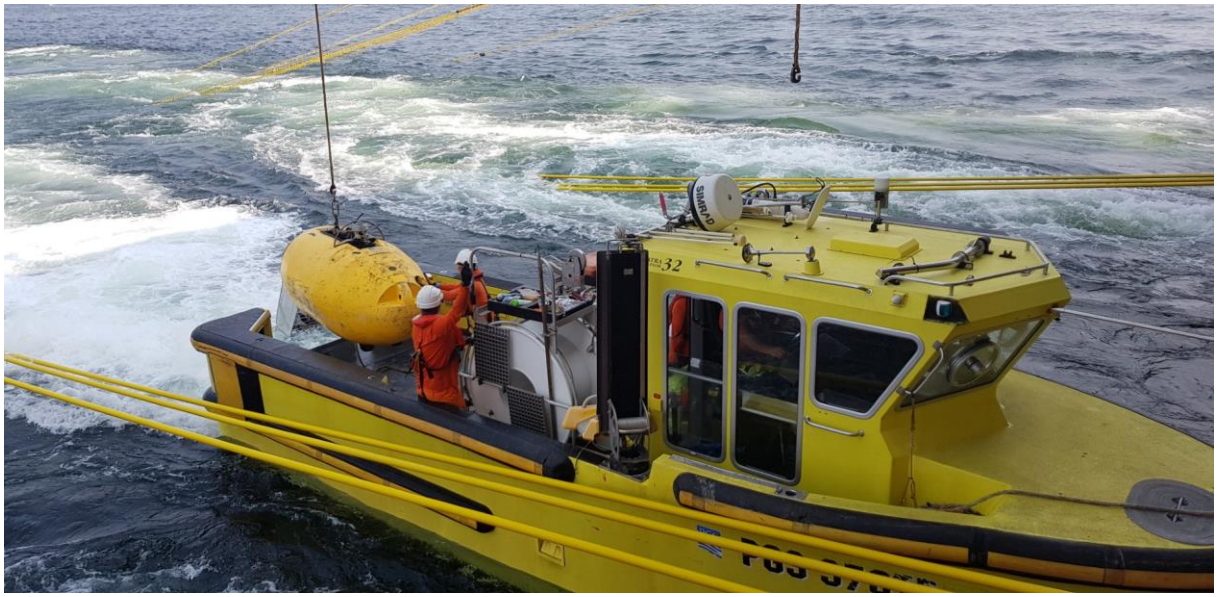

Figure 3. Small workboat operations involve diverse and complex activities in remote locations and under challenging conditions.

Summary

Digital transformation can improve business practices in almost all arenas of pursuit. The two applications to improved safety management briefly described here demonstrate the value of consistent and semi-automated data collection, the ability to analyze data across diverse global operations, and the transparent management of trends and best-practices for forward project planning. The free-text format of most HSEQ data presented a unique challenge to historical trend analysis. The smarter ways of monitoring and categorizing safety issues in many forms are now helping PGS improve crew safety, improve inventory management, reducing costs, and enabling a more proactive approach to incident management and prevention.

Acknowledgements

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