BUILDING A DREAM TEAM

Paul Courtenay, PGS, Norway, discusses the importance of investing in crew competence and teamwork for safe and robust operations.

In the oil business an undesirable event, incident or accident can cost the contractor or the customer tens of millions in lost revenues, cause delays and damage to equipment, and ultimately result in a damaged reputation costing immeasurably more. PGS has embarked on a project to better protect all parties by investing directly in crew competence: not just technical competence, but also teamwork and organisational competence. Such gains in crew competence have been proven to reduce downtime, insurance claims, operational and capital costs, and significant events by as much as 70%.

Coming out of a period of depressed spending on exploration, the direct benefit to both PGS and its customers has been to buck the trend and maintain sustained operational reliability with low reputational risk exposure and without changes to equipment or technical processes, but with a full focus on the human performance within a team and the larger organisation.

Traditional seismic vessel operations

PGS has been running 3D seismic vessel operations since 1991, initially using the traditional offshore crew structure universally adopted in the offshore seismic industry at the time. This structure historically comprised of a vessel operation split roughly down the middle between seismic (back deck and instrument room) activities and maritime (engine room, hotel and deck) activities.

At its extremes, during the 'bad old days' of seismic, one could have almost cut the vessel in half along a line between the engine room and the back deck, going upwards through the vessel between the galley and the instrument room, and it would have been some time before anyone would have noticed.

In this tradition, vessel activities have been arranged around line-reporting structures, and performance was, in the main, focused around individual department technical up-time, or rather the allocation of 'punishment' downtime: both lagging indicators that are not always useful in predicting future performance. The success of the seismic operation as a whole was largely left to senior management to take a view, and the levers they had available to influence activities on the shop floor were limited. This often resulted in direct interaction between senior management and field crews onboard the vessels.

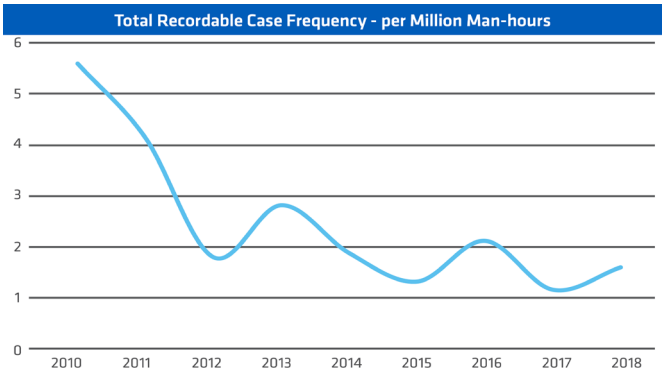

Figure 1. *Development of TRCF (total recordable case frequency) over the last 9 years clearly showing a reduction in incidents and a step-change in HSEQ performance.*

Figure 2. *Simulation includes interaction between multiple vessels on the seismic operation. Here a support vessel passes the Ramform, and is manned by a team in a second bridge simulator.*

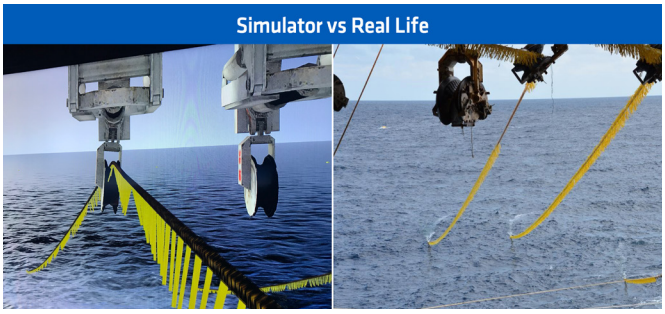

Figure 3. *Simulated and real back-deck and towed equipment. The simulator provides a high-fidelity learning environment.*

Seismic vessels are different

These predominantly function-oriented models work, to a degree, and have been in use since at least the 1950s with apparently acceptable results. The challenge comes when the sensitivity of a seismic operation to the robustness of the maritime systems is considered.

For example, should a cargo vessel or a cruise ship lose its main propulsion for 10 minutes during a voyage, the likely consequence is the delay in arrival at the destination by a similar 10 minutes. For a seismic operation, however, the dynamics are fundamentally different as they are towing many tens of millions of dollars of in-sea equipment behind the vessel. These seismic 'spreads' consist of long hydrophone and accelerometer sensor streamers, which are kept pulled-out wide behind the ship by so-called deflectors which require a minimum water speed of around 1.5 kts to function, and usually operate at between 4 and 5 kts vessel speed. A loss of propulsion could result in collapse, and potentially a total loss of the in-sea gear and weeks, if not months, out of production.

100% up-time is a fundamental requirement for the main maritime systems of propulsion and steering, just as it is with aircraft in the airline industry.

Not all breakdowns are attributable to technical defects

During 2010, in a relatively buoyant seismic market, any single day out of production for a vessel could mean substantial opportunity losses, and this triggered some deeper analysis of a number of apparently unconnected, unscheduled maritime breakdowns. There was no obvious link between breakdowns, although it often involved the running and maintenance of the main machinery, so PGS engaged maritime consultants PROPEL to dig deeper into the available data to see if they could find a link, and potentially a weakness in the technical systems. That analysis led PROPEL to the hypothesis that the failures, although technical in nature, were more than likely due to decisions, and more importantly, to the attitudes of those personnel responsible for operating and maintaining the equipment. A confidential employee survey on what PROPEL call 'cultural maturity' confirmed the hypothesis and highlighted areas of the seismic operational structure that created these attitudes and behaviours.

Circumstances that could be seen as barriers to a robust and optimised operation included:

- Outsourced maritime technical management on some vessels, where the maritime management company shared no contractual consequences of the losses in performance.
- Highly compartmentalised (silo) structures, both between maritime and seismic operations.
- Conflicting goals between different functions and responsibilities were not being managed for the overall or long-term best outcome.
- Planning of operations was, in general, short-term, with a high bias towards lagging indicators and a focus on collecting data on past performance.

With these insights, PGS embarked on a programme that would, over the subsequent five years, change both the onboard management processes and the onshore management structure, as well as the communication and decision-making processes.

'One Culture' – breaking down traditional barriers

Highest among the programme's priorities was to dissolve and ultimately remove the traditional work-practice barriers between the vessels' maritime and seismic operations, and for this reason the participants

in the early workshops chose the banner 'One Vessel: One Culture', abbreviated to 'One Culture' to be the slogan for the rollout. The use of the term emphasises that culture alludes to 'the way we do things around here', and is not referring to formal documented policies, procedures or standards.

Practical steps to achieving a cultural shift to move towards a more collaborative working mindset started with the formalisation of a number of team constructs that would define and give a clear identity to groups of individuals who should collaborate, clearly stating their responsibility, accountability and authority. These teams were defined as such:

- For each vessel the officers and seismic department chiefs form 'The Onboard Management Team' (OBMT) and the interface between the onshore and offshore management form the 'Vessel Management Team' (VMT).
- The 'Senior Vessel Management Team' (SVMT) manages fleet-wide and more significant issues.
- The highest-level interface between the main internal line-organisations is the 'VP Team', comprising the heads of the main line-organisations represented offshore.

The most crucial interface meeting between vessel and onshore management was guided by a prescribed agenda, ensuring a forward-looking and risk-focused approach. This helped move on from the old ways of prioritising actions based on the 'here and now', and shifted the focus to those events in the future for which planning could reduce the risk to performance, safety or project timeline.

However, any team construct is just an idea unless the members of that team share an intrinsic camaraderie and practiced rules of engagement.

Simulators: practice makes perfect

PGS (in collaboration with Kongsberg and the University of South-Eastern Norway (USN)) have been running courses using purpose-built simulators to train and raise the bar on operational competence. The approach taken by PGS to develop inter-personal competencies was to utilise the very same simulator infrastructure and facilities with a different agenda.

Back deck and maritime simulators

The simulators were originally built at the university to replicate the seismic 'back-deck', bridge and engine control room of the unique Ramform seismic vessels. Crews could realistically perform tasks in the high-fidelity simulator such as deploying and recovering seismic streamers, and dealing with problems should a piece of hardware fail in the water. Similarly, crises such as tangling of the streamers could be simulated, and the crews learnt the best practices established across the fleet.

During the last six years, 35 courses, covering 96% of the relevant crew, have achieved an exceptionally high level of competence. This is reflected in reduced technical downtime and improved asset life of the towed equipment. This in turn delivers a faster and more reliable service to the customer, with improved quality and operational robustness.

Maritime officers within PGS and its key contractors have been trained in how to manage critical tasks such as in-line offshore bunkering (seismic vessels cannot stop to take on fuel during a project), while the support vessel crews contracted by PGS have also been able to run simulations of their support function before entering the field.

Focus on communications

With the above foundations of technical competence training in place, and using the principles of CRM (Crew Resource Management) and BRM (Bridge Resource Management), PGS and the University of South-Eastern Norway have developed a course to focus almost exclusively on the communication competencies needed for a high-performing team. The three-day intensive course for the Onboard Management Teams (OBMT), called 'OBMT Critical Situation Training', is pitched to encourage these managers to practice and experiment working together across the traditional functional silos in a safe environment ('safe' meaning there is no risk to the vessel or seismic equipment). The course also includes the contracted support-vessel crew to integrate them into the overall operation. The One Culture concept aims to improve the coordination and integration between the bridge and back deck to mitigate incidents and better manage them should they occur. This approach is known as Marine Resource Management (MRM).

The course aim is primarily to allow the onboard management to experience operations in critical situations within the team. The application of appropriate procedures and best practices for equipment deployment/recovery, and HSEQ procedures to use in critical situations and how to execute them, is therefore an integral part. The sessions in the simulator are scenario-based, using familiar and realistic situations, allowing the participants to discover firsthand what optimal performance can be like for interaction between the control room, back deck, engine room and bridge during operations, and specifically, during a crisis. This provides the team with a competence that would otherwise only be tested during a real incident. Each course is compiled using interchangeable simulator modules. Each scenario, developed together with USN, starts with a briefing and ends with a de-brief. The goal is to create a realistic learning arena for the crew who will be making the decisions in the field.

In addition to practical simulator sessions, classroom group work allows the team members to reflect upon what a functioning OBMT looks like, what it is intended to achieve, and which areas require focus to develop the team.

Concrete benefits from investing in people

The investment in this training has been significant: simulator infrastructure, staff from USN, travel and overtime for the participating crew, management from PGS being present at various parts of the course, and so on. The gains in competence, however, are also significant. Competency in teamwork and interaction, as well as in working in stressful situations, should they occur, means the crew are equipped to manage the scenario by understanding the communication processes. This has delivered clear and measurable cost savings. From 2010, PGS technical downtime for combined maritime and seismic operations has been reduced by up to 50%, significant incidents have been reduced by 70%, and insurance claims and the severity of incidents have been reduced to low and sustainable levels not seen before in the seismic industry.

Figure 4. *PGS Maritime Technology Advisor, Einar Nielsen, explains the workings of the Ramform Bridge Simulator to Norwegian Crown Prince Haakon.*