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INTRODUCING THE V-SENTINEL AUTONOMOUS CONDITION MONITORING SOLUTION FOR SUBSEA CONTROL SYSTEMS
The Problem
Monitoring the condition of subsea assets is made difficult by the inaccessibility of the equipment and relies predominantly on the monitoring and reporting undertaken by the subsea control system. The diagnostics from conventional control systems tend to react to problems that have already had an impact on functionality. The subsea control system recovers vast amounts of housekeeping and sensor data but archives most of it. The consequences of fault reporting after the event leads to a reactive and costly intervention and repair regime, potentially coupled with a loss of production.

The Solution
V-SENTINEL™ is a monitoring and reporting system that utilises artificial intelligence to analyse the returned subsea data in real time in an autonomous and continuous way. V-SENTINEL will then communicate alarms to the control support engineers whenever there is a significant change in the pattern of data. The computational intelligence employed means that V-SENTINEL does not rely on mathematical modelling or understanding of the system and does not rely on fixed alarm thresholds as in conventional systems. V-SENTINEL learns the normal relationships between data streams and uses adaptive threshold and decision making to determine if an abnormal condition exists. Then through initial system training and continuous learning, faults can be identified earlier, and therefore predicted by evaluating data deviation from the norm. V-SENTINEL utilises historical data, integration test data, commissioning data and early usage data for the training /learning stage. During normal system operation, V-SENTINEL will then notify the support engineer of any anomalies ensuring early fault detection and therefore allowing a pro-active not reactive intervention.

Key Benefits
- Enables condition based maintenance
- Early fault detection
- Does not overload the system operators in the CCR or beach-based support
- Provides adaptive and dynamic decision support to flag problems
- Improves safety and integrity
- No physical installation subsea, therefore no production downtime necessary to implement

Key Features
- Installed in the topside master control station or a stand alone PC
- Can be retrofitted to brownfield applications
- Monitors data only and takes no executive actions
- Independent of host control system
- Can flag faults that it has never previously experienced
- Generates email to control system engineers attaching the particular suspect dataset
- Applicable to a wide range of problems seen subsea. Eg:
  - Electrical Insulation Resistance breakdown
  - Hydraulic leakage
  - Sensor validation
  - Mechanical wear
  - Valve characteristic profiling