Situational Awareness in the Offshore Digital Transformation Era
THE DIGITAL TRANSFORMATION ERA

• Digitalization will determine the future of nearly all offshore industries especially Oil and Gas
DIGITAL TRANSFORMATION IN SEISMIC OPERATIONS

- Multiple Data Sources Recorded Individually
- Paper or Non-Integrated Record Keeping
- Not Easily Analyzed

- Regulatory Compliance
  - Auditable records through digital data collection
  - GIS based SIMOPS
  - Digitally modelled operation optimization
  - Retrospective analysis to de-risk future operations
  - Enhanced Situational Awareness
ENDSLEY’S MODEL OF SITUATIONAL AWARENESS

• “Situation awareness is the perception of elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future”
  - Dr. Mica Endsley
MODERN DIGITALIZATION SITUATIONAL AWARENESS MODEL

- **Descriptive** reporting
  - *Question:* what happened? what is happening?
  - *Technique:* business reporting scorecard
  - *Example:* financial results, staff performance scorecard

- **Diagnostic** discover & explore
  - *Question:* why is it happening? where is the problem? what are the trends?
  - *Technique:* agile dashboards cause and effects
  - *Example:* risk analysis, workforce analytics

- **Predictive** forecast
  - *Question:* what is likely to happen next?
  - *Technique:* predictive modeling, regression analysis
  - *Example:* strategy & growth analysis, customer analytics

- **Prescriptive** anticipate
  - *Question:* what should I do? what is the next best action?
  - *Technique:* artificial intelligence, machine learning, simulation
  - *Example:* analytical applications with simulated outcome

Integrated Activity Planning
Optimize Geophysical/Geotechnical Operations
Digitize Offshore Logistics and Supply Vessel Ops
Enhanced Emergency Response
GIS Based SIMOPS

Source: Kongsberg
SITUATIONAL AWARENESS IN THE OFFSHORE DIGITAL TRANSFORMATION ERA

• Descriptive - Data Drives Situational Awareness
• Diagnostic – Digitalized Integration of Data Boosts Efficiency and Risk Mitigation
• Predictive – Digital Operation Optimization and Data Analysis
• Prescriptive – Industry lead data driven initiatives
DATA DRIVES SITUATIONAL AWARENESS
- DESCRIPTIVE

• One factor critical in preventing accidents is maintaining an adequate collection of data to understand the current situation.
**REAL-WORLD DIGITALIZATION INTEGRATION**

*Fishing Damage Claims*

- Case of proven impacts from auditable descriptive digital data:

  Fishing Industry claimed that seismic vessel had damaged and disposed of fishing buoy and attached gear.
  - Claim was for both damaged/lost gear and lost revenue

Auditable data proved that the seismic vessel was more than 50 km away from the equipment at the time of the claim and was even able to show another shipping vessel in the vicinity at the time of the event to assist with the investigation

- Planned operation around fishing activity to avoid any other confrontations and significantly reduce exposure to other stakeholders
- 6-figure financial savings on single project
**DIGITALIZED INTEGRATION OF DATA BOOSTS EFFICIENCY AND RISK MITIGATION**

- **Diagnostic**

- Integration and digitalization of the available data sources to create a common operating picture leads to efficiency gains and risk mitigations through heightened awareness.

- Unites all stakeholders, onshore and offshore.
REAL-WORLD DIGITALIZATION INTEGRATION

**Fishing Aggregation Devices (FAD's)**

- Case of proven Digitalized Descriptive and Diagnostic process

Heavy fishing traffic in the survey area. Both commercial and subsistence.

Digitalization of FAD locations that were integrated with an automated GIS based visualization software with live data views that forecasted activates based on available data sources to estimate FAD locations.

- Planned operation around fishing activity to avoid any other confrontations and significantly reduce exposure to other stakeholders
- 6-figure financial savings on single project

~45% increase in daily production
DIGITAL OPERATION OPTIMIZATION AND DATA ANALYSIS - PREDICTIVE

• Combining temporal project planning with 3D spatial situational awareness will support critical decision making to reduce operational risk, and improve safety performance.

• Creating common awareness through data collection as an industry will provide the information we need to maintain and expand our freedom to operate.
REAL-WORLD DIGITALIZATION INTEGRATION

**Obstructed Fields and Challenging Environments**

- Case of proven impacts from Digitalized Predictive Technology

Heavy activity in busy fields during OBS operation

All field operations (Diving, FPSO, Seismic, etc...) were able to be digitalized and planned for on a single integrated GIS and timeline based platform to improve efficiency and safety

- Planned operation around all stakeholder activity in a digitally integrated GIS and timeline based software to improve SIMOPS activity planning and Risk Mitigation
- Time and financial savings in the reduction of SIMOPS downtime
DIGITALIZATION WAVE BEGINNING TO TRANSFORM MARITIME OPERATIONS - PRESCRIPTIVE

• Cloud Environment
  • Linking onshore and offshore stakeholders

• Artificial intelligence
  • Autonomous vessels
  • De-manning operations

• Internet of Things
  • An explosion of sensors drives IoT, focusing on data analytics

• Industry Data Harvesting Platform
DIGITALIZED SITUATIONAL AWARENESS

Integrated Digitalized Situational Awareness

- Real-time decision making
- Automated recording of events and activities, with audit trail of associated timelines for behavioral analysis and conflict resolution
- Leveraging of new approaches to data collection and analytics
- Predictive Detection of conflicts and inefficiencies

Data Collection and Analysis

- Targeted and data driven initiatives to efficiently aid the operation and the industry where it is needed most
- SIMOPS guideline enhancement
- Freedom to operate Initiatives
- Provide a database of real-world impact data for input into regulatory discussions
DIGITALIZED SITUATIONAL AWARENESS

A shift in global operations towards digitalization is coming

We need to arm ourselves with the digital information required to maintain our Freedom to Operate

Time to get in line or get left behind
THANK YOU

• Shawn.m.rice@iongeo.com
• iongeo.com
• www.iagc.org