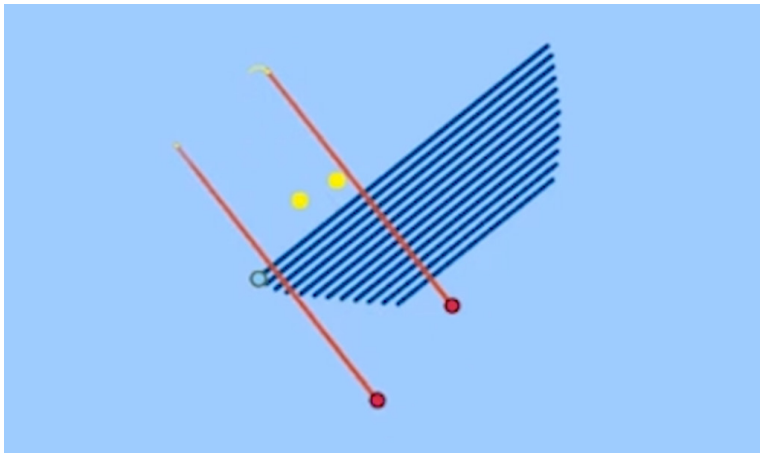


OPTIMIZED ACQUISITION PLANNING AND SURVEY DESIGN SERVICES

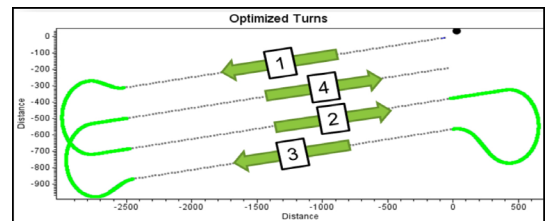
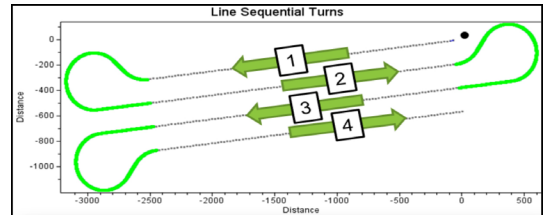
Ensure geophysical integrity, risk mitigation, HSE compliance and operational efficiencies (both time and costs) of your operational planning and survey design goals by utilizing the expertise and experience of ION's MESA Services team. Our experts provide collaborative and customized services to meet specific project targets.

Operations planning and execution services via SimSurvey seismic simulation tool

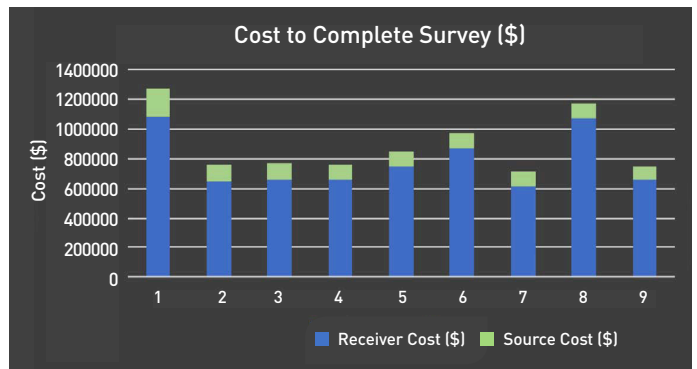
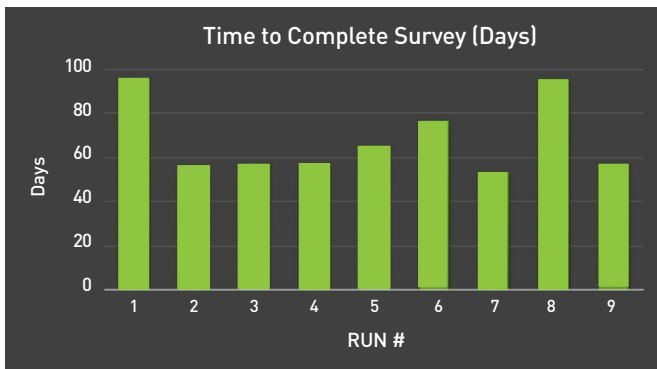
- Time and motion analysis for comparison of various operational scenarios providing time and cost estimates
- Animation of vessel/crew movements through project lifecycle - multi-line deployment, acquisition and retrieval
- Flexible parameterization; number of vessels, crew size, vessel speeds, turn radius analysis and unit costs
- XPS Export of simulations to MESA + operations control software + Excel for multiple run analyses



Two vessel simulation



Turn Radius Analysis



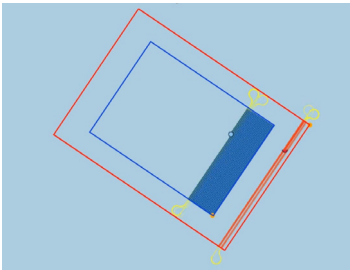
SimSurvey DEMO | INPUT GEOMETRY FROM MESA

Three acquisition scenarios were simulated in SimSurvey for the modeled geometry. Two different receiver vessel scenarios (5000 and 2500 nodes inventory) as well as the benefits of having a second source boat operating simultaneously were compared in the illustration below.

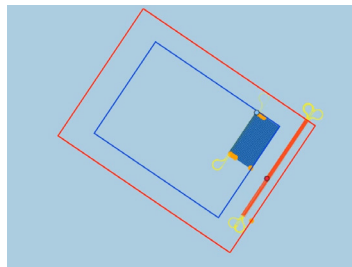
| Source Information | |
|---------------------------------|------------------------------|
| Total number of source lines | 432 |
| Source line separation | 50 m |
| Shot interval | 50 m |
| Shot strategy | Dual Source |
| Total length - all source lines | 9683.44 Km |
| Total number of shots | 137376 |
| Source Point density | 206.21 shots/Km ² |

| Receiver Information | |
|-----------------------------------|---------------------------------|
| Total number of receiver lines | 105 |
| Receiver line separation | 150 m |
| Receiver group interval | 150 m |
| Total length - all receiver lines | 1197 Km |
| Total number of receivers | 8085 |
| Receiver Point density | 12.14 receivers/Km ² |

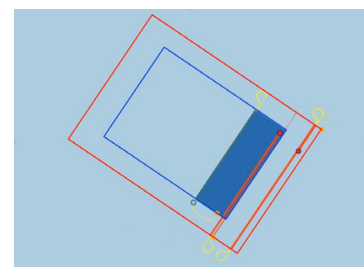
Scenario 1 - Patch management example:
5000 nodes inventory - single source boat



Scenario 2 - Patch management example:
2500 nodes inventory - single source boat



Scenario 3 - Patch management example:
5000 nodes inventory - two source boat



| | Time (days) | | |
|--------------------|--------------|--------------|--------------|
| | Scenario 1 | Scenario 2 | Scenario 3 |
| Mobilization | 1 | 1 | 1 |
| Line Change | 4.82 | 9.25 | 4.88 |
| Transit | 11.02 | 19.23 | 11.32 |
| Receiver | 7.13 | 7.55 | 7.13 |
| Receiver Retrieval | 7.13 | 7.55 | 7.13 |
| Waiting | 30.95 | 91.28 | 13.43 |
| Demobilization | 1 | 1 | 1 |

| | Source and Receiver Costs (M\$) | | |
|-----------------|---------------------------------|-------------|-------------|
| | Scenario 1 | Scenario 2 | Scenario 3 |
| Source Vessel | 2.54 | 134 | 3.01 |
| Receiver Vessel | 2.62 | 5.77 | 2.50 |

| | Time (days) | | |
|--------------------|--------------|--------------|--------------------|
| | Scenario 1 | Scenario 2 | Scenario 3 |
| | Boat 1 | Boat 2 | Boat 1/2 |
| Mobilization | 1 | 1 | 1 |
| Source Acquisition | 42.53 | 79.40 | 25.32/24.09 |
| Line Change | 12.08 | 29.56 | 6.73/6.39 |
| Transit | 5.43 | 11.81 | 3.41/3/24 |
| Waiting | 0.66 | 8.66 | 7.61/9.50 |
| Demobilization | 1 | 1 | 1/1 |

| Time/Cost Relative Comparison | | | |
|-------------------------------|-------------|--------------|-------------|
| | Scenario 1 | Scenario 2 | Scenario 3 |
| Time (days) | 61 | 134 | 44 |
| Cost (M\$) | 5.16 | 10.96 | 5.51 |

Scenario 2 (2500 nodes inventory) is the less recommended option, costing almost twice the price of Scenario 1 and 3 (5000 nodes inventory), as well as exhibiting the lowest operational performance among the analyzed options (2 zippers required - higher source effort).

On the other hand, Scenario 1 looks as the most economical option, however, it is not the most efficient alternative (time wise).

A simultaneous shooting operation (Scenario 3) is perhaps the most balanced option, exhibiting the best operational performance with minimal cost impact.

ION has been delivering innovative solutions to the energy industry for over 50 years, and is the leading provider of real-time, multi-vessel positioning and control systems. For further information contact MESAsupport@iongeo.com

About ION

ION is a technology leader with a strong history of innovation. Leveraging innovative technologies, ION creates value through data capture, analysis and optimization to enhance companies' critical decision-making abilities and returns. Our offerings are focused on improving E&P decision-making, enhancing reservoir management and optimizing offshore operations.