

PROBLEM

Complex requirement balancing combined with unpredictable voyage disruptions make it difficult to maximize time and capacity utilization of shipping fleets for oil and gas trading. Traditional fleet optimization fails to provide rapid and effective corrections in real time to minimize cost overruns.

SOLUTION

The trading and shipping arm of one of the world's largest O&G majors deployed SparkCognition™ Maritime Shipping Advisor to simulate and optimize continuous scheduling with a few clicks across its fleet, enabling increased utilization of time charter vessels and 4%-13% monthly operational cost reductions.

RESULTS

Global utilization considerations allowed the customer to use fewer spot charters—in many cases shipping a schedule of 100+ requirements with three fewer vessels—creating opportunities to save \$2M every two to three weeks.

EXECUTIVE SUMMARY

Optimally assigning vessels to satisfy maritime shipping requirements for oil & gas trading is a challenging problem as more vessels, requirements, and hard-to-anticipate conditions impact fleet schedules.

Traditional approaches to fleet optimization are compromised by both the quality of the results and burdensome maintenance to cope with the dynamic and unpredictable nature of impacting parameters such as port and channel congestion, weather factors, demand fluctuations, etc.

SparkCognition Maritime Shipping Advisor solves this problem with rapid and reliable re-optimization of fleet schedules at the click of a button—no matter what, when, or how often impacting changes occur.

The trading and shipping arm of one of the world's largest O&G majors uses SparkCognition's first-of-its-kind solution to schedule their fleet across thousands of voyages annually. Moving millions of barrels of oil per day, they are driving down shipping costs while optimizing local decisions across their shipping and logistics workflows, resulting in annual savings of up to \$40M.

THE PROBLEM: UNPREDICTABLE EVENTS DISRUPTING TRADITIONAL FLEET OPTIMIZATION METHODS

Scheduling a fleet to load and discharge oil products around the world and around the clock hinges on innumerable and constantly shifting factors, such that any single voyage plan is only a snapshot of how the world looked when the plan was created. But then, inevitably, the world changes. When rapidly evolving situations like supply chain logistics issues, weather conditions, or major global events interfere with carefully optimized fleet schedules, voyage costs climb rapidly as shipping operations of oil & gas trading scramble to adjust to changes.

Shipping operations of oil and gas trading rely on subject matter experts (SME) to simulate the various scenarios that would inform feasible schedule options for their fleet (time charter, spot charter, and/or own vessels), balancing intricate and overlapping shipping requirements in order to maximize the utilization of time charter vessels while minimizing the cost of the overall fleet, resulting in a minimum cost per barrel.

This is a complex problem to begin with, considering hundreds of requirements and a fleet of time charter vessels as well as spot charters. Still, from all feasible options, SMEs would choose an optimal schedule, factoring in what they know about the weather, ports, markets, and so on at that time.

However, even the most careful scheduling is vulnerable to ripple effects beyond the SME's control. In a highly dynamic global maritime shipping environment, schedules rapidly become brittle, putting shipping costs of oil and gas trading at risk of spiraling out of control.

Recent events have made it clear how complex maritime shipping is and how challenging it can be. Pandemic-related demand fluctuations have generated waves of imbalance in global ocean shipping networks. Increasing frequency of severe weather events often force ports and harbors to halt operations in advance of hurricanes and tropical storms. Port congestions and abrupt canal closures play havoc with shipping schedules, but predicting the impact of these events is difficult outside of a few days.

Traditional approaches are a poor match for the complexity and dynamic nature of fleet optimization for shipping mass quantities of oil by sea, but SparkCognition's knowledge representation technology can continually optimize the fleet-wide plan in a computationally tractable way even as a multitude of variables and constraints change continuously.

SparkCognition has now made it possible to adapt to real-time schedules and simulate 'what-if' scenarios, with continuous fleet optimization at the click of a button. Our unique solution enables increased utilization of time charter vessels through continuous fleet optimization and has been proven to deliver a range of 4%-13% lower month-on-month operational costs.



THE SOLUTION: CONNECTING SCHEDULING AND OPERATIONS WITH CONTINUOUS FLEET OPTIMIZATION

SparkCognition's customer, the trading and shipping arm of one of the world's largest O&G majors, transports several million barrels of oil products across the seas each day. With hundreds of constraints and business rules in play, and data from a dozen different sources for vessels, routes, ports, charter parties, customer SLAs and so on, developing feasible fleet schedules and recommending an optimal one was already a tedious and lengthy process for our customer. However, operational matters such as canal closures, port unavailability, weather conditions, storage issues, and port congestion frequently made following the recommended plan impractical. This unpredictable reality created a costly ripple effect of economic and logistical impacts across the rest of their fleet schedule.

The complexity of responding to known and unknown circumstances was challenging our customer to evaluate costs and optimize the execution of its global shipping schedules. Determined to grow their daily volume of trading and shipping, they wanted a solution to optimally schedule shipments across the fleet and respond daily to frequent changes in supply and demand.

To solve their fleet utilization and shipping cost challenges, our customer decided to use SparkCognition Maritime Shipping Advisor, a first-of-its-kind intelligent maritime fleet optimization application running on Microsoft Azure.

Having deployed our solution to unify its maritime fleet optimization, planning, management, and shipment scheduling on a single platform, our customer is now able to:

- Systematically integrate all data sources, constraints, and business rules.
- Automatically optimize schedules across the fleet with a single click.
- Rapidly process "what if" scenarios for better insights.

SparkCognition Maritime Shipping Advisor's patented knowledge representation technology encodes our customer's domain knowhow and operational expertise into actionable digital knowledge. Managing data from customer sources and 3rd party portals (routes, trading, ports, vessel locators, etc.), it efficiently computes over 200 factors, such as vessel/terminal/product compatibility, bunkering requirements, vessel details, cleaning requirements, possible vessel speeds, and so on. After identifying feasible assignments of routes and vessels to cargo using advanced computational techniques, it quickly evaluates the costs of each feasible assignment, optimizing the fleet schedule subject to all of the above business constraints.

Making frequent, timely, and wise decisions requires continuous observation of all domains and relevant parameters, correctly modeling their relationships to support real-world reasoning and actionable advice. While SparkCognition Maritime Shipping Advisor automatically accounts for all constraints at all times, it also allows our customer's SME to stay in control. Suppose a particular vessel has to go to a specific terminal. The schedulers can easily change the plan via drag and drop in the UI and immediately observe the feasibility and impact of the modification. They can zoom in to see ports, vessels, berths, and a host of other entities, including the

relationships between them. A comprehensive fleet dashboard helps schedulers view and manage vessels, shipments, and schedules for voyages, pick-ups, drop-offs, and the products shipped, all in a single pane of glass.

One example of how SparkCognition Maritime Shipping Advisor helps maximize efficiency and optimize schedules is its ability to monitor vessel bunker levels at all times and ensure that each vessel is scheduled to bunker at the preferred port for that vessel.

By creating a virtual mirror of the customer's global fleet operations—controlling the history, present state, and future simulations of billions of barrels of petroleum products over thousands of voyages and vessels with an intuitive model approach and drag-and-drop interface—SparkCognition Maritime Shipping Advisor enables them to reoptimize as many times per day as needed to avoid substantial extra costs in maritime shipments of crude and refined oil products.

Based on any given set of cargoes and fleet of vessels, SparkCognition Maritime Shipping Advisor has proven that it can determine how to best optimize the fleet to schedule shipment of oil in a way that increases fleet utilization, reduces shipping costs, and maximizes business value.

The solution empowered our customer, the trading and shipping arm of one of the world's largest oil and gas companies, to optimize and continuously adapt its scheduling and operations, delivering significant benefits in the first year of deployment:

- Fleet optimization supported by recommended optimal schedules.
- An empowered chartering team with deeper insights for negotiation.
- Traders and cargo operations enabled to respond to "what-if" scenarios rapidly.
- Management provided with a better view of Key Performance Indicators (KPI).
- Planning team supported in deciding time vs. spot chartering.
- A unified knowledge platform across the organization supporting other functions.

SparkCognition Maritime Shipping Advisor improved cost reduction and fleet utilization in many areas including, but not limited to:

- Optimizing the assignment of vessels to requirements.
- Reducing the use of spot charters, in many cases shipping a schedule of 100+ requirements with three fewer vessels, with savings in the range of \$2M per two weeks.
- Assigning the right speed to the vessel to minimize the time of sailing, creating opportunities to satisfy extra requirements while avoiding demurrage penalties and without unnecessarily burning expensive bunker.
- Providing decision support to choose what, when, and where to bunker.



In 2020, transporting an average of five million barrels per day and optimizing a fleet of roughly 130 vessels performing more than 2,000 voyages, our customer used SparkCognition Maritime Shipping Advisor to realize 4%-13% reductions in per-barrel shipping costs month on month.

With the ability to make the most economical voyage choices for an entire fleet with a single click, SparkCognition has solved a fundamental problem for maritime shipping and oil and gas trading. It is now possible to optimize your fleet utilization and reduce costs—no matter what the world looks like from one day to the next.

To learn more about our SparkCognition Maritime Shipping Advisor fleet optimization solution, contact SparkCognition today at info@sparkcognition.com.

ABOUT SPARKCOGNITION

SparkCognition's award-winning AI solutions allow organizations to predict future outcomes, optimize processes, and prevent cyberattacks. We partner with the world's industry leaders to analyze, optimize, and learn from data, augment human intelligence, drive profitable growth, and achieve operational excellence. Our patented AI, machine learning, and natural language technologies lead the industry in innovation and accelerate digital transformation. Our solutions allow organizations to solve critical challenges—prevent unexpected downtime, maximize asset performance, optimize prices, and ensure worker safety while avoiding zero-day cyberattacks on essential IT and OT infrastructure. To learn more about how SparkCognition's AI solutions can unlock the power in your data, visit www.sparkcognition.com.

