Validating a Predictive Model of Maritime Casualty Risk for RightShip

Elder Research validated the processes and methodologies applied by RightShip in the development of RightShip Qi, a new model that enhances maritime safety by predicting the casualty risk of ships.

INDUSTRY

» Transportation – Maritime Shipping

BUSINESS NEED

» To provide a third-party assessment and validation of a model of maritime casualty risk for conformance with industry and predictive analytics best practices

SOLUTION

» Holistic assessment of end-to-end analytics process, encompassing data warehousing, automation, and predictive modeling methodology

BENEFIT

» Increased customer confidence in the validity of factors contributing to risk score

» Increased client confidence in the methodology and analytic strategy

The Challenge

RightShip's Ship Vetting Information System (SVIS™) has been the top solution for evaluating ships over the last 15 years, and is credited for industry-wide improvements in maritime safety. The SVIS 5-star rating was very popular with vessel-owners and charterers alike because it provided a clear measure of the likelihood of a maritime casualty – that is, an accident or incident that would prevent trading or endanger the crew, vessel, cargo, or environment. SVIS produced these ratings based on rules derived from historical ship data combined with expert knowledge and experience.

With the new RightShip Qi model, the organization seeks to take ship vetting to an entirely new level by implementing a data-driven solution with machine learning techniques. The new risk rating refines and predicts the propensity for vessel casualty using a complex model calculated from a mastered "golden record" of historical data available on individual vessels from a wide variety of sources.

The challenge in rolling out RightShip Qi was to ensure the accuracy and stability of the predictive results while also preserving customer confidence. RightShip needed to visually communicate the risk scoring associated with a vessel in an intuitive fashion to assure their clients that the factors influencing a rating were logical and, where possible, actionable.

The Solution

Elder Research performed a thorough assessment of RightShip's end-to-end process to measure its compliance with predictive analytics best practices and standards, covering:

- Data ingestion
- Data warehousing
- ETL
- Model building
- Results presentation
- Model updating

Elder Research found that the Qi model results were verifiably stable and consonant with RightShip's

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traditional 5-star rating, empirically confirming that vessels with a lower star rating have a higher chance of incident than those with a higher rating. Thanks to the emphasis on automation, adherence to best practices with regard to hold-out testing, and the integration of new and better data sources, Elder Research found that RightShip Qi represented a significant technological improvement over the SVIS baseline. Elder Research also worked side-by-side with RightShip stakeholders to understand their visualization needs and develop an intuitive and comprehensible presentation of the factors associated with a given risk score.

Elder Research found RightShip's analytically minded culture had applied best-in-class automation techniques to secure the robustness and hardness of the Qi data pipeline. RightShip emphasized automation for processes like:

- Integrating new data sets into the data warehouse
- Preparing data for model scoring via Extract-Transform-Load
- Refreshing the Qi model and storing its structure

Results

Thanks to the thorough Model Validation performed by Elder Research, RightShip was able to release the Qi model with confidence. RightShip also successfully implemented and deployed the developed visualization methodology, providing charterers and vessel owners with better insights on the factors contributing to assigned star ratings for each vessel.
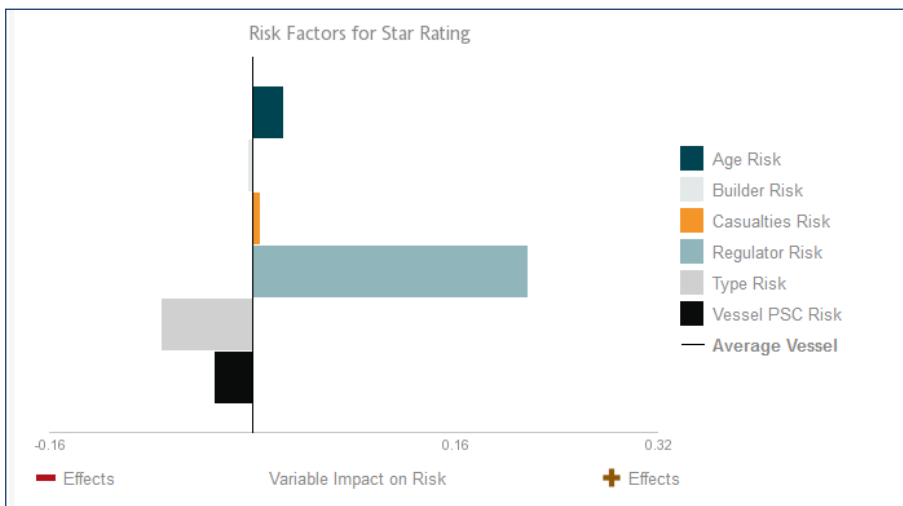

Figure 1. This detailed view shows the individual factors that have a negative or positive influence on this vessel's 4-star rating outcome.

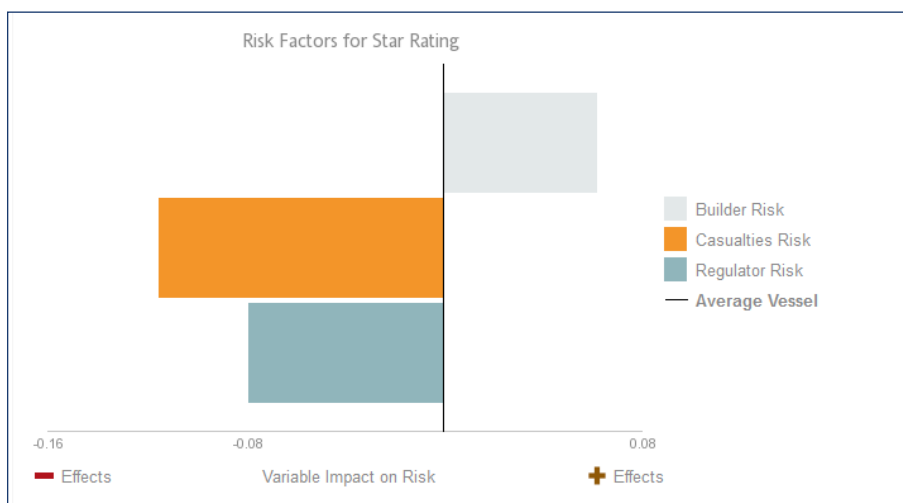The solid zero line shows the average score (a 3 star vessel).

Figure 2. This detailed view shows the individual factors that have a negative or positive influence on this vessel's 2-star rating outcome.

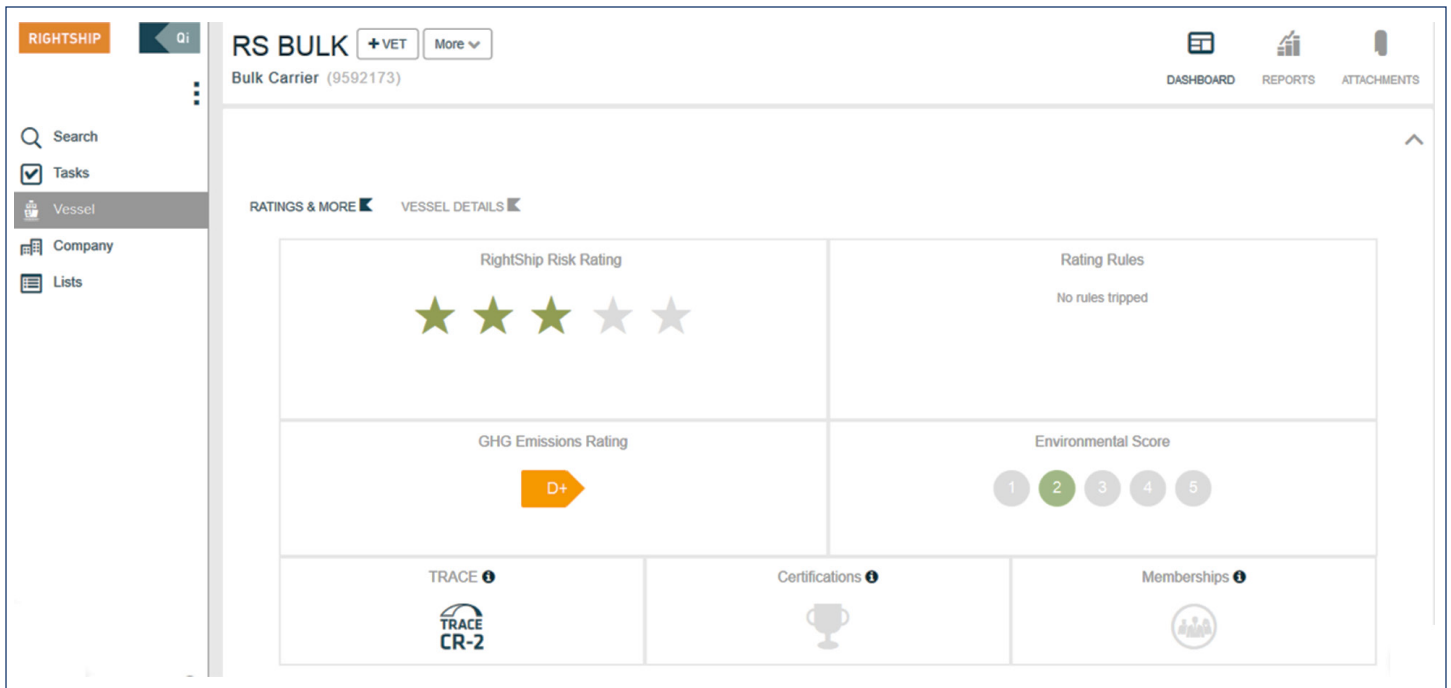The solid zero line shows the average score (a 3 star vessel).

Figure 3. The dashboard shows a summary of the vessel's ratings at a glance. This dashboard shows a 3-star (average) vessel.

About RightShip

RightShip is the world's leading third-party ship-vetting agency, supporting 3,000 users in over 270 organizations worldwide with expert vetting support and advice, vessel inspections, and secure hosting of client systems.

RightShip's comprehensive online risk management system, RightShip Qi, takes big data and turns it into valuable information through a predictive risk analysis model. RightShip Qi uses real-time data from over 76,000 ships and thousands of maritime companies to deliver instant, reliable marine risk and environmental sustainability assessments.

At the forefront of maritime safety and sustainability, RightShip used its years of experience in the creation of online risk rating algorithms in the maritime sector to develop the Greenhouse Gas (GHG) Emissions Rating. This rating allows customers to make environmental sustainability a key factor in their vessel selection process. Learn more at www.rightship.com.

About Elder Research

Elder Research is a recognized leader in the science, practice, and technology of advanced analytics. We have helped government agencies and Fortune Global 500® companies solve real-world problems across diverse industries. Our areas of expertise include data science, text mining, data visualization, scientific software engineering,

and technical teaching. With experience in diverse projects and algorithms, advanced validation techniques, and innovative model combination methods (ensembles), Elder Research can maximize project success to ensure a continued return on analytics investment.