PREDICTIVE MODEL VALIDATION
IMPROVING MODEL ACCURACY AND STABILITY

Our Model Validation service is an end-to-end assessment of the process of building a predictive model. Elder Research works as a trusted third-party advisor to validate the quality and robustness of a client's existing model and provide expert judgment on whether the model meets the necessary regulatory and compliance standards.

INDUSTRIES

» Financial Services

» Insurance

» Defense

» Consumer Goods

» Software

» Energy

» Healthcare

MODEL VALIDATION APPLICATIONS

» Risk Assessment

» Credit Scoring

» Underwriting Analytics

» Customer Retention

» Loan/Claims Approval

» Fraud Detection

» Investment Modeling

BENEFITS

We use a rigorous, scientific investigation to determine:

» Robustness of the model to changes in the data and underlying assumptions

» Potential threats to model validity

» Recommendations for potential improvements

Background

At the time of our founding by Dr. John Elder over 20 years ago, Elder Research provided independent assessment and validation of predictive models for hedge funds. Since then, we have diversified our practice from finance into industries as varied as insurance, defense, and consumer goods. In all our engagements, we "teach our clients to fish"—to build internal capabilities to ensure their continued analytic success.

With our depth and breadth of experience with data science tools and techniques, our success developing and deploying analytical models across a wide range of industries, and our renown for teaching, Elder Research is a widely trusted partner for Model Validation consulting services.

Our Model Validation Procedure

Our Model Validation service is a multi-week, three-phase end-to-end assessment of the whole process of building a predictive model (Figure 1). Through meetings and investigations, we seek to understand:

• The business context for the model
• The structure of the data warehouse and robustness of the data pipeline
• Extract-Transform-Load procedures performed to prepare the data for analysis
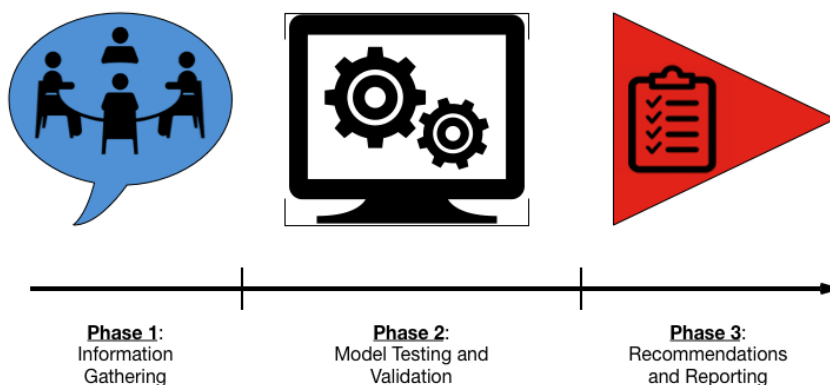• Model training, testing, and validation procedures

Phase 1: Information Gathering   **Phase 2**: Model Testing and Validation   **Phase 3**: Recommendations and Reporting

Figure 1. Timeline for Validation

ELDER RESEARCH
— DATA SCIENCE · AI · MACHINE LEARNING —

Elder Research will then attempt to reproduce the observed results using independent methods and industry best practices, to ensure the robustness of the model being tested. Additionally, certain industries have regulatory requirements for predictive models (e.g., FDA certification). Where appropriate, we will assess compliance with these constraints.

MODEL TECHNICAL VALIDATION

At Elder Research, we apply a proprietary approach to model testing to quantify the variability in results inherent to machine learning algorithms. Most algorithms have been proven to be sound and complete, but only as the sample size of the input data becomes very large. As the amount of input data decreases, models will produce false positive and false negative results in increasing numbers.

Depending on the algorithms and input data, we may apply a combination of the following strategies to scientifically validate the accuracy and stability of the model results:

- Permutation or Randomization tests (such as Target Shuffling) to assess how responsive the model results are to variation in the input data
- Variable Selection techniques to gauge the importance of each variable alone, and in conjunction with other inputs
- Comparison of the model with industry-standard and industry-leading modeling algorithms.

Phase 1 — Information Gathering

Review of Background Materials
- » Model Documentation
- » Data Dictionaries
- » Database Schemes
- » Analytics Strategy

On-Site Meeting
- » Business Overview
- » Data Overview
- » Model Development Overview
- » Discussion of Deliverables and Timeline

Phase 2 — Model Testing and Validation

Model Testing
- » Reproduction of Results
- » Stability Assessment

Validation
- » Independent Model Comparison
- » Permutation Testing

Phase 3 — Recommendations and Reporting
- » Detailed Report of Findings
- » On-site Report Delivery
- » Letter of Validation

WHAT YOU RECEIVE FROM US

Upon completion of the Model Validation, we will provide a thorough report of our investigation, including:

- Confirmation of results accuracy and stability
- Threats to validity
- Recommendations for future improvements

As valuable as our clients have found the tangible results of our Model Validation service, the most worthwhile outcome has often been intangible: confidence.

ABOUT ELDER RESEARCH

Elder Research is a data science and predictive analytics consultancy and a recognized industry leader in the science, practice, and technology of advanced analytics. Founded in 1995 by Dr. John Elder, Elder Research has over 20 years of experience partnering with hundreds of companies ranging from large Fortune 50, multinational corporations to small startups in diverse industry segments, including healthcare, insurance and reinsurance, retail, telecommunications, banking, investment, and oil and gas exploration.

If you are interested in information on the Model Validation service for your business, please contact us for a consultation on our website or contact us at our Charlottesville, VA headquarters at (434) 973-7673.