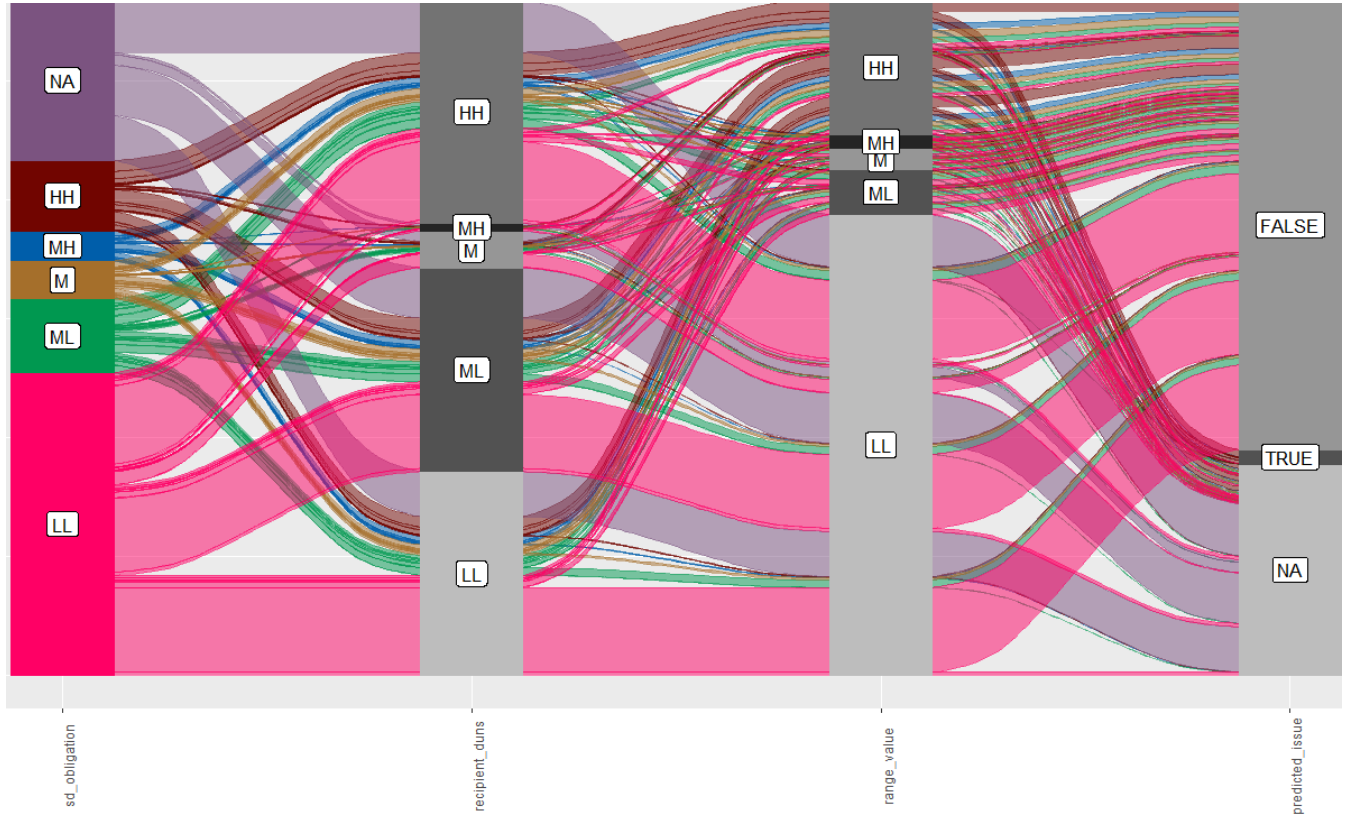
Predicting Federal Contractor Performance Issues Using Data Analytics



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David Gill, Internal Revenue Service

Left: Alluvial data visualization showing a simplified representation of machine learning model used to assess contractor performance risk.

Research Problem

- Despite the ubiquity of contracting in the public and private sectors, organizations both public and private struggle to effectively and efficiently contract out for goods and services, often failing to achieve full value for their contract dollars.

- The purpose of this research is to uncover antecedents and to develop a predictive model of severe contractual performance issues, such as those leading to contract failure, in transactions between Federal agencies and their suppliers.

- This research examines factors at the firm-level and, utilizing data now publically available on contractor performance, proposes a predictive model through the application of random decision forests, a machine learning technique.

Exploring A New Method for Source Selection

- Most source selections rely on evaluating proposals submitted by offerors.
- Additionally, databases such as FAPIIS and CPARS provide retrospective information about past contractor performance.
- Predictive modeling can assess vast amounts of contract data to assess whether contractors will likely experience severe performance issues (e.g. cost overruns, schedule delays) in the future.

Machine Learning Model to Predict Which Contractors will Experience Terminations

- Gathered government-wide contract and vendor entity data from FPDS.gov and SAM.gov.

- Constructed data-derived vendor risk indicators to measure volatility in contract dollars and contractor longevity.

- Generated thousands of decision trees using machine learning software. Trained model on past examples of contractors that were terminated for cause or default.

Findings – Predictive Model With Significant Ability to Identify High Risk Contractors

- The model is estimated to correctly distinguish between high likelihood and non-high likelihood contractors 81% percent of the time.

- The model identifies important contracting events occurring throughout the entire federal contracting ecosystem. Often these events would not be found through traditional processes (e.g. proposal evaluation, responsibility determinations, or contract file reviews).

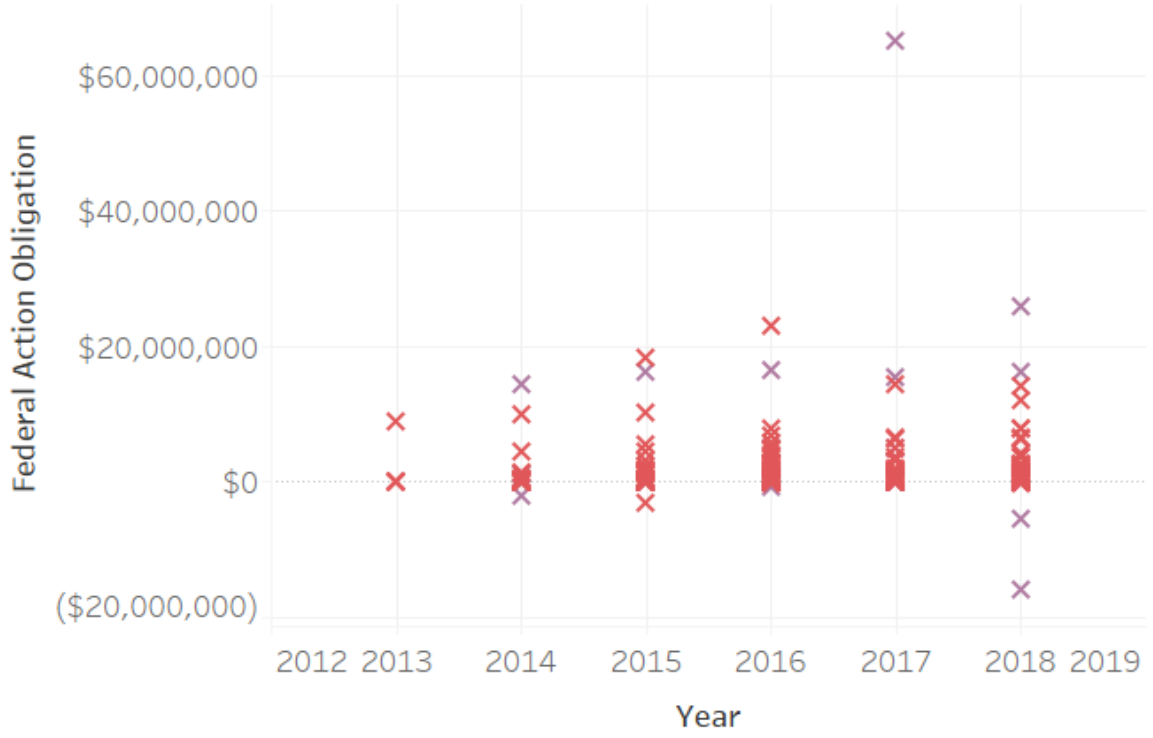
Recommendation – Make Predictive Analytics Available for use by Contracting Officers

- Predictive analytics can complement and enhance the ability to select contractors that are likely to perform successfully.

- To make the best decisions possible – contactors must be provided an opportunity to make their case (e.g. describe relevant experience gained outside of a federal prime contractor role). Further, transparency in risk modeling will enable constructive government-industry dialogue.

Sample Vendor Dashboard

Vendor Search (Deep Dive)



Recipient Name

Example Vendor ×

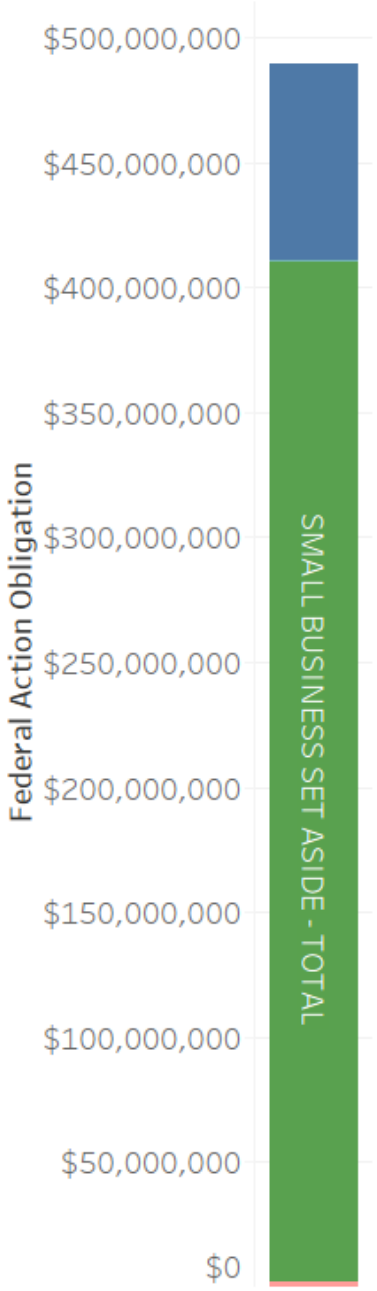
Awarding Agency Name

- DEPARTMENT OF DEFENSE (..
- DEPARTMENT OF HOMELAN..
- DEPARTMENT OF HOUSING A..
- DEPARTMENT OF STATE (DO..
- DEPARTMENT OF THE INTERI..
- GENERAL SERVICES ADMINI..
- NATIONAL AERONAUTICS AN..
- SMITHSONIAN INSTITUTION ..

Type Of Set Aside

- Null
- NO SET ASIDE USED.
- SMALL BUSINESS SET ASIDE ..
- SERVICE DISABLED VETERAN..

Set-Aside Breakdown



Key Statistics

Vendor Largest Contract Value	$72,549,456,595.00
Vendor Largest Deobligation	($16,101,046.75)

Obligations by Year