WHITE PAPER

Government Procurement Offices: Improving Fiscal Responsibility Through Data Analytics

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Executive Summary

While fiscal responsibility in federal government is always a concern, the current global economy and budget realities have turned it into a mantra. But just because fiscal responsibility is receiving additional attention doesn't mean it's easy to achieve. Procurement officers have long been stymied by inefficient procurement processes – not to mention fraud and abuse. These challenges have been caused by siloed information, lack of analytics tools, an inability to map relationships between possible co-conspirators and difficulty tracking adherence to procurement mandates. But now data management and analytics tools are helping procurement officers surmount these issues, enabling them to avoid fraud and waste and get more bang for the procurement buck – all while more effectively complying with procurement mandates and quotas. More importantly, these tools are giving procurement officers the useful information they need to support their agency's mission, while demonstrating good stewardship of taxpayer resources.

The Need for Fiscal Responsibility Within Government Agencies

Fiscal responsibility is a longstanding concern within government agencies. Depending on the professional background, procurement integrity may mean different things.

- For a government inspector general, procurement integrity may mean assuring fair, honest and transparent legal contracting processes that are free from fraud, waste and abuse.
- For an investigator, it may mean quantifying risk within the procurement processes to detect, prioritize and reduce the risk of fraud.
- For a procurement officer, it may be a way to meet compliance set by the government.
- To others, it may be a set of rules regarding conduct and a way in which those rules identify what you can and cannot do.

The global economy and budget realities are causing agencies to be more concerned than ever with spending taxpayer dollars efficiently and appropriately. Yet procurement officers are limited in their ability to address these concerns due to inefficient procurement processes and significant fraud and corruption. At the same time, procurement officers face difficulties complying with procurement mandates.

Inefficient Procurement Processes

The US federal government is one of the world's largest and most complex entities. It spent $4.1 trillion in outlays in fiscal year 2018 for a wide range of programs. Part of the General Accounting Office's (GAO) responsibility is its High Risk List, which seeks to identify areas vulnerable to fraud, waste, abuse and mismanagement. One area of particular interest is procurement challenges specifically with the Veterans Administration (VA). The VA spends tens of billions of dollars to procure a wide range of goods and services – including medical supplies. The VA has one of the most significant acquisition functions in the federal government, both in obligations and

number of contract actions. The Veterans Health Administration provides medical care to veterans and is by far the largest administration within the VA. According to the March 2019 GAO Highlights report, "The VA's procurement policies have historically been outdated, disjointed and difficult for contracting officers to use. In September 2016, we reported that the acquisition regulations contracting officers currently follow have not been fully updated since 2008."

$26 billion of the $86.5 billion in discretionary budget was used to contract for goods and services. The GAO noted particular concerns with contracting officer workload challenges, lack of reliable data systems, limited contract oversight and incomplete contract file documentation.

Natural disasters cause devastation across the globe. When a disaster strikes, the US relies on the Federal Emergency Management Agency (FEMA). For example, following the fallout from Hurricane Katrina, Congress directed FEMA to establish contracts for goods and services in advance of storms to enable quick and effective mobilization of resources in the aftermath.

The rapid, preemptive response has not always been the case. When the GAO was asked to review the federal government's response to several other hurricanes and wildfires, it found some problems and inefficiencies. The GAO analyzed data from the Federal Procurement Data System – Next Generation and recommended that "[FEMA] update its strategy and guidance to clarify the use of advance contracts, improve the timeliness of its acquisition planning activities, revise its methodology for reporting disaster contracting actions to congressional committees, and provide more consistent guidance and information to contracting officers to coordinate with and encourage states and localities to establish advance contracts."

Compliance With Procurement Mandates

While procurement officers struggle to improve procurement processes and fight fraud and corruption, they must also comply with various procurement mandates. These include quotas for procuring from veteran-owned, woman-owned and minority-owned businesses.

What's Preventing Procurement Officers From Addressing These Issues?

Several challenges have prevented procurement officers from improving the efficiency of their procurement processes and eliminating fraud. These include siloed procurement data that makes it difficult to understand purchasing patterns, lack of tools that can analyze purchasing information to uncover overpayments or fraud, an inability to determine relationships between people to detect possible collusion, and difficulty tracking adherence to procurement rules.

Siloed Information

Procurement data is spread over multiple, siloed systems. For example, the Department of Homeland Security includes US Immigration and Customs Enforcement, the Transportation Security Administration and the Secret Service. All store procurement data, such as that for guns and ammunition, in their own databases. All of these agencies may be purchasing guns and ammo from the same manufacturer but paying different prices. Determining who's paying what would require agencies to look up the data and compare prices manually, a prohibitively time-consuming process.

Similarly, the General Services Administration (GSA) is responsible for maintaining a list of contractors that are barred from providing services to the federal government. Federal agencies are required to check this list before awarding contracts and grants. But this list is stored in a different database from each agency's vendor list. And the data may be in different formats. This makes it difficult to check vendors against the barred provider list.

Lack of Tools for Data Analysis to Understand Pricing or Pinpoint Fraud

Procurement officers could use spreadsheets to analyze their procurement data. But entering and manipulating data in a spreadsheet is very labor-intensive. Spreadsheets break easily, especially when they become very large. And spreadsheets only allow agencies to report on what's happened in the past. They don't allow procurement officers to analyze who's paying what or which agencies are potentially overpaying. Nor do spreadsheets help procurement officers identify potentially fraudulent patterns of activity.

Inability to Determine Relationships Between People

To uncover collusion, you need to know who has relationships with whom. Tracking these relationships has required a big bulletin board with pushpins representing entities (such as people or bank accounts), and string representing the relationships between them. Finding all that relationship information would take many people many hours. As a result, agencies have a lot of difficulty detecting collusion. One example, reported by The Washington Post, is the case of a former State Department contract specialist who, along with her husband, committed enormous government contracting fraud. While employed by the department, the woman concealed her marriage while funneling millions in lucrative, high-value contracts toward a company that she and her husband jointly owned. The company was awarded $53 million in contracts to provide HVAC services at US embassies between 2008 and 2011.

Difficulty Tracking Adherence to Rules

Following the procurement rules required of government agencies can be daunting. Purchasing officers need to look up each purchase in every procurement database across the organization and evaluate the level of compliance for each one. Needless to say, this is an extremely time-consuming process.

The Solution: Data Management and Analytics

Data management and analytics solutions can give procurement officers deep insights into their agencies' processes and portfolios. These solutions can help procurement officers answer questions such as:

- Are we paying too much?
- Are we seeing patterns of bidding from our vendors that could indicate bid rigging?
- Do our vendors and internal staff members have relationships that could lead to collusion?
- How far along are we in reaching our goals for purchasing from veteran-owned businesses?
- Is there more we can be doing to reach our procurement and business goals?

When procurement officers are able to answer these questions, they can provide meaningful input into the decision-making process and help their agencies become more fiscally responsible.

Several data management and analytic tools and techniques, such as data management and integration, anomaly detection, predictive analytics, link analysis and rules-based algorithms, can help procurement agents better understand and answer key procurement questions.

Data Management and Integration

Data management and integration tools help agencies bring together data from different silos within government agencies, as well as from external data sources (such as LexisNexis, Equifax, Experian, or Dun & Bradstreet – sources that provide information about vendors). Combining these sources results in a complete data set agencies can analyze and use to connect the dots. Data management capabilities merge multiple files (or duplicate records within a single file) in such a way that records referring to the same entity are treated as a single record. The solution matches records that at first appear to be different based on the information they have in common. For example, a record for John Q. Smith at 220 Academy St. would be matched with the record for JQ Smith at the same address.

Analytic Techniques

With the necessary data in hand, organizations can apply a number of analysis techniques to detect fraud and identify potential savings. SAS® solutions provide multiple analysis techniques, including rules, anomaly detection, predictive models and social network analysis.

Rules-based algorithms

Rules-based systems test each transaction against a predefined set of algorithms or business rules. These algorithms can help determine whether a particular purchase is helping the agency meet its procurement quotas, as well as how far along the agency is in meeting all or any one of its goals.

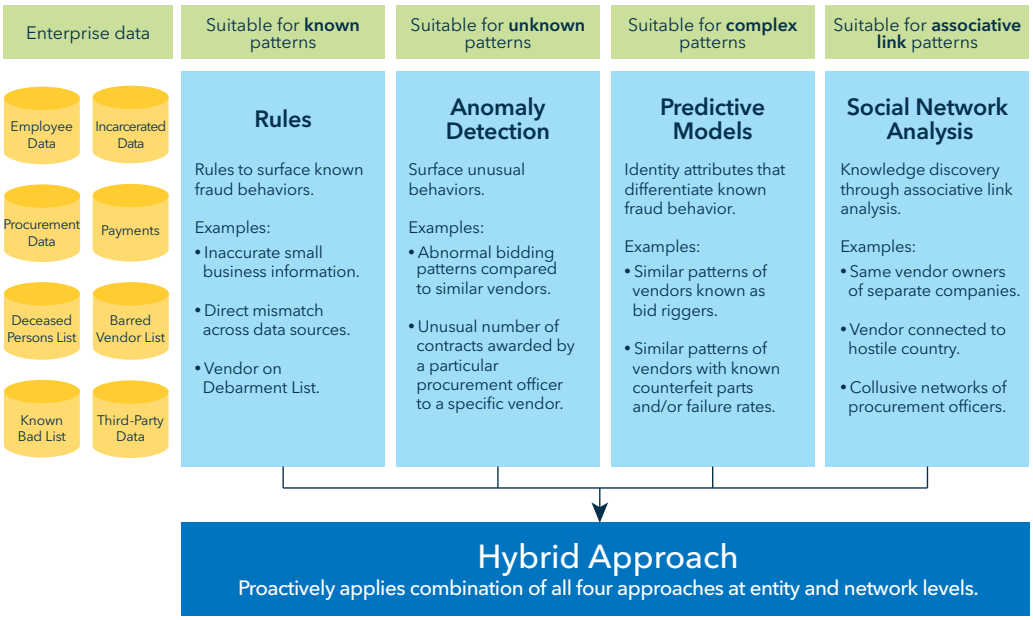

Figure 1: Procurement officers at federal agencies can use rules, anomaly detection, predictive models and social network analysis to minimize fraud, waste and abuse, and improve fiscal responsibility.

Rules can also be used to find purchases over a certain dollar threshold or to ensure that an agency doesn't do business with a vendor on a barred provider list.

While rules-based systems are a good first line of defense, they're not the optimal solution. Once fraudsters figure out the rules, they're able to find ways around them. For this reason, organizations need to employ additional analytic techniques.

Anomaly detection

Anomaly detection compares entity behaviors and attributes to peer groups or past behavior patterns to highlight activity that's outside the norm. (An entity can be a single transaction, an individual or even a network.)

Predictive analytics

Predictive analytics takes patterns of activities known to indicate fraud, such as bid rigging, and evaluates them against current activity to help agencies determine whether the current patterns are likely to be fraudulent. Activities identified as suspicious are scored using advanced predictive modeling techniques. The scores are used to prioritize suspicious activity that should be investigated. These patterns are based on analysis of actual activity and can be revised over time to keep up with changing fraud patterns.

Social network analysis

Social network analysis is a mathematical and graphical analysis that highlights the links between persons of interest. It helps determine who knows whom, who calls whom and who does business with whom. Social network analysis tools describe a person by extracting and integrating data from multiple data tables or data sources. They

then generate a web-like graph that illustrates the type and strength of connections between people. These connections might include shared addresses, phone numbers, employment information, account ownership and transactional data, not to mention business, family and personal relationships.

Data Integration and Analytics in Action: A Sampling of Examples

These analytics tools can be used alone or in combination to help improve sourcing, uncover fraud and collusion, or ensure compliance with purchasing mandates.

Improving Procurement With Data Management

Data management solutions allow procurement officers at federal agencies to collect all vendor and purchasing information from their far-flung divisions and offices in one place in such a way that records referring to the same entity (in this case a product purchased) are treated as a single record.

Data management is one tool that can help identify fraud. For example, if an agency has a database containing a list of vendors, it might want to compare that list with the federal government's barred providers list. Data management capabilities that consolidate information from multiple data sources allow procurement officers to easily see which of the vendors currently bidding on a project are on this barred-providers list.

An agency can also use data management to look in public databases, such as articles in LexisNexis, for additional information about a vendor to determine previous involvement in any criminal activity. If the agency finds an incriminating report or article, procurement officers can avoid awarding the vendor a contract.

Using Anomaly Detection to Identify Savings

Once agencies have a complete set of product/pricing data, they can use anomaly detection to determine the typical price paid for a particular item, as well as prices that fall outside normal bounds. The anomaly detection solution plots all of the prices paid for the same item on a scatter plot so that procurement officers can see who's paying what and how those prices compare to each other.

Anomaly detection can then be used to score the prices based on their location on the scatter plot. The tools can specify what the peer group looks like and then give anything outside of that group a higher score. For example, of 100 purchases, 70 percent might fall between $70 and $80; 20 percent between $90 and $100 and 10 percent between $100 and $120 – and the system would score each of these price levels.

With this information, procurement officers can plan a course of action. They might choose to investigate reasons for the 10 percent of purchases with the highest prices (perhaps the items included extra features, or maybe the procurement agent was a poor negotiator). Or they might use this pricing information to negotiate better prices or volume discounts.

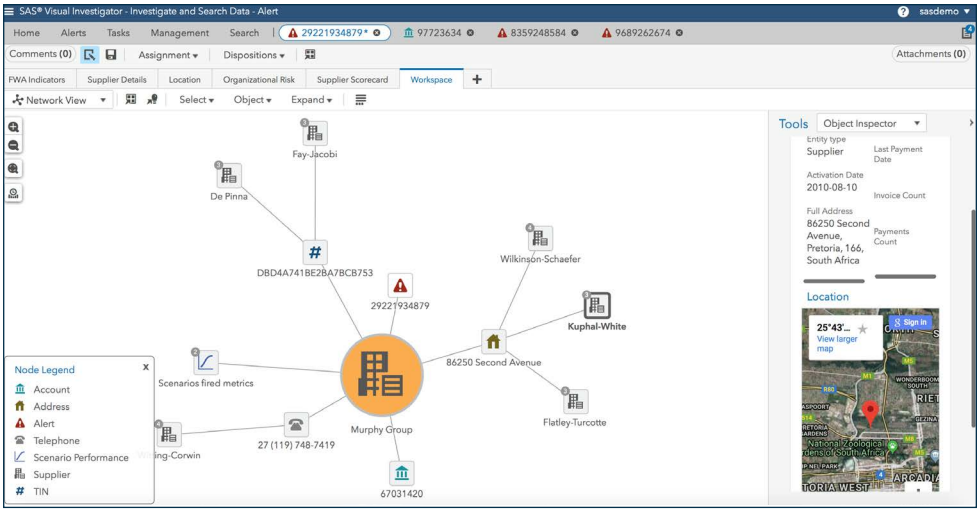

Figure 2: Social network analysis highlights the connections between persons of interest.

Using Predictive Analysis to Detect Fraud, Such as Bid Rigging

Imagine a bid rigging scheme where Vendor A and Vendor B constantly bid on a particular type of work. For the first project, Vendor A bids $100 and Vendor B bids $150. For the second, Vendor A bids $200 and Vendor B bids $150. Thus, the scheme is for the two vendors to predetermine who will bid high and who will bid low and then switch the next time.

Typically, such schemes are uncovered by chance. They might be detected if the bids from these contractors were signed off by the same senior contracting officer and the officer happened to notice the pattern, but the chances of discovery are slim.

Predictive analytics lets procurement officers look at all bids and their prices and compare them to known patterns that indicate fraud. The solution then ranks the bids in terms of how closely they match fraudulent patterns. Procurement officers can investigate incidents that receive a ranking that indicates likely fraud. In this way, predictive analytics helps procurement officers prioritize bids that require further investigation, rather than having to investigate every bid or being unable to investigate any bids.

Using Social Network Analysis and Anomaly Testing to Uncover Collusion

The case of the former State Department contract specialist mentioned earlier who funneled millions of dollars in high-value contracts toward a company that she and her husband jointly owned could have easily been uncovered using social network analysis. Social network analysis documents all of the relationships between people based on a wide range of information, such as bank accounts and phone numbers. Once the relationship is uncovered, procurement officers can apply anomaly detection/predictive modeling to the patterns of behavior of those in the network to evaluate the likelihood that the network is propagating fraud.

Using Rules to Ensure Compliance With Procurement Mandates

The rules engine makes it easy for procurement officers to track how well they're meeting their procurement mandates, whether that's purchasing American-made goods or those from a veteran-owned, woman-owned or minority-owned business.

A rules engine automatically sorts through each purchase, categorizes it according to the requirements it satisfies and then calculates where the agency stands at a given time in reaching each of its objectives. For example, in March, the agency might be 10 percent of the way toward meeting the quotas for veteran-owned businesses and 70 percent of the way toward meeting the goals for minority-owned businesses. With this information in hand, procurement officers can easily adjust future procurement to reach their goals.

The Benefits of Data Management and Analytics

By using data management and multiple analytic techniques, procurement officers can gain the insight they need to spend their procurement dollars more wisely, detect fraud and collusion, and ensure compliance with procurement requirements and quotas.

Get More Bang for the Agency's Procurement Buck

By easily identifying prices paid for a particular item and how they compare across the agency, procurement officers have the data they need to take action — whether that's investigating reasons for higher-than-normal payments or negotiating volume discounts with the vendor.

Avoid Fraud and Waste

Rather than relying on chance to uncover fraud, such as bid rigging and collusion, agencies can analyze all of their bids and vendor relationships. They can quickly determine which bids show patterns that indicate possible fraud or map out vendor relationships that point to possible collusion. With this information, agencies can investigate potential fraud and/or avoid doing business with companies with histories of fraud and abuse. Rather than wasting precious money on fraudsters, the agency can spend its money wisely and effectively in ways that contribute to its mission.

Ensure Compliance With Procurement Requirements and Quotas

Better tools that allow procurement agents to spend money more wisely also help them more effectively meet their agencies' missions.

Conclusion

Data management and analytics tools furnish procurement officers with deep insights into their agencies' processes and portfolios and enable them to effectively identify overpayments and potential fraud – all while meeting their procurement mandates and quotas. With these newfound capabilities, procurement officers can support their agencies' efforts to improve fiscal responsibility. They can simultaneously support their agency's mission while demonstrating good stewardship of taxpayer resources.

For More Information

Learn more about how SAS can help government agencies achieve new levels of fiscal responsibility: sas.com/gov.

To contact your local SAS office, please visit: sas.com/offices

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