4.6 Workers' Compensation

10 years of fraud specific solutions development – plus 24 years of foundational technology development

A. A description of relevant experience specific to this subject matter category;

For the past 10 years, SAS has been developing and deploying solutions to help our customers detect, manage and prevent fraud. Our proposal outlines the reasons that substantiate SAS and the SAS Fraud Framework's ability to meet the State's requirements now and in the future.

SAS Solutions OnDemand customers span the global spectrum

SAS Solutions OnDemand's key responsibility is to deliver the SAS Fraud Framework for our fraud customers, whether hosted by SAS or the customer. Nearly 150 customers trust SAS Solutions OnDemand with their solutions. All of SAS' global fraud resources are available to support SAS Solutions OnDemand in ensuring a successful project for the State. Successful customer projects include the following:

- Los Angeles County, CA—expects return on investment of between $7 million and $30 million annually and has achieved an 85 percent accuracy in identification of suspected fraud rings.
- Royal Bank of Canada—uses SAS to build a fraud rules application that applies powerful analytics to target suspect applications.
- BBVA Bancomer—uses SAS Fraud Detection and Prevention for Financial Services to detect suspicious credit/debit card activity with greater ease and precision.
- Commonwealth Bank of Australia—uses SAS to improve its fraud detection efficiency and has detected twice the level of check fraud, increased Internet banking fraud alerts by 60 percent and had a 60 percent improvement in Internet banking fraud-alert volumes using SAS.
- Health Care Services Corporation—saves millions of dollars using SAS to identify fraudulent healthcare claims before they are ever paid.
- Highmark—uses SAS to stop millions of dollars in fraudulent health insurance claims from being paid.
- Louisiana Workforce Commission—expects 8-to-1 ROI and has already received $450,000 from one of the first companies identified.
- Medical Benefits Fraud (Australia's largest privately owned insurance company)—relies on SAS to create an anti-fraud culture and realized a 200 percent return on investment.
- PBS (the leading provider of electronic payment systems in Denmark)—uses SAS to improve processing time and employ better analytic tools to fight credit card fraud.
- Washington State Department of Labor and Industries expects an 8-to-1 return on investment as has seen an 80% increase in efficiency using the SAS Fraud Framework.
- WorkCover, the workers' compensation program in New South Wales Australia, applied the Employer Premium Payments model, resulting in a

"SAS is committed to ensuring that we continue to have a leading-edge anti-fraud solution. We are very pleased with the results."
- Derek Wylde
Head of Group Fraud Risk, Global Security and Fraud Risk
HSBC Bank

savings of AUD$3 million (US$1.98 million). Since applying the model, there has been a doubling in collected premiums for two consecutive years and net revenue of audits has increased fivefold.

- State of North Carolina Department of Justice—Although not fraud, uses SAS to consolidate information across all criminal justice entities to create an offender centric view of all offender information. Data sources span multiple branches and agencies of state government, local courts, jails and arrest data, and select federal information. The system provides robust search and watch capabilities so that any criminal justice professional can get accurate and timely offender information at the touch of a button.

B. A description of the data analytics services you are proposing to offer in this subject matter category (be specific, noting that agencies may seek to contract for a subset of the offered services);

SAS combines expert technical consulting services with award-winning software to ensure long-term success

SAS is dedicated to your long-term success. The intelligence that is housed in your data is unique, defining the diverse facets of who you are, what you have accomplished, and how you can succeed. At SAS, we are committed to helping you transform this raw data into vital enterprise intelligence by delivering the technical solutions and services you need. We blend award-winning software with flexible business and technical consulting services to turn your business strategies into a real advantage.

Solving your unique business requirements

SAS has been partnering with customers to solve their business problems for more than 35 years. SAS consultants take the time to listen and learn about your business challenges and enterprise goals to establish a foundation for strategic advancement. This enables SAS to deliver the right SAS technology and tailored services to solve your unique business requirements.

Domain expertise across all industry sectors

SAS consultants have a wealth of experience gained working with many hundreds of customers across all industry sectors including finance, telecommunications, retail, and government. Alongside this industry domain expertise, we give customers practical insights into how their organization can use business analytics to become more focused, more effective and ultimately more successful. Such advice can be offered independent of any SAS software.

Range of services

SAS Professional Services provides expert advice and help at all stages in a project's life cycle. Specific services range from solution discovery workshops, through to cleaning and analyzing data, evaluating your architecture, and implementing the right business solution to address customers' needs. S AS provides all the help customers need to drive project success.

PMM

SAS' methodologies allow for seamless integration of multi-disciplinary teams to achieve a more efficient and effective use of resources with better alignment of the

specialist strands. Along with the technical implementation or solution methodologies is the Project Management Methodology (PMM). PMM is used for all implementations to provide a consistent and unified project approach regardless of the number of solutions or focus of the project.

Our expert SAS Analytical Consultants are available to share their vast knowledge and real world experience to address:

- The analytical approach to a particular business problem.
- Additional insight and foresight that could be gleaned from your data.
- Building a high performance enterprise that is driven by analytics.

Our goal is your ultimate satisfaction with SAS software and to become your trusted technology and business partner. To support your analytical needs, SAS offers a variety of customized or defined consulting services options.

Analytic Workshop

The SAS Analytic Workshop begins with a discovery session between your business professionals, analytics experts and seasoned SAS analytic consultants. We discuss your specific business needs and how SAS data mining and forecasting tools and solutions address those needs. The workshop will help you identify and explore alternatives to expand the value of your current SAS analytical software.

Installation and Configuration

The SAS Installation & Configuration Service provides a proven process for quickly and properly installing your SAS analytical software and configuring it to run effectively within your environment. We verify the software was installed correctly, functions properly and integrates with other SAS software products and platforms.

Analytic QuickStart

The SAS Analytic QuickStart enables your analytical experts to work hand-in-hand with SAS Analytical Consultants as SAS Enterprise Miner™ or Text Miner is deployed within your organization. SAS Analytical Consultants will design a custom knowledge transfer session to help your analytical specialist quickly learn and utilize the SAS products to meet your specific project's needs and review best practices for the construction of flow diagrams in SAS Enterprise Miner™ to build predictive models.

Data Mining Service

The SAS Data Mining Service allows you to leverage powerful SAS analytic software and expert consultants to identify previously unknown patterns and trends in your data that could impact your organization. During the service, we teach you data modeling techniques, develop a data mining model using your own data and train your staff in analytical techniques, the use of SAS Enterprise Miner™ software and industry best practices, allowing you to become self-sufficient in these areas.

Text Mining Service

The SAS Text Mining Service leads you through a systematic process to define your text mining business objectives. Using your data, we introduce you to our text mining product by demonstrating text pre-processing, clustering and predictive modeling. Similarities and patterns are identified in profile clusters, providing you keys to unlock valuable data.

Analytic Modeling Service

The SAS Analytic Modeling Service enables SAS Analytical Consultants to review available data sources to identify possible variables of interest for extraction. The data sources will be inspected for general data cleanliness and information content that can be used in model development. SAS Analytical Consultants will identify driver variables and develop models using appropriate statistical methods to address the customer's business need and score the data for use in production.

Forecasting Service

The SAS Forecasting Service offers you the ability to leverage SAS' powerful forecasting capabilities through data management, analytics and reporting with expert SAS assistance. SAS Analytical Consultants will help you understand trends, seasonality, events and behavioral characteristics of historical data. SAS Analytical Consultants will educate your staff about both analytic techniques and forecasting, enabling you to embark on the path toward self-sufficiency in these areas.

Customer Care Program

The SAS Customer Care Program provides you the ability to purchase a block of consulting hours and use them over a pre-determined timeframe. If you have analytical experts in-house, you can use these hours to access analytical experts at SAS with whom you can discuss model development, statistical methods, or any other analytical needs. If you don't have analytical experts in-house, you can use these hours to leverage SAS Analytical Consultants to assist you in building models, maximizing use of your SAS analytical software and knowledge transfer of analytical concepts including industry best practices.

Listening to our customers

SAS has been listening to our customers for 35 years, and that is why we understand your business, competition and IT environment. No one knows SAS technology better than SAS consultants. Our hands-on experience—drawn from more than 1,500 expert consultants worldwide—provides your organization with the fastest proven path to successful implementations of SAS Solutions. Our flexible engagement model is structured to meet your specific business and industry needs. While we work directly with your project team, we also serve as your liaison to SAS Research and Development and Technical Support. Your success is our shared success.

Service Levels (Levels of sophistication or maturity)

1. Reporting/Information Extraction

- ***Operational reporting***
- ***Parameter driven reports***

- ***Pre-defined Queries***
- ***Pre-defined Data Cube(s) and/or Mart(s)***
- ***Pivot Tables***

In its 2010 Forrester Wave report, SAS was cited as a leader in Enterprise Business Intelligence Platforms

Reporting/Information Extraction are key services provided by the SAS team using the SAS Fraud Framework. SAS consultants will develop the fraud and abuse performance report portfolio. These reports include operational reporting, parameter driven reports, pre-defined queries, pre-defined data cube(s) and mart(s) and pivot tables. In addition, ad hoc reports are available.

2. Data Analysis

- ***Direct Access to Data***
- ***Economic and Financial Analysis***
- ***Data Cube(s) and/or Mart(s) creation***
- ***Ad hoc Queries***
- ***On Line analytical processing (OLAP)***
- ***Use of Business Intelligence (BI) tools***

SAS/DataFlux is strongly positioned in the visionary quadrant of the Gartner Magic Quadrant for Data Integration Tools, 2010

Data analysis is another key service provided by the SAS team using the SAS Fraud Framework. Some of the services offered by SAS consultants include:

- Establish an ETL process for direct access and/or mapping to source data feeds for existing and new data sources
- Establish a production batch schedule for existing and new data sources
- Integrate existing business rules from various sources
- Develop fraud and abuse management dashboard
- Implement sophisticated name matching and record linking techniques (including fuzzy matching) to match entities across and within data sources

Maximize prevention of fraud with the SAS Fraud Framework's integrated advanced analytics

In implementing the SAS Fraud Framework solution to address workers' compensation fraud, specific rules and analytical models (anomaly detection and predictive models) will be used to maximize the prevention of fraud. The analytics and data used in each solution will be shared accordingly to leverage the fraud detection capability across the platform. The Social Network Analysis capability will also be utilized across all of these initiatives to facilitate the sharing of fraud information across programs.

Creating a more complete picture of employees, employers and service providers

By combining the disparate data sources, running fraud detection analytics, and applying social network analysis, a more complete picture of employees, employers, and service providers will emerge allowing for:

- Detection of previously unknown claims fraud
- Detection of previously unknown employer and service provider fraud and abuse
- Increased referrals for legal and civil penalties
- Increased referrals for prosecution

- Sentinel deterrent effect of imposing penalties and prosecution on would-be fraudsters
- Increased amounts of recovered monies
- Lower insurance premiums for Minnesota businesses
- A level playing field for honest businesses
- A more attractive business climate to recruit and retain businesses

Workers' Compensation Premium Evasion

Employers misclassify workers to avoid withholding income taxes, paying employment taxes, and workers' compensation premiums. Premium evasion fraud comes in two forms. First is the intentional misreporting and underreporting of employees and employee hours. Second, there are employers who operate in an underground economy and don't report any or a sizable portion of their workers.

Data sources make up the foundation of the solution

Based upon our experience, to maximize detection, integration of several key data sources is recommended. These data sources will allow the State to obtain a single view of the entities and understand behavior holistically to better profile for fraud. This is NOT a complete list, but is representative of the types of data that have been useful in other engagements:

- Employer database—static data on the businesses receiving workers' compensation benefits
  - Contact information (e.g., address, phone, email, industry data)
  - Owner information (e.g., static data of owners/spouses, ownership dates and %)
  - Place of business—all details of the respective places of business
- Policy data—specific details on coverage purchased/subscribed to by employers and any changes to the coverage
- Employer premium reports—employer filings of hours worked and worker risk class (used to derive premiums owed)
- Workers' compensation claims—claim data including injured party, injury details (e.g., date/time, description, work type, witness), employment history, etc.
- Accounts receivables—provides data on accounts receivables for premiums and other agency receivables
- Premium payments—data on accounts being used to pay premiums
- Safety inspection data—can be used to compare the workers on a site to what is being reported
- Wage claim data—employees that have filed a claim for unpaid wages
- Fraud/audit case details—outcomes and information from past fraud investigations and audits
- Referral information—details of all fraud and audit referrals from internal and external sources

- Department of Licensing/Contractor Registration—registration data for employer licenses and contractors (can also leverage Secretary of State)
- Department of Revenue—total revenue reporting for employers/businesses
- Building permits—details of the permits and type of work being completed by businesses
- Office of Motor Vehicles—details of individuals registered with the state
- Federal and State Directory of New Hires—static and employment information on recently hired workers
- IRS data—details of business and individual returns
- Known bad lists—hot lists of employers that have been flagged for past fraud
- 3rd Party commercial databases—business/employer, fraud hot lists, and fraud scheme details

SAS will leverage data sources in the State which include any suspicious activities such as known bad lists or public referrals. Upon integration of the agreed upon data sources, SAS will build analytics that will allow the State to focus on detection of key fraud behaviors.

The following list includes several sample areas of focus that can form the baseline of the detection capability SAS can provide. As this is NOT an all-inclusive list, SAS will work with the State to refine and prioritize the scope of the detection capability.

- Misreporting/misclassification of employees: employer, owner, policy/premium payment, and employee information will be linked together to provide a holistic view of employer behavior
  - Evaluation of premiums paid over time to detect anomalous behavior
  - Detection of employee transfer fraud—transfer employees to new businesses with different profiles and cleaner claims history to obtain better rates
  - Evaluation of claims/injury types in relation to employee classification
  - Leverage audit referral data—history of multiple referrals across single or linked entities drives risk
- Underreporting of employees/hours
  - Evaluation of claims frequency in relation to employees/hours reported
  - Evaluation of IRS, licensing, department of revenue, and permit data to determine if it is in line with workers/hours reported (uncover late or under reporting)
  - Evaluation of historic premium payments (receivables)—difficulties can be a leading indicator of financial stability that can lead to underreporting
- Detection of an underground economy (unregistered businesses/ subsidiaries)

- Linking of cross agency data (e.g., IRS, department of revenue) to determine if businesses exist but are not paying workers' compensation
- Evaluation of wage claims against unregistered businesses
- Evaluation of claims filings for unregistered businesses
- Evaluation of structured and unstructured data from field audits and inspections

Workers' Compensation Claims Fraud

In addition to the data sources listed in the Workers' Compensation Premium Evasion section, additional data is recommended for enhanced detection of workers'' compensation claimant and provider fraud.

- Workers' compensation claims (line item)—all specific claim line items, inclusive of information for all injuries, diagnosis, and medical procedures performed
- Claim payments—payment transactions to the individuals filing claims
- Medical bill payments—line item payment transactions to medical providers for services rendered
- Registered medical service providers—medical providers and all static details (e.g., contact information, ownership structure, ownership contact information) that are registered with the State or as preferred providers
- Medical referral information—doctor referral information that is tracked as part of the medical procedure data
- Fraud case details—outcomes and information from past fraud investigations on claimants and providers
- Known bad lists—hot lists of individuals and entities that have been flagged for past fraud

Ferreting out fraud

Through leveraging these additional data sources, SAS will build analytics that will allow the State to focus on detection of both employee claim fraud and provider claim fraud. Listed below are several sample areas of focus that can form the baseline of the detection capability SAS can provide. As this is NOT an all-inclusive list, SAS will work with the State to refine and prioritize the scope of the detection capability

- Workers' compensation claim fraud (employee and employer fraud)—claimant, employee, medical provider, and payment information will be automatically linked together to provide a holistic view of claimant behavior.
  - Evaluation of claims paid over time to detect anomalous behavior (e.g., multiple claim activity)
  - Evaluation of claim timing (e.g., seasonal claims, after long layoff)
  - Detection of claimant/injury malingering (e.g., time based, procedure based, working while injured)
  - Evaluation of discrepancies between accounts of the incident (employer disputes, injured on personal time)

- Evaluation of claims/injury types in relation to incidents and employee job function
- Evaluation of claims occurring immediately after policy inception/changes (e.g., reporting additional employees) or in relation to major employer events (e.g., layoffs)
- Assessment of misalignment of employment details with claim (e.g., timing of claim, income not aligned with employment)
- Evaluation of treatments (e.g., timing, diagnosis to procedure alignment)
- Assessment of suspicious engagement of legal counsel

➢ Workers' compensation provider fraud—claimant, employee, medical provider, and payment information will be automatically linked together to provide a holistic view of provider behavior.

- Evaluation of line item claim data to detect abnormal behavior
  - o Misalignment of procedure performed
  - o Excessive treatment or discrepancies
  - o Inconsistencies in medical billing information
- Evaluation of claims paid and procedures performed over time to detect anomalous behavior
  - o Reputation for overbilling / miscoding / unbundling
  - o Submission of fictitious claims
  - o Fictitious providers (shell companies)
- Detection of invalid or inter-organization referrals
- Evaluation of consistent medical providers and attorneys involved in high risk /suspicious claims

3. Advanced Analytics

- ***Clustering/Segmentation***
- ***Data Mining***
- ***Predictive modeling***
- ***Advanced Statistical Analysis***
- ***Cause-Effect Validation***

Owning 35.2 percent of the market, SAS advanced analytics software dwarfed sales of the next nine vendors combined, who together held only 22.9 percent of the 2010 market

Advanced Analytics is the core service provided by the SAS team using the SAS Fraud Framework. Some of the services offered by SAS consultants include:

➢ Customize fraud scoring models and investigator alert management to adapt to the State's requirements

➢ Apply predictive modeling by taking known fraudulent claims or behavior and overlay that on new aims data being processed Network data sources:

- Provides enhanced network collusion detection and search capability based upon association to known fraud
- Improves fraud handling efficiency through data aggregation and visualization tools and reduction of false positives

- Employ SAS' Social Network Analysis to link entities together and investigate fraud in a meaningful way. By finding and establishing those linkages between the entities, our team essentially creates a single rollup that is then subjected to rules, anomaly detection, and predictive modeling. This is a critical component to the SAS hybrid approach as it allows us much needed insight into increasingly sophisticated fraud rings.
- Enhance business rules, anomaly detection, and predictive models added to the network analysis for broader protection:
  - Deploy anomaly detection models for specific areas of concern
  - Build relevant customer state vectors and clusters for predicting out-of-form behavior
  - Improve fraud handling efficiency through data aggregation and visualization tools and reduction of false positives

4. Build Data Access Skills and Understanding (Foundational) Training

- ***Generic and/or tools specific***

Comprehensive training curriculum geared for all experience levels

SAS is dedicated to meeting the diverse needs of our customers and strives to make every training event a successful one. SAS began its software training program in 1976 with the first course given to the U.S. Department of Agriculture. Since then, SAS has trained thousands of state and federal government employees. SAS' comprehensive training curriculum consists of more than 200 courses that address all aspects of SAS software. SAS offers courses for users of all experience levels, from new computer users to seasoned professionals. As the developers of SAS software, we provide the most up-to-date training available on the SAS System. Instructor-based training courses allow students the opportunity to learn the course material in a desirable time frame. SAS has a training centered located in Minneapolis, Minnesota with two state-of-the-art classrooms and local instructors. We combine lectures with textbook exercises and computer workshops to reinforce each lesson taught.

C. A description of any tools, hardware, and software that would be needed to support the services you are offering for the subject matter;

Pinpoint focus on the areas of most benefit

What distinguishes SAS is our ability to complete the project with expediency and low risk, while delivering value early in the project lifecycle. We are also able to immediately focus on the areas that will result in the significant cost avoidance benefits that are critical to the State especially during these difficult economic times.

SAS Solutions OnDemand offers rapid deployment

For this project SAS will be accountable as the prime contractor to provide complete software, hardware, services, training, maintenance and support in one fully integrated solution hosted by SAS Solutions OnDemand. The sole objectives of SAS Solutions OnDemand, formed in 2000, are to provide customers with rapid deployment, best practices in the use of SAS solutions, scalable and highly secure hosting environment, all wrapped in a full service approach. This approach provides

the State with a one-stop shop to answer any questions whether solution related, infrastructure related, or any facet of the users everyday working environment.

Over 140 government and commercial customers entrust their data and applications to SAS Solutions OnDemand

For each OnDemand customer, a professional team is assigned to work with the customer's specific solution and support a wide variety of questions, additional requirements, issues, solution enhancements—all directly connected to SAS' research and development. SAS Solutions OnDemand's is committed to on our customers obtaining the most value from SAS solutions as quickly as possible. Through this approach, SAS has redefined the concept of hosting services with a holistic approach that integrates three interwoven components into a unified offering:

- **Infrastructure**– A secure, high-performance data processing infrastructure, with 99% uptime guaranteed in service level agreements. Additional service levels are available as additional options if required by the client.
- **Expertise**—"The right expert at the right time" for optimizing the infrastructure, the data warehousing foundation and the business intelligence applications = the total solution.
- **Communication**—A single point of contact for customer liaison and project management, with "the buck stops here" accountability for the end-to-end solution.

Industry-ready solutions for fast "time to value"

Customers enjoy the benefits of a comprehensive solution based on the industry's leading analytics; delivered by the insiders who know these tools best; and deployed on an infrastructure that has been tuned specifically for the solution at hand. SAS Solutions OnDemand delivers actionable intelligence about workers' compensation fraud, but also solid customer relationships and organizational performance.

SAS has one of the highest concentrations of PHDs of any other entity across the country

The SAS Advanced Analytics Lab team is a group of highly proficient statisticians and modelers within the SAS Solutions OnDemand department. Using SAS software, this team developed the innovative analytical processes and techniques inherent to the SAS Fraud Framework Solution. This team has delivered end-to-end solutions from raw data as well as advanced analytics solutions encompassing data warehousing, data quality, and documentation as part of our Solution Delivery Methodology. The Advanced Analytics Lab has the flexibility and competence to address emerging and challenging analytic issues within all business sectors.

SAS Solutions OnDemand offers the complete solution—easing the burden on the State's IT resources

SAS customers receive a full suite of support services at no extra charge, including skilled telephone technical support and unlimited, around-the-clock online technical support. Our online customer support center provides always-on access to a wealth of technical support, reference information, educational resources and communities. Knowledge-sharing is continuously available through regular seminars, Webcasts and an expansive selection of training courses. SAS OnDemand customers are also provided with a web-based issue-tracking and communication tool with severity alerts

escalating based on issue categorization, as well as an integration on-line project documentation solution.

The SAS Fraud Framework for Worker's Compensation

Fraud increasing at an alarming rate demands solutions keep up

The opportunistic fraudsters of yesterday, who typically exploited a single government service or program, have evolved into sophisticated and organized networks attacking every available program and service while moving at light speed. The tax dollars lost to fraud are increasing at an alarming rate. Although most workers' compensation claims are perfectly legitimate, the FBI estimates that 10 percent of all claims contain some element of fraud.

Enterprise approach to fraud detection = thought leaderships

Traditional program or agency controls are no longer sufficient to keep up with today's fraudster. Governments must look to a more holistic and enterprise level approach that spans program and agency boundaries to more effectively track and identify both opportunistic fraudsters and sophisticated and organized fraud rings and criminal networks.

The SAS Fraud Framework addresses all types of fraud

The SAS Fraud Framework is enterprise in scope, allowing the State to create a holistic view of entities across all government programs and services, and aggregate their activity in such a manner as to detect discrepancies across various government touch points that could be easily missed when only looking at one program or service area. In addition, it allows activities to be easily consolidated at the entity level to streamline investigations, recoveries and, if necessary, criminal prosecution. Thus, access to pertinent information is available to any internal or external resource having the appropriate privileges—providing a way to effectively analyze the wealth of available data and turning it into actionable information. In addition, the solution supports a wide variety of fraud types and exposures, including worker's compensation and unemployment insurance, tax, healthcare programs such as Medicaid, and other social services programs such as TANF, WIC, Child Care, etc.

End-to-end fraud detection process

As shown in Figure 4.6.1, the solution is built on the SAS Business Analytics Framework, a complete end-to-end data integration, business intelligence, advanced analytics and business solution framework. The SAS Fraud Framework supports the entire end-to-end fraud detection process, including data integration, analysis, alert generation, investigation and ultimate disposition—be it an audit, recovery action, criminal prosecution or decision to take no action. Because the solution helps to manage the entire fraud discovery and investigation workflow, pertinent information flows seamlessly throughout the process, and the outcome of each and every investigation is fed back into the detection engine to fine tune the analytics over time.

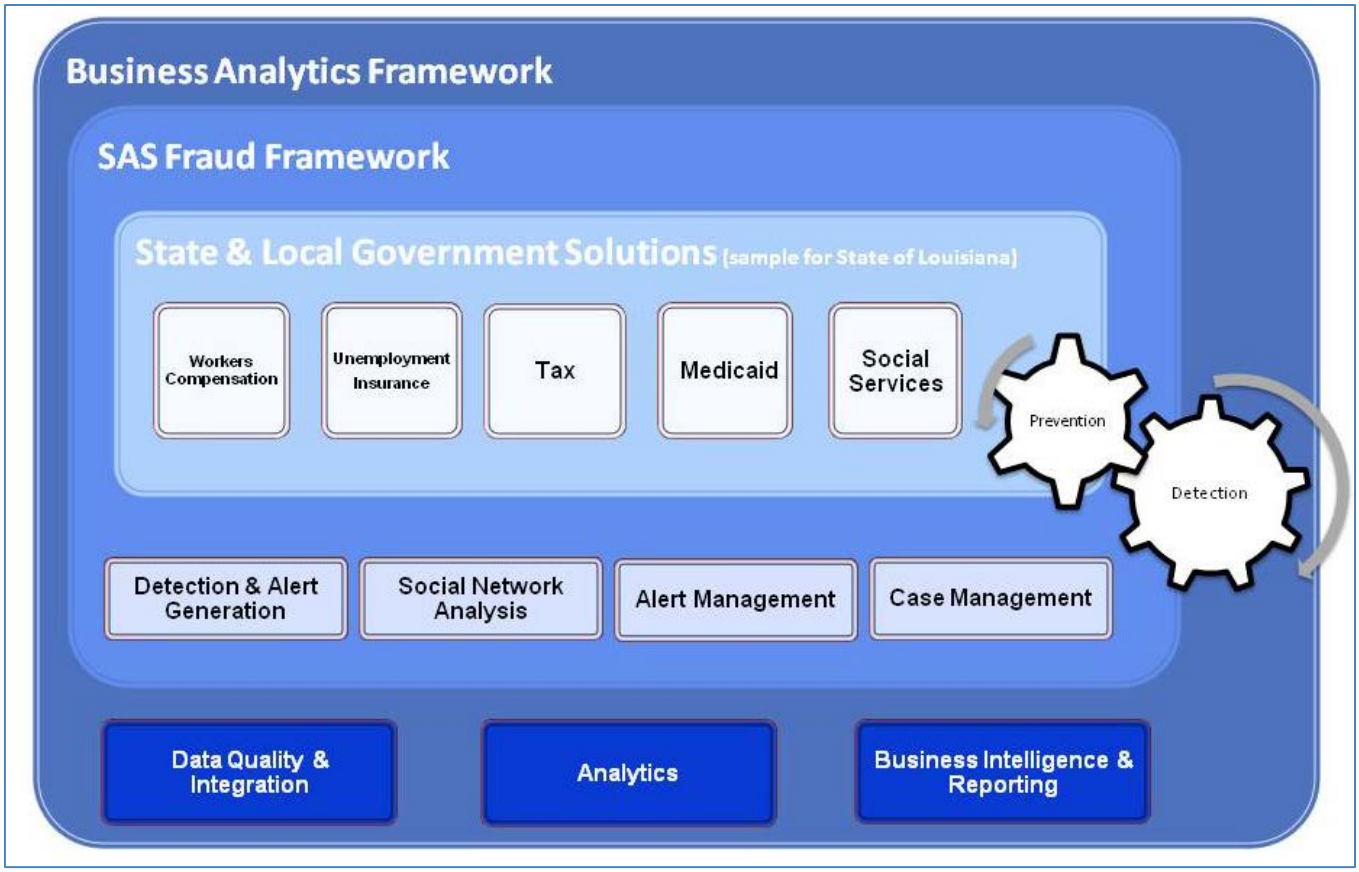

Figure 4.6.1. The SAS Fraud Framework solution is built on the SAS Business Analytics Framework, a complete end-to-end data integration, business intelligence, advanced analytics and business solution framework. The SAS Fraud Framework supports the entire end-to-end fraud detection process, including data integration, analysis, alert generation, investigation and ultimate disposition. Prevention and detection are the two key gears guiding the solution.

The SAS Fraud Framework can help you stay one step ahead of today's fraudsters

Since fraudsters are becoming increasingly more sophisticated in their ability to detect and circumvent traditional control measures, the SAS solution leverages a hybrid approach to fraud detection. Rather than relying on a single detection technique, the solution combines heuristic rules to find known fraud patterns, anomaly detection to surface unknown yet unusual behavior, and predictive models to allow the system to leverage attributes of past fraud cases to identify future cases of fraud within the State's data. And finally, the solution incorporates sophisticated link analysis and social networking capabilities to detect hidden relationships between entities—detecting larger fraud networks and collusion. This hybrid approach allows the system to cast a very wide net to identify a wide variety of both known and unknown fraud schemes, and then score, rank and prioritize suspect entities in such a manner as to enable a limited staff of investigators and auditors to concentrate on the most important and highest risk entities for investigation.

SAS recently earned the Technology Innovation of the Year Award in the field of enterprise fraud detection and prevention by Frost & Sullivan for its fraud management solution. After thorough analysis of the fraud solution market, the research firm found that SAS Fraud Management led the industry in integrating

Owning 35.2 percent of the market, SAS advanced analytics software dwarfed sales of the next nine vendors combined, who together held only 22.9 percent of the 2010 market

advanced analytics, superior decision management capabilities and sophisticated rules into a complete scoring and reporting platform. SAS has consistently been positioned in the Leaders Quadrant of the Gartner Magic Quadrant for products such as data quality, enterprise business intelligence and data mining. Not only is SAS the largest vendor in the overall data mining market, we have the most established track record of customer successes. Gartner cites our strength being due to our wide set of tool-based capabilities along with our expanding numbers of packaged solutions. SAS remains the overwhelming leader in the advanced analytics market, according to IDC, with 33.2% market share in 2008 (IDC, June 2009). Voting with their IT budgets, companies and government chose SAS Analytics more often than the next 16 analytics suppliers listed COMBINED, according to June09 Worldwide Business Intelligence Tools 2008 Vendor Shares report.

SAS Fraud Framework Overview

Scalable platform to expand to areas outside of workers' compensation and unemployment insurance

The fraud detection capabilities of the SAS Fraud Framework are delivered through a range of innovative approaches driven by the needs of SAS customers across industries. The sophisticated data integration, analytics, and fraud investigation platform is proven to scale by amount of data processed, quantity of users, and number of business areas addressed. This scalability will allow the State to not only expand the capability within the SAS Fraud Framework, but expand to other fraud detection areas to resolve subsequent business issues.

SAS' hybrid approach to fraud proactively detects fraud and gives complete intelligence picture

The advanced analytic approaches and fraud risk scoring techniques, along with the powerful entity linking and social network building capabilities, create a complete intelligence picture of all of the entities and risks associated with a case. From opportunistic fraud detection, to locating sophisticated and organized fraud that is invisible when using traditional techniques, the SAS Fraud Framework will proactively produce fraud alerts/referrals earlier in the cycle and then support the full investigation process—ultimately finding more fraud, faster, and greatly reducing losses and exposures.

Advanced Analytics Lab tunes models based on their experience

As the laws and environment of each state vary, we have found pre-built models are useful, but not as valuable as customized models for identifying fraudulent behavior. Thus, the SAS Fraud Framework has been built on a foundation of flexibility in the data structure and detection engine, allowing modification and customization of analytics models while minimizing the effort required. In order to detect the State's fraudsters, our proven approach for detecting fraud includes customizable market-specific business rules, predictive models, anomaly detection, and social network analysis based on the State's unique data. In addition, our implementation team has valuable experience in detecting these types of fraud which they bring to bear rather than relying solely on canned or pre-built models. Members of the SAS Advanced Analytics Lab will leverage our vast experience in workers' compensation and unemployment insurance fraud detection to apply proven analytical models, methods

and templates to the State's unique data, thus providing a solution that is based on industry best practices but precisely tuned for the unique circumstances within the State.

Differentiation from the competition

From SAS' advanced hybrid approach to fraud analytics to the integrated end-to-end fraud prevention solution, to the intuitive user interface, the SAS Fraud Framework offers a wide array of competitive advantages. It is only with SAS that the State will be able to:

- Proactively prevent more fraud through a holistic, enterprise view of the big picture
  - Automated associations of related perpetrators and a clear understanding of all behaviors
  - Aggregation of fraud alerts and cases to arm investigators with all pertinent information
  - Better understanding of emerging threats so action can be taken before substantial losses occur
- Effectively prioritize alerts and cases for fraud investigators using a configurable value based approach
- Significantly reduce false positives through the application of the hybrid approach and analytical based scoring
- Maximize investigator efficiency through the automated aggregation of data and the streamlined investigative tools and interface
- Drive consistency into the end-to-end fraud prevention process
  - Consistency in fraud alert generation through data driven detection
  - Consistency in investigation process to ensure minimum standards in case file output for ready consumption by law enforcement
- Reduce overall total cost of ownership and be able to rapidly implement fraud detection in new business areas by leveraging a single enterprise-wide, flexible and extensible, end-to-end fraud detection platform

All components needed to address fraud

The SAS Fraud Framework process consists of a series of components that support end-to-end fraud detection. Included in the SAS Fraud Framework software package is all applicable software components needed for combating fraud, including:

- Data access, quality and integration
- Detection and alert generation (including fraud rings and networks)
- Analytic model generation tools
- Enterprise business intelligence and reporting
- Alert management and investigation
- Enterprise case management

As depicted in Figure 4.6.2., the SAS solution facilitates the entire end-to-end process for fraud detection and prevention. The following sections outline how the SAS Fraud Framework will work for the State:

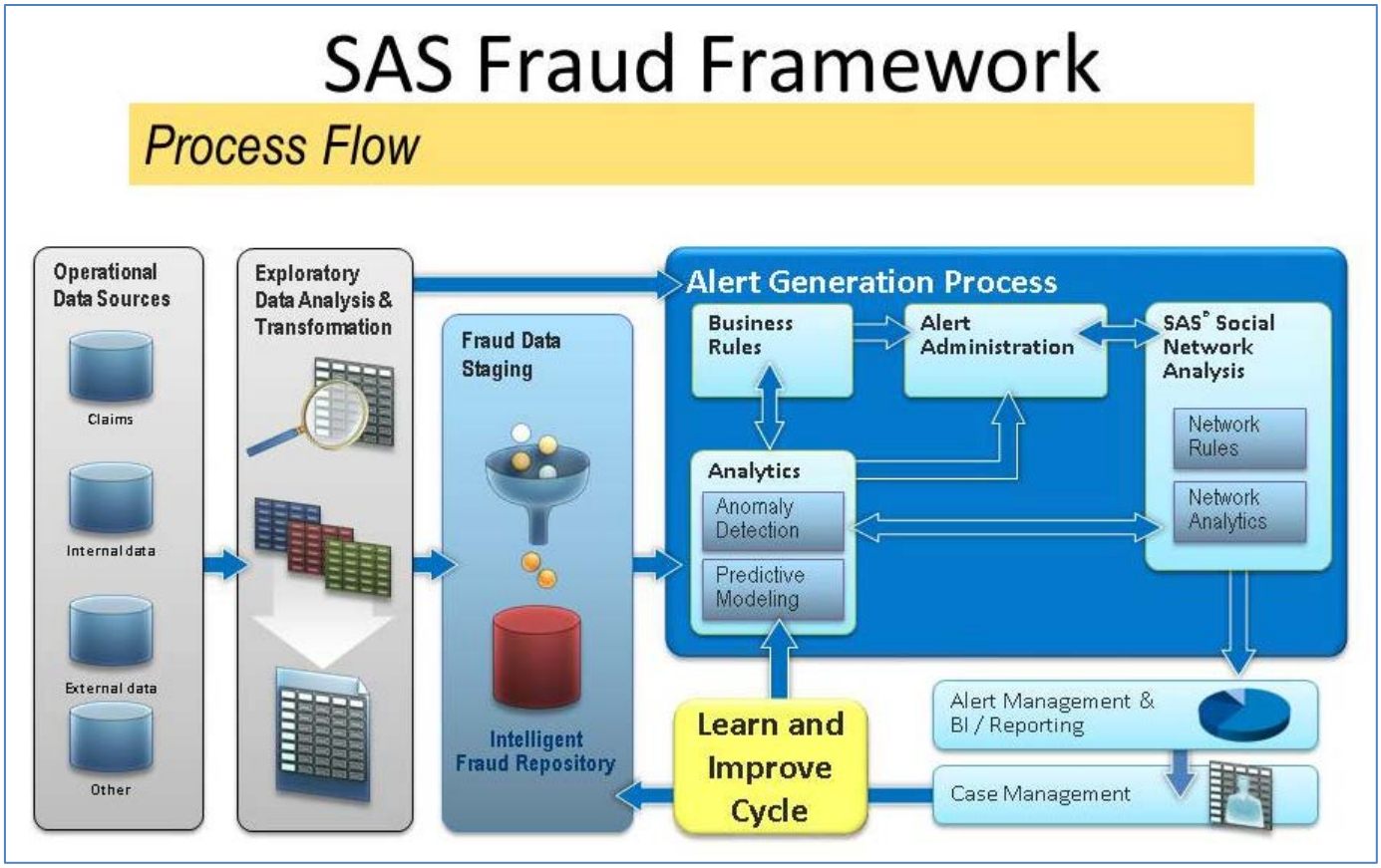

Figure 4.6.2: High-level SAS Fraud Framework process flow shows how the solution ingests data for exploratory data analysis and transformation, stages it, merges business rules and then applies advanced analytics such as anomaly detection, predictive modeling and social network analysis to generate alerts. The alerts are then surfaced in an easy to understand interface and can be integrated with an existing or SAS' case management solution. The solution has a "learn and improve" cycle in order to fine-tune results over time as more information is added to the system.

Data Access, Quality and Integration

Access virtually any data source

SAS enterprise data integration is a powerful, user configurable and comprehensive component of the SAS Fraud Framework that can access virtually all data sources; extract, cleanse, transform, conform, aggregate, load and manage data; support data warehousing, migration, synchronization and federation initiatives; and create real-time data integration services in support of service-oriented architectures. The power behind SAS data integration is that it will support the integration and configuration of disparate data sources to create a comprehensive person profile across various agencies and source systems.

Sharing data across the State –removing traditional barriers

The SAS Fraud Framework leverages SAS enterprise data integration to draw in data from all relevant sources, including cross-agency and third-party, and parses the data to create a complete data model of all entities and their respective attributes and activities. Identity and relationship resolution capabilities are employed to consolidate data when multiple source records exist, creating a single view of each entity by applying sophisticated data matching, precedence and lineage rules to resolve inconsistent or ambiguous data. This aspect of data quality is especially

important in fraud detection, since persons with intentions of cheating the system will often provide inaccurate or conflicting information. As these differences across records and systems can often be a warning sign of fraud or other improper activities, the system maintains all original values, while leveraging precedence rules developed in concert with each customer to establish what is the most trusted value to use for initial display purposes within the application—ultimately providing a clear and concise composite depiction of each entity.

Create a comprehensive person or citizen profile with the SAS Fraud Framework data model

Because of its ability to integrate data from any source, the solution provides the capability to create a comprehensive person profile (whether natural or juridical) that is then available to all users of the system provided they have the appropriate security privileges. The sophisticated matching engine provides both deterministic and probabilistic matching capabilities that allow match sensitivities or scores to be set at the individual attribute level. Match codes can be assigned and persisted on an individual record basis, providing an extremely efficient matching process.

SAS is helping to ensure criminals in NC do not fall through the cracks

An example of this capability is State of North Carolina Department of Justice, who uses SAS to consolidate information across all criminal justice entities to create an offender centric view of all offender information. Data sources span multiple branches and agencies of state government, local courts, jails and arrest data, and select federal information. The system provides robust search and watch capabilities so that any criminal justice professional can get complete, integrated, accurate and timely offender information at the touch of a button. Within the context of this application, SAS helped the North Carolina address a number of challenges, both technical and cultural. We assisted the state with developing data governance standards and process for inter-agency data sharing to ensure that sensitive data was adequately secured and protected. In addition, we helped the state develop data precedence rules to establish which data elements were considered to be either the most trusted or the “value of record” when conflicts existed between records.

The SAS Fraud Framework is built to be shared and extended

The metadata driven approach of SAS enterprise data integration enables the SAS Fraud Framework to ingest data in virtually any format, including unstructured free text. Because the solution leverages SAS’ award winning data integration tools, the underlying data model and data integration process can be easily maintained, enhanced and extended. This allows the system to maintain a comprehensive dossier on entities that includes consolidated identity and descriptive information, transactions, changes and associations across multiple agencies and systems and extending even into external data sources. The tools provide an easy to use graphical interface for managing the data integration process, allowing new data sources to be added as they are identified and available.

Detection Engine/Alert Generation Process

Aggregate scores to prioritize alerts

The Alert Generation Process is an advanced detection engine that applies business rules, anomaly detection algorithms, predictive models, and social network analytics on the ingested data to raise alerts on entities (e.g., claims, participants, employers) and networks for fraud. The Alert Generation Process aggregates scores generated by the analytics at the appropriate entity level The Alert Generation Process uses these aggregated scores to prioritize the alerts for consumption.

- Produces independent and combined scores to assess overall risk on an entity and network basis, and then generates alerts that are automatically routed to the appropriate resources.
- Scores entities and their full histories—scores associated networks using behavioral data (patterns, network growth rates, activity levels) and other data provided (current/previous addresses, contact numbers, employers).
- Performs batch processing of existing participants, claims, and networks, enabling you to detect and investigate existing fraud as well as prevent new fraud.
- Ingests existing risk scores or red flags and provides an aggregated score at the network level to identify subtle or hidden relationships.
- Can be executed as a scheduled batch job or run on an ad-hoc basis.

SAS' hybrid approach reduces false positives

One key differentiator of the SAS Fraud Framework that drives incremental fraud detection earlier with reduced false positive referrals is the SAS hybrid approach to fraud analytics. The SAS hybrid approach contains business rules, anomaly detection algorithms, predictive models, and Social Network Analytics to produce targeting schemes. It then utilizes sophisticated scoring and ranking to surface the most relevant referrals for investigation. The content and logic within the four pillars of the hybrid approach are specific to SAS Fraud Framework and are configurable to the State's data and specific industry sectors and fraud detection objectives. That is to say, SAS has sets of rules for detecting certain types of fraud (workers' compensation, medical claims fraud, etc.) that can be used "off-the-shelf." The hybrid approach augments these rules with additional tools that are built specifically for the climate at hand.

As depicted in Figure 4.6.3, the SAS hybrid approach leverages the following techniques:

Unique to SAS, these techniques ensure no fraudsters can fall through the cracks

- **Business Rules**—encode known fraud schemes and indicators and are a good first measure for identifying suspicious activity. Unfortunately, rules alone are easy for sophisticated fraudsters to spot and avoid by managing their behaviors under the rule threshold levels. However, rules in combination with anomaly detection, predictive models, and social network analysis provide a strong capability to detect the fraud that is acting below

the rule thresholds. The SAS Fraud Framework includes built-in rules for common types of fraud.

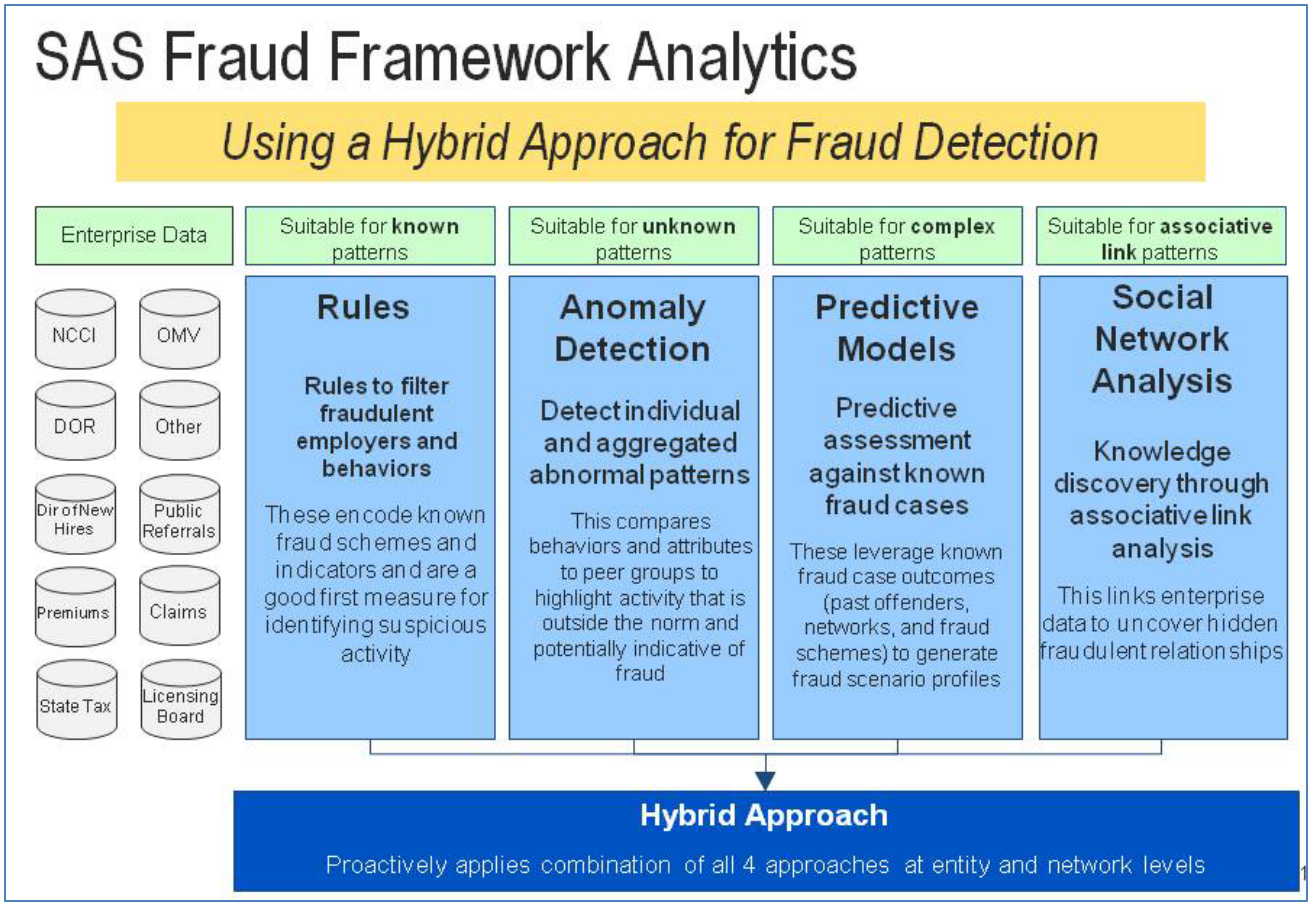

Figure 4.6.3. The SAS hybrid approach to fraud detection includes the integration of multiple disparate data sources and first adding business rules to filter fraudulent behaviors. Anomaly detection then detects individual and aggregated abnormal patterns. Predictive models are created to assess against known fraud cases. Finally, social network analysis adds knowledge discovery through associative link analysis and can help identify organized fraud rings. This hybrid approach proactively applies a combination of all four analysis approaches at the entity and network levels and ensures fraud does not slip through the cracks.

Identifies outliers that may prove fraudulent – unique to SAS at the network level

- **Anomaly Detection**—compares entity behaviors and attributes to peer groups or past behavior patterns to highlight activity that is outside the norm and potentially indicative of fraud. (An entity can be a single transaction, an individual, or even a network.) Also known as unsupervised methods, SAS Fraud Framework anomaly detection leverages many analytical techniques, including, mean, standard deviation, robust regression, clustering, sequence analysis, and peer group analysis to name a few. These techniques are critical to uncovering unknown fraud schemes and keeping up with the changing trends in fraud. The SAS Fraud Framework has existing anomaly detection algorithms built from SAS' industry leading advanced analytics capability in the government space. These anomaly detection algorithms run in conjunction with the rules at the entity and network levels and highlight suspicious behaviors to the investigators to assist in investigative efficiency.

Uses known fraud to identify patterns and create rules

- **Predictive Models**—leverage known fraud case outcomes (known fraudulent claims, participants, networks, and schemes) to generate fraud scenario profiles. These fraud scenario profiles are used in the review of the enterprise data to uncover similar behavioral patterns and raise alerts on entities and networks that are demonstrating similar fraud attributes as the known cases. Also known as supervised methods, SAS Fraud Framework predictive models leverage many analytical techniques, including neural networks, decision trees, generalized linear models, econometric models, and gradient boosting to name a few. The SAS Fraud Framework has existing predictive model templates built from SAS' industry leading advanced analytics capability in the government space that are configurable to an organizations data and requirements. These predictive models are run in conjunction with the rules and anomaly detection algorithms at the entity and network levels. The application of these predictive models at the network level is unique to the SAS Fraud Framework.

SAS' Net-Chaid refines Social Network Analysis links to identify meaningful networks. In fact, it is only with SAS that organized crime can be detected—in addition to the other types of fraud

- **Social Network Analysis (SNA)**—fraudsters often recycle information and behaviors to spread their activity across identities and programs to obtain the maximum financial gain without being detected. In addition, collusive networks of employers, providers and beneficiaries often act in concert to thwart internal control mechanisms. By linking all data, including claim, provider, employer, and participant data, the SAS Fraud Framework can uncover these hidden relationships. Linking, however, is not enough—SAS has a patent pending approach, Net-CHAID, to refine these links into meaningful networks for the application of fraud analytics. Once these networks are created, then rules, anomaly detection and predictive models are applied at the network level. It is through the application of these techniques on aggregated data that the SAS Fraud Framework can detect the most sophisticated and costly fraud rings, with reduced false positives.

Proactively produce employer fraud scores, related targeting lists, and audit requests

The advanced analytic approaches and fraud risk scoring techniques, along with the powerful entity linking and social network building capabilities, create a complete intelligence picture of all of the entities and risks associated with an entity and its related fraud score. From opportunistic fraud detection to locating sophisticated and organized fraud that is invisible when using traditional techniques, the SAS Fraud Framework will proactively produce employer fraud scores, related targeting lists, and audit requests earlier in the cycle and then fully support the entire investigation process.

Social Network Analysis

Additional layer of fraud protection uncovers hidden relationships

Social Network Analysis uses static and transactional data to build links between entities and uncover the hidden relationships. The automatically generated social networks (groups of entities linked based upon their relationships with each other)

are used in the Alert Generation Process for the application of network based rules and analytical models, providing an additional layer of fraud detection.

Patent-pending techniques applied to data

The generation of social networks is driven by a metadata configuration. All data records ingested are linked exhaustively based on combinations of attributes and behavioral patterns within the data. Then, using statistical techniques, including the patent pending Net-CHAID algorithm, common entities are identified and collapsed to produce single views of entities and the links are refined to produce meaningful groups—or networks—for analysis.

More advanced than entity analytics

The Alert Generation Process generates scores at the entity level that are then aggregated during the network build process and used to further refine the networks based upon common behavioral patterns. Once the networks are fully refined, the Alert Generation Process applies an additional set of network based rules, anomaly detection algorithms and predictive models to the social networks to generate network level scores and alerts. The Alert Generation Process also prioritizes the alerts for consumption.

Alert Management & Investigation

Combine all alerts in Alert Management for real view of fraud

Alert Management integrates and manages the alerts created in the Alert Generation Process, providing an interface to perform list review, analysis and investigation on the output of the Alert Generation Process. The prioritization and queuing of alerts is configurable to an organization's requirements, and multiple separate user queues can be defined and alerts routed to specific fraud triage resources or fraud investigators based upon an organization's business rules. Through a Flex based graphical user interface, Alert Management provides detailed line item fraud alert information, corresponding source data, analytic scoring results, and the social network views that are required to support alert triage/disposition and the fraud investigation process. In addition, alerts from other existing fraud systems can be consolidated within the Alert Management component to provide a true enterprise wide view of fraud.

The SAS Fraud Framework designed for all user types

The SAS Fraud Framework utilizes the SAS business intelligence platform for management of business intelligence and reporting. SAS business intelligence platform is a comprehensive, easy-to-use solution that integrates the power of SAS analytics and data integration to share insights that power better business decisions. It includes role-based, self-service interfaces for all types of users within a well-defined IT governance framework and a centralized point of administration. This helps organizations simplify and speed business intelligence deployment.

The SAS Fraud Framework end-user interface provides the capability to create a wide array of customized reports and dashboards, as well as select pre-defined reports from a gallery via SAS' web reporting capability. Pre-defined layouts and

templates are also available to ease the report creation process. Output from reports and dashboards can be integrated with MS Office technologies and exported to multiple different formats.

Enterprise Case Management

Structured environment for managing investigations

SAS Enterprise Case Management (ECM) enforces best practices and proper gathering of evidence to complete the fraud investigation process. ECM provides a structured environment for managing investigation workflows, attaching comments or documentation, and recording financial information. Case management is the backbone of documenting investigation processes, exposures, and losses and of driving consistency into the process. The user defined requirements to drive consistency will help ensure that case files are completed appropriately and that cases referred to law enforcement and the district attorney have sufficient evidence for prosecution. Additionally, ECM is expandable to include prosecutors and law enforcement groups as end users.

ECM makes investigator's jobs easier

ECM is a configurable work flow based case management solution with a full document repository for storing and tagging investigation and case documentation. ECM receives referrals and incident alerts requiring investigation from multiple monitoring systems, including Alert Management, and is utilized to support and drive consistency into the field investigation process and case file creation. The automatic pre-population of field level data from Alert Management streamlines the investigation process and prevents rekeying errors. The disposition and tracking of case outcomes is a critical element of ECM that supports the enhancement of future monitoring and overall operational efficiencies based upon historical information. In addition, the ECM solution can import existing case records and historical information from existing tools to ensure a full auditable history is maintained.
The SAS Fraud Framework can also integrate with existing case management utilities.

Learn and Improve Cycle—Intelligent Fraud Repository

Known outcomes feed the models

Each time an alert is actioned or a fraud referral/case completed, the results are stored within the Intelligent Fraud Repository as known outcomes. The predictive models used in the Alert Generation Process access this repository of known outcomes in the application of the supervised analytic approaches for the SAS Fraud Framework.

The SAS Fraud Framework never stops learning and evolving

This feedback loop allows the SAS Fraud Framework to continue to learn from investigative results and further improve precision by raising more alerts on entities and networks that have similar attributes to confirmed fraud cases. In addition, this supports the SAS Fraud Framework in keeping up with the changing trends in fraud, by integrating newly confirmed fraud results into the Alert Generation Process.

Provides easy configuration and distribution of alerts

Alert Administration

Alert Administration allows system administrators to administer and maintain the business rules, models, and network analytics run within the Alert Generation Process. Through the GUI of the Scenario Administrator, Fraud Business/Process Administrators can easily configure the details of the rules and models and the batch frequencies without support from IT. Through this interface, administrators can configure various populations (industry segments, geographic regions, etc.) to target, and develop specific detection schemes or thresholds for each defined population.

Confirming and validating the best models to include in the solution

SAS Fraud Framework's data mining is used to generate and test the validity of new fraud business rules and analytical models. Once validated, the new rules/models can be readily deployed from SAS Fraud Framework data mining to the SAS Fraud Framework and managed via Alert Administration. SAS Model Manager provides an easy-to-use graphical user interface that guides fraud analysts through a repeatable process for registering, testing and validating models. Model Manager also supports the champion vs. challenger capability of confirming the best fit models.

D. To the extent you are able, indicate the level of State involvement necessary for the successful implementation of the services you are offering. Include estimates for resources levels and time.

The level of State involvement will vary from project to project. We have included a high level roles and responsibilities chart in Section E for your information.

E. A list of personnel anticipated to provide professional services under this master contract program; provide a narrative of their individual qualifications or provide a resume or curriculum vitae specific to each proposed subject matter category;

The following table shows typical SAS roles and responsibilities:

SAS Role	Typical Responsibilities
Project Director, Advanced Analytics Lab	➢ Provide overall program leadership for development, strategy and direction of the SAS Fraud Framework. ➢ Facilitate cross-departmental activities and resources within SAS in order to ensure success of the State project.
Analytics Manager, Advanced Analytics Lab	➢ Review, assess and provide recommendations for business and functional requirements. ➢ Supervise State Analytic Consultants and provide guidance with respect to data mining, text mining, Social Network Analysis, forecasting and analytic model management.
IT Manager – Advanced Analytics Lab	➢ Review, assess and provide recommendations for State system and infrastructure requirements. ➢ Supervise State implementation and provide guidance with respect to SAS Solutions OnDemand best practices, processes and IT policies.
Quality	➢ Review and approve all State Quality Assurance test plans.

Assurance Manager - Advanced Analytics Lab	➢ Review and approve all State Quality Assurance test results. ➢ Review and approve State quality control plans. ➢ Review and approve State quality management deliverables. ➢ Ensure adherence to SAS methodology processes and best practices. ➢ Assign State testing responsibilities when Quality Assurance is needed. ➢ Create project quality plans (Integration Test Plan, System Test Plan, and Quality Plan Worksheet) for the State project. ➢ Coordinate acceptance of State code subsystems and programs with appropriate staff.
ETL Development Lead, Advanced Analytics Lab	➢ Build, implement and manage data integration processes for State data sources. ➢ Develop State metadata environment. ➢ Perform impact analysis of potential changes made across all State data integration processes. ➢ The proposed solution shall provide interactive debugging and testing of jobs during development and give full access to logs. ➢ Develop capabilities to connect to all required State data sources. ➢ Build SQL functionality to load State data.
Fraud Analyst Lead and Application Developer, Advanced Analytics Lab	➢ Develop and implement data mining features for interactive models such as rules building and exploratory data analysis capabilities. ➢ Develop and implement social network analysis functionality such as alert generation, network level scoring and querying using advanced analytic and statistical methods such as associative cluster analysis. ➢ Develop and implement text mining tools to provide comprehensive text preprocessing, multi-format document support and model score code generation. ➢ Create forecast modeling tools. ➢ Create analytic model management tools.
Project Manager	➢ Project management and administrative responsibilities of the State project. ➢ Coordinate data mining, text mining, SNA, forecasting and analytic model management development. ➢ Work with State users to identify all system level, data, business, technical and functional requirements for the State project.

The following table shows the State's typical roles and responsibilities:

Role	Responsibilities
Analytic Engineer (optional)	➢ Design analytic applications (only if the State plans to design its own analytical work).
Business Analyst	➢ Advise the project team on the key industry business objectives and the definition of the business process. ➢ Advise the project team on specific subject matter, including industry trends, and business systems requirements. ➢ Help identify and evaluate the business value of the project. This may involve establishing and measuring ROI. ➢ Communicate high-level business requirements to team.

	➢ Participate in requirements meetings. ➢ Provide information on business needs and existing business processes and required enhancements to those processes. ➢ Provide analytical and reporting requirements. ➢ Review design to verify that it meets requirements.
IT/Data Administrator	➢ Address security issues. ➢ Administer user access. ➢ Compliance / user access lead is primary contact of SIRT team if a security incident occurs. ➢ Advise project team on the State's overall IT strategy, processes, and policies. ➢ Coordinate the IT staff to support the project team. ➢ Manage the data extract process. ➢ Ensure consistency and integrity of data. ➢ The data stewards have read/write access to the metadata, allowing them to perform the following functions on tables within the metadata environment: read, write, alter, and create.
Data Architect/Data Modeler	➢ Perform logical database design. ➢ Provide information on the design of the operational data sources and responsible for reviewing the subject data models, dimensional data models, and physical data models.
End-user or Business Users	➢ Advise project team on business requirements, and desired attributes. ➢ Actively provide feedback on intermediate deliveries, if any. ➢ Assume responsibility for the quality of the system, and perform User Acceptance Testing ➢ The end-users can include • Business users • Business unit analysts • User representatives • Test users • Business unit managers. ➢ Develop User Acceptance Test Plans. ➢ Conduct User Acceptance Testing. ➢ Provide results of User Acceptance Testing.
Executive Sponsor	➢ Provide overall direction for team. ➢ Promote cross-departmental activities. ➢ Facilitate resolution of cross-departmental issues. ➢ Create environment conducive to teamwork. ➢ Ensure adequate funding is available. ➢ Manage expectations of executives. ➢ Identify the key members of the project's management team. ➢ Establish key priorities. ➢ May authorize and/or finance the project. ➢ Notified by SIRT team if primary contacts cannot be reached.

Initial project team

When beginning the project, SAS assembles the initial project team. The team usually includes one or more members of the sales/proposal team along with an allocated account manager or director, a project manager, and a technical lead. At appropriate points throughout the project as identified in the project plan, the SAS team may expand to include other resources as applicable.

SAS provides the right skills needed based on the requirements of the project

All nominated SAS staff allocated to any agreed project role possess the required skills, experience and knowledge required to meet assigned expected work products. SAS strives to hire and retain the best employees in the industry. Many SAS consultants hold bachelors, masters, and doctoral degrees in such areas as computer science, statistics, operations research, and business administration. SAS consultants are also are experienced in detailed consulting operations, applications development, system analysis and design, and project management.

SAS team approach

When possible, SAS attempts builds teams using consultants who have previously worked together or who share specific domain knowledge relevant to the project expected work products. This further extends the benefits of the SAS team approach. The following profiles represent examples of SAS employed individuals who could be made available to assist with the proposed project or engagement. Specific consultants allocated to any project are assigned based on the actual requirements of the proposed project and availability at the time of contract commencement.

Project Director—(J.B.)

Relevant Experience

SAS Institute, Inc. (1981 – Present)

Vice President, SAS Solutions OnDemand (2008 – Present)

- Product research and development, marketing, sales, program management, IT, quality assurance, and documentation. Current products and services include SAS Solutions OnDemand, SAS Fraud Framework, Advanced Analytics Lab, SAS Drug Development, Education Value Added Assessment System, ASP educational testing.

Senior Research and Development Director (2000 – 2008)

- Product research and development for the Analytic ASP within Research and Development.

Research and Development Director (1999 – 2000)

- Product research, development, and marketing for Analytic Solution Products within the Business Solution Division.

Product Development Director, Data Mining (1997 – 1999)

- Product development of Enterprise Miner, Quality Assurance, and product Marketability.

Manager, Statistical Training and Services, (1988 – 1996)

- Support for all statistical training and consulting support.

Manager, Statistical Training (1983 – 1988)

- Provided customer software support for all statistical training needs. Intensive travel around the world and participation in on-going development of product to customer needs.
- Pioneered on-site customer and general public statistical training program.

Statistical Training Specialist (1981 – 1983)

- Taught product software lines to limited customer base. Due to the newness of the company, much time devoted to course development for on-coming statistical software product lines.

North Carolina State University (1999 – 2002)
Adjunct Professor of Statistics and Genetics

Self-Employed (1981)

- Contracted by SAS as an instructor.
- Employed into a new department to establish continuity of statistical training style. After less than three months, employed full time.

Department of Statistics, North Carolina State University (1978 – 1981)
Research Associate

- Consultant to U.S. Department of Agriculture and on-going studies to receive Ph.D.

Department of Statistics, North Carolina State University (1978)
Statistical Instructor

Department of Biostatistics, State University of New York (1977)
Statistical Instructor

Vanderbilt University (1976 – 1977)
Research Associate

Subject Matter Expert—(J.R.)

Relevant Experience

SAS

Solutions Architect, SAS Global Fraud and Financial Crimes Global Practice Principal for Insurance Fraud Solutions

- Responsible for the planning, management and marketing of fraud detection and investigation management solutions for the property, casualty, life and disability insurance markets worldwide.

The Hartford Financial Services Group

Director of SIU Strategic Operations for the Property & Casualty Special Investigations Unit

- At one of the nation's largest insurance and financial services operations, J.R. established and managed a 20-member analytical and intelligence operation within the SIU and designed analytical protocols for investigating auto, property, liability, and workers' compensation claims.

Hartford Life

Manager in the Group Benefits Division Special Investigations Unit

- Supervised a team of Investigative Analysts and developed tools and resources for investigating suspicious life and disability claims.

LexisNexis

Product and Markets Manager, Fraud Solutions Group

Education and Awards

- Master's degree in Economic Crime Management
- Bachelor's degree in Criminal Justice
- Utica College Economic Crime and Fraud Management MBA program, Adjunct Faculty
- Certified Fraud Specialist (CFS)
- Certified Fraud Claim Law Specialist (FCLS)
- Co-inventor of a patent-pending insurance fraud detection model that utilizes determinate and indeterminate data
- Executive board member of the New England Anti-Fraud Association (NEAFA)
- Trainer for the Association of Certified Fraud Examiners (ACFE), International Association of Law Enforcement Intelligence Analysts (IALEIA), National Healthcare Anti-Fraud Association (NHCAA), and the International Association of Special Investigation Units (IASIU), as well as working groups for the Federal Bureau of Investigation (FBI) and other law enforcement agencies.

Subject Matter Expert (C.B.)

Relevant Experience

Forrester & Dick

Consultant 2010 – Present

- Consultant providing advice on matters of general liability and workers' compensation insurance matters as well as consultation to clients on matters of public policy, insurance and labor laws.

State of Louisiana - Louisiana Workforce Commission 2008 – 2010

Director, Office of Workers' compensation

- Managed staff of 157 and an annual budget of $62 Million
- Legislative Lead for Louisiana Workforce Commission
- Worked with Agency Executive Team and Governor's Policy Team to develop policy priorities.
- Drafted legislation and handled committee testimony for agency bills.
- Revamped fraud division audit selection and investigative procedures resulting in a 60% increase in investigations and a 700% increase in referrals for criminal prosecutions.
- Lead in the procurement and implementation of a statewide fraud, waste and abuse detection platform.
- Served as interim executive counsel for Executive Director, Louisiana Workforce Commission (October, 2009 – November, 2010)

State of Louisiana Property and Casualty Insurance Commission – Member – 2008-2010

- The Property and Casualty Insurance Commission reviews and examines the availability and affordability of property and casualty insurance in the state of Louisiana and makes policy recommendations to the Louisiana Legislature.

Chairman of the Governor's Advisory Council on Workers' Compensation (2008-2010)

- Committee of 17 stakeholders from business, labor and the medical community charged with advising the Governor and the Legislature on policy matters pertaining to workers' compensation.

Chairman of the Louisiana Workers' Compensation Second Injury Board (2008-2010)

Subject Matter Expert–(G.H.)

Relevant Experience

SAS Institute Inc. (September 1997 – Present)

Government Practice Director, Fraud and Financial Crimes Global Practice

2005 – Present

- Responsible for field support and product direction in applying SAS' fraud detection and prevention capabilities within the government market.

Sr. Systems Engineer May 2004 – 2005

- Responsible for technical relationship with flagship State and Local Government customer.
- Duties included developing overall account strategy, developing key messages and collateral to support sales initiatives, pre-sale customer meetings and presentations, and post-sale customer care activities.
- Grew account revenue by 600% over a 4 year period and developed customer into a premier partner and reference.
- Also acted as strategic advisor to business unit General Manager to assist with repeating success throughout the business unit.

Anti-Money Laundering Product Manager December 2002 – May 2004

- Manage overall product life cycle, including market opportunity evaluation, requirements definition, go-to-market and launch plans, sales readiness and release cycles.
- Liaise with R&D to insure that product meets requirements and is delivered in a timely fashion.
- Coordinate with various internal marketing groups to insure that appropriate marketing programs and collateral is produced.
- Insure field readiness through development of field training programs and delivery support and partner development.
- By adopting a streamlined R&D and go-to-market processes, was able to deliver three versions of a new product in 18 months and drive over $10M in new revenue.

Sr. Systems Engineer September 1997 – December 2002

- Utilized Solution Selling methodology to provide technical sales support for both pre-sale and post-sale activities, helping to insure that regional revenue objectives were obtained.
- Activities included customer pain identification, formulating creative technology solutions to address those pains, and then articulating the value of the solution to various stakeholders in the organization through customized proposals, presentations and demonstrations.

- Also acted as mentor to new hires, as well as provide national leadership on selected technology areas.

Subject Matter Expert—(J.G.)

Relevant Experience

SAS Institute, Inc. (1996 – Present)

Statistician July 2008 – Present

- Designed and implemented advanced fraud discovery systems in the areas of welfare, finance, and insurance.
- Most recent project involved detection of social services fraud for a large urban county.
  - Project combines general anomaly detection rules, predictive modeling techniques and social network analysis.
  - Project is expected to eliminate tens of millions of dollars per year in fraudulent welfare payments.
- In other duties at SAS, has personally authored most of the company's data mining training curriculum.

Statistical Services Specialist 2002 – July 2008

- Created and taught course in exploratory analysis, inferential statistics and predictive modeling. Developed and maintained most of SAS Institute's data mining curriculum.

Analytic Consultant 1996 – 2002

- Provided consulting, educational, and project management services to clients. Specialization in predictive modeling, time series analysis, exploratory analysis, data visualization and unsupervised classification methods.

Statistics Unlimited, Inc. 1993 – 1995

Statistical Analyst

- Engaged in the design and analysis of experiments in the biomedical, environmental, defense, and chemical industries.

Information Arts, International 1991 – 1993

Software Developer

- Created educational software in C for studying fractals, chaos and dynamical systems.

Freelance Programmer 1982 – 1987

Developed and maintained software in medical equipment, manufacturing, financial and educational domains.

Subject Matter Expert—(S.B.)

Relevant Experience

SAS Institute

Principal—Fraud Strategy (March 2009 – Present)

- Serve as catalyst for providing SAS Fraud Framework solution direction to maintain SAS's leadership position within fraud and financial crimes. Manage SAS fraud capability across industries at the global level.
- Engage with key clients, prospects, and partners to ensure SAS Fraud Framework keeps pace with emerging trends.
- Serve as subject matter expert to support fraud organization design and solution implementations.
- Manage end-to-end delivery of enterprise SAS Fraud Framework.

Detica Consulting LLC

Senior Manager—Risk & Regulatory Business Unit (2006 – 2009)

- Built Detica Chicago office from inception to prosperous 11 person team focused on Financial Services clients. Initiated expansion of Detica US practice into the Retail Financial Services sector through leveraging risk and regulatory expertise and the Fraud Detection and Risk Management platform. Led series of mission critical consulting engagements to address clients' most visible risk management problems.
- Fraud Detection and Risk Management Platform – US Business Development and Delivery
  - Managed US business development activities for Fraud Detection Platform in the banking and insurance industries – built annual pipeline to $15M+.
  - Managed pilot and implementation projects for Fraud Detection Platform across industries, resulting in up to 10X return on investment year 1.
  - Developed US centric fraud and social network analytics implementation methodology for execution of software pilots and implementations and the respective sales approach.
- Client On-boarding and Management Target Operating Model for Global Investment Bank
  - Designed target operating model for an industry leading operations and technology platform to manage risk of Client On-boarding and Account Maintenance (COBAM) processes across global footprint.
  - Established strategic roadmap for integration of workflow, case management, regulatory rules, and document repository technology components across all lines of business and support functions.
  - Leveraged project expertise to develop Deice COBAM offering.
- Regulatory Risk Platform Implementation for Global Banking Organization

- Managed software development lifecycle for custom development and implementation of regulatory risk platform to support Client Lifecycle Management, Anti-Money Laundering (AML) and 'Know Your Customer' (KYC) operations in North America.
- Facilitated Joint Application Development sessions across bank's global footprint, ensuring regional user requirements were appropriately integrated.

PricewaterhouseCoopers LLP

Advisory Manager—Financial Services Risk and Regulatory Practice (2005 – 2006)

- Developed PwC FS Risk and Regulatory practice into a market leader in the Chicago Financial Services Industry. Established strong working relationships with key banking and exchange/securities clients and became their trusted advisor for consulting services. Facilitated sale of $10M in consulting services and managed delivery of associated projects.
- AML/KYC Implementation for Global Banking Organization
  - Managed design of target operating model for client on-boarding process in support of the Anti-Money Laundering (AML) and 'Know Your Customer' (KYC) initiatives for the Client Engagement Group.
  - Implemented 25 person operations group to support client on-boarding processes. Defined roles and responsibilities and outlined a management framework to drive operational efficiency.
  - Identified key operational metrics and negotiated stakeholder agreements with the businesses supported by the Client Engagement Group.
- Operational Risk Assessment for Global Banking Organization
  - Facilitated series of Risk Assessment workshops for the Operational Risk Management group of the bank's Consumer and Commercial Division focusing on financial reporting, KYC and AML operations, and financial and operational effectiveness.
  - Devised action plans for mitigating the operational risks identified in the workshops.
- Regulatory Reporting Remediation for Consumer Finance Unit of Global Bank
  - Managed cross functional team through the review of the regulatory reporting process and designed a streamlined method for the analysis and refiling of quarterly regulatory reports for the consumer finance unit.
  - Identified opportunities to improve regulatory reporting processes and formulated strategic plans for the implementation of the defined enhancements.
  - Designed and delivered a custom regulatory reporting training program for client management and staff.

PGS Trading LLC

Owner and Risk Manager (2000 – 2005)

- Expanded individual trading operations and founded PGS Trading LLC. Developed business from inception to a multi-strategy investment fund specializing in OTC and listed securities, futures, and options.
- Built investment fund to eight employees and an annual revenue base of $1,000,000.
- Developed financial models and cash flow projections to determine the most profitable trading methods to utilize.
- Utilized quantitative and qualitative analysis to develop trading databases and implemented computerized models to manage positions. Models applied technical analysis, long-short pair trading, and arbitrage strategies.
- Implemented risk management procedures to limit downside exposure of positions.
- Designed and conducted training and continuing education programs to improve staff trading efficiency. Enhanced trader skills in arbitrage identification and trade entry/exit optimization. Increased revenues by 25% from inception of programs.
- Developed business relationships and negotiated contracts with several securities firms to cut trading costs by 40%.

Deloitte Consulting

Consultant—Financial Services and Healthcare Divisions (1997 – 2000)

- Led teams of Deloitte and client personnel to further business development and to enhance information technology systems. Utilized financial modeling tools for system valuation and built consensus around strategic recommendations.
- Vendor Selection for Futures Clearinghouse
  - Facilitated meetings with executives to define the business and technical requirements of an enhanced clearing system.
  - Executed vendor selection process using customized quantitative methodology and conducted gap analysis to determine software and hardware deficiencies between defined requirements and vendor systems.
  - Generated financial models and presented strategic recommendations to executive board.
- Design of Enhanced Clearing System for Options Clearinghouse
  - Devised and implemented strategies for the design and development of data distribution functions.
  - Led team to create a new data structure and architecture platform for a superior system.
- Implementation of Financial System for Healthcare Provider

- Deployed testing approach and facilitated cross-division issue resolution between accounting and IT leadership.
- Managed development and integration testing of electronic reporting system. Improved automated acceptance of electronic reports by 55%.

Expertise

- Seven plus years of management consulting experience in the across industries with a focus on managing and delivering projects in fraud and regulatory risk management platforms and operational strategy.
- Built US pipeline for Fraud Detection and Risk Management platform from scratch to $15M+ annually in insurance and banking industries within 1 year timeframe.
- Established reputation as expert in fraud analytics space, with regular speaking engagements at industry conferences and executive roundtables.
- Expanded consulting business into retail financial services (banking and insurance) sectors through leveraging Fraud Risk platform.
- Advanced Risk and Regulatory practice into a market leader in the Chicago Financial Services Industry. Facilitated sale and delivery of $10M in advisory services.
- Demonstrated entrepreneurial and management capabilities by starting a new business to capitalize on strategic opportunities within the securities markets. Built revenues to $1M+ annually.

Project Manager—(C.B., PMP)

Relevant Experience

SAS June 2009 – Present

Project Manager

- Manage client facing implementations of hosted SAS software solutions and analytical services.
- Experience implementing advanced analytical software and services for the insurance, telecom and pharmaceutical industries.
- Proven track record of high quality work delivered on time and on budget.

Microsoft Corp. (Microsoft Advertising) June 2007 – May 2009

Senior Project Manager

- Most recently managed a 4200 man-hour project to successfully implement a new Online Ad Server and two Yield Management tools for Careerbuilder.com.
- Utilized Agile Development principles to reduce project timelines and increase customer involvement in final product.
- Managed project financials and resource burn down with weekly reports to management.

- Successfully managed 35 Online Ad Server implementations, 6 licensed upgrades, 60 hosted upgrades and 12 custom development project in my first 6 months.
- Integrated Salesforce into our revenue tracking and daily tactical operations.
- Led the effort to fully map our Custom Development and Implementation processes.
- Mentored newly hired Project Managers.

Peopleclick, Inc. (April 2001 – June 2007)

Consulting Project Manager Jan 2007 – June 2007

- Managed the implementations of a hosted Applicant Tracking System (Peopleclick RMS) under the SaaS model.
- Consulted on business practices and gathered system requirements
- Acted as subject matter expert for other Project Managers for general system knowledge specifically, Data Integrations with 3rd party vendors and Internet Job Boards (Monster, Careerbuilder, etc.)

Business Analyst (informal Project Manager) Jan 2006 – Jan 2007

- Mapped product enhancements against external client needs and internal business requirements
- Defined software requirements and system Use Cases for Peopleclick RMS portal product including those enhancements designed for the emerging High Volume market
- Gathered requirements via customer interviews, JAD and RAD sessions with Subject Matter Experts and cognitive walkthroughs.
- Managed projects for the creation of a new internal environments and data exchange scheduling modifications.

Implementation Consultant June 2003 – Jan 2006

- Maintained a long term relationship with a subset of Peopleclick's tier 1 accounts.
- Lead an effort to more efficiently integrate the Peopleclick's job posting engine with common Job Boards (Monster, CareerBuilder, etc.) using SOA principles.
- Consulted with clients to ensure their requested changes met their business need and to see if there was a more cost efficient method of achieving their goals.
- Gathered and documented requirements for Development, Quality Assurance and Client Approval.
- Member of a process design team responsible for defining how client initiated Change Requests are completed accurately and in a timely manner.
- Responsible for creation and maintenance of Change Request Requirements Design Guide.

Quality Assurance Analyst April 2001 – June 2003

- Performed user level validation for custom development prior to release.
- Improved internal processes and overall client satisfaction.

Fraud Analytics Manager—(J.J.)

Relevant Experience

SAS

Director, Advanced Analytics Laboratory

- Handles the customer business problems which require high-end analytics. Current focuses in AAL are on credit scoring and fraud detections in financial, health care, service and many other industries.

Samsung Life Insurance, Seoul, Korea

Vice President of CRM

- Led three primary departments; CRM Infrastructure, CRM Strategy, and CRM Operations to support the Sales and Marketing, Services, and Risk departments.
  - The areas involved: CRM Business Strategy, Data Collection Strategy, and CRM Systems such as SFA, CMS, EDW and Call Center, Out-Bound Call Center Execution, Market Segmentation, Customer's lifetime value, VIP program, Market & Consultant Research, and Acquisition/Cross/Up-Sell/Retention/Risk Analytic & Business Model etc.
- Experienced Analytical consulting with many of fortune 100 companies including financial, telecommunication, retail, and pharmaceutical, etc.
  - Type of Projects are Cross-sell/Up-sell, Fraud detection, Promotional response model, Churn (Attrition), Fair lending detection, Drug degradation (stability), Mail direct marketing response, Portfolio optimization, Customer loyalty and life-time value, Default modeling, Credit scoring, Domino effect, Campaign evaluation, Customer segmentation, Scheduling, randomizing, and designing of experiments, Customer satisfaction survey, Web-mining

Relevant Awards/Recognition

- ASA Best Student Paper Award in Biopharmaceutical Statistic Section (1997)
- 2001 SAS.COM magazine cover story (May/June) about the work with Bank of America
- 2001 REALware award in e-CRM area with Bank of America

Fraud Analyst Lead—(S.A.)

Relevant Experience

SAS

Analytical Consultant

- Fraud Detection in Information Technology
  - Lead developer and implementer of a fraudulent access detection system for a leading on-line information services provider.
  - Helped design and develop the system that used weblog and other data for monitoring usage patterns and other related activity. Many high end analytical methods were used for alerting suspicious usage with successful results.
- Fraud Detection in Social Services
  - Lead analytical consultant in a project related to detecting fraud and abuse in social welfare.
  - Helped develop and implement methods for detection and prevention of fraud and abuse including business rules engine, anomaly detection system, fraud prediction system and social network analytics to great success.
- Credit Scoring in Financial Services
  - Served as analytical and business consultant in a number of SAS®/Credit Scoring engagements.
  - Built acquisition and behavior scorecards for credit card, auto lending, and mortgage portfolios in both production and pre-production capacities.
- Customer Retention Modeling in Banking
  - Developed customer retention solutions for multiple banking organizations.
  - Developed models for ranking customers based on their propensity for attrition. These analyses involved working with large datasets with large number of variables, statistical segmentation, all aspects of predictive modeling and supporting automated lead distribution as the end state of the solution.

Fraud Application Developer—(J.K.)

Relevant Experience

SAS (2000 – Present)

Senior Analytical Consultant 2008 – Present

- Achieved expertise in fraud detection, statistical process controls, customer retention, cross/upsell modeling, customer acquisition, insurance rate making, and credit modeling.

Analytical Consultant 2000 – 2008

General Dynamics 1998 – 2000
Metrics Engineer

ManTech Environmental 1997 – 1998
Statistical Programmer

DynTel 1996 – 1997
Programmer Analyst

Holcombe and Associates 1994 – 1996
Actuarial Assistant

Relevant Training

- 2007, SAS®9 Base Certified, SAS Institute

Fraud Analyst/Modeler

Relevant Experience

SAS Institute Inc.
Analytic Engineer (2009-present)

- Insurance and health care fraud analyst/modeler. Implements fraud detection rules; identifying anomalies that can help detect fraud, using of advanced analytic and statistical techniques and using the social network analysis to prevent fraud. Expert user of SAS Social Network Analysis and has hands on experience in developing user guides and delivering user trainings.

Accenture, Bangalore, India (2006-2008)
Operations Manager

- Worked as an expert team member of Global Sales Support and Solutions team for Business Process Outsourcing & Project Mobilization, with key expertise in solution, proposal response development and bid support.

Tata Interactive Systems, Mumbai, India (2005-2006)
Manager-Corporate Marketing Group

- Managed a cross functional team of consultants focusing on planning of large to medium sized e-Learning solutions. There he developed project plans including effort estimations and costing.

IBM Global Services, Gurgaon, India (2001-2005)
Sr. Executive-Business Development and Customer Operations

Education

Masters of Science in Analytics (2009)
North Carolina State University, Raleigh, NC

MBA-Information Systems & Marketing (2001)
GGS Indraprastha University, Delhi, India.

BA-Economics, Education, English and Modern Indian Language (1999)
University of Delhi, Delhi, India

Relevant Skills and Training

- SAS Social Network Analysis
- Certified Advanced Programmer for SAS®9
- Certified Base Programmer for SAS®9
- Predictive Modeler using SAS® Enterprise Miner™ 5
- Six-Sigma Black Belt

ETL Development Lead—(B.M.)

Relevant Experience

SAS (June 1986 – Present)

Software Consultant May 2004 – Present

- Designed and built a campaign performance report system. Used Enterprise Guide and Data Integration Studio to build an ETL process combining SAS campaign reference data, customer contact data and campaign response/revenue data. Resulting data is consumed by a SAS Information Map used in SAS Web-based reports. The report displays key performance indicators related to the effectiveness of the campaign.
- Directed and lead a team of SAS consultants and customer resources to deliver C-level executive reports to help uncover customer sales promotion effectiveness. Designed and built SAS On-Line Analytic Processing (OLAP) cubes using SAS OLAP Cube Studio. Produced and deployed web-based reports for the SAS Information Delivery Portal using SAS Information Map Studio and SAS Web Report Studio.
- Selected from a global SAS consulting organization to attend SAS Telecommunications Intelligence Solutions training sessions in Heidelberg, Germany and Miami, Florida to facilitate future sales opportunities related to telecommunications analytics. Each session covered installation and usage of the SAS Intelligence Solution package. The package includes pre-defined Detail Data Stores, Analytic Base Tables and Analytic Data Models.
- Team co-lead for a customer-facing SAS Telco Intelligent Solution Technical Assessment. Reviewed existing database tables to perform a gap-analysis for the matrix-of-fields detail data store document.

- Performed SAS 9.1.3 SAS Software installations and knowledge transfers at customer sites. Produced customer deliverable installation documents. Installations components include Xythos WFS, Apache WFS, Jakarta Tomcat 4.1.18, BEA Weblogic, SAS mid-tier components, SAS Forecast Studio, SAS EMiner 5.2, SAS DI Studio, SAS Enterprise Guide 4.0. Tested the start-up functionality of each SAS software application. Software installations performed on UNIX and Windows Operating Systems.
- Assessed Windows Server Sizing and Usage Assessment for SAS BI Server architecture. Microsoft-based PERFMON utility used to capture performance metrics over a 24 hour time interval. Utilized Process Monitor from sysinternals.com for similar server performance engagements.
- Presented impromptu white-board presentations of the SAS 9.1.3 architecture design to educate customers during pre-sales engagements.
- Demonstrated SAS 9.1.3 ETL/DI Studio product overview presentations for pre-sales and post-sales engagements.

Software Manager/Systems Developer July 1999 – May 2004

- Project Manager for SAS/Warehouse Administrator Add-ins Development Team
- Managed six programmers whose collective tasks involved the development, testing, and release engineering for add-ins developed for releases 2.0, 2.1, and 2.2
- Responsible for the design, implementation and customer release of each add-in release
- Extensive use of Microsoft FrontPage web page development tools
- Monitored and used internal SAS Institute OASIS project management tools
- Developed Target Designers and AboutBox versioning information for Version 9 SAS DataBuilder Java Client software.
- Responsible for EDM divisional roll-out of the pilot project usage of Oracle ITime
- Responsible for initial investigation and implementation of Microsoft Project Software used for EDM project management.

Systems Developer June 1998 – July 1999

- Helped develop SAS Institute Defects Data-Warehouse. Scheduled warehouse load jobs.
- Maintained servers that hosted the warehouse databases.
- Maintained and extended functionality of existing SAS Warehouse Administrator Release 1.3 add-ins.

Project Manager June 1994 – June 1998

- Project Manager of Release Engineering and Source Management Team within Open Systems R&D Host Division.

- Managed five programmers whose collective tasks involve the coordination of the release and source management of the 6.09, 6.10, 6.11, and 6.12 SAS systems for UNIX based machines.
- Responsible for the design and implementation of the Version 7 SAS installation software for UNIX platforms.
- Provided direction to the Version 7 SAS system divisional source management research groups.

Systems Developer June 1991 – June 1994

- Developed configuration management tools for the Open Systems R&D Host Division.
- Member of the porting process team that designed and implemented software used to port the SAS system source code to UNIX platforms.
- Responsible for building and debugging the SAS system across five different UNIX platforms.
- Member of the UNIX SAS installation design team. Coded shell script modules used in the installation software.
- Worked with the manufacturing department to prepare the 6.09 SAS system for shipment to customers.

SAS Associate Systems Developer June 1986 – June 1991

- Developed the source management and configuration management tools used to port six million lines of the SAS system source code for the Data General/Prime Host Group.
- Responsible for compiling and linking the SAS system.
- Worked with other host groups within the Host R&D division in setting standards for porting and building the SAS system.
- Installed the SCO UNIX operating system on Intel 486 PCs; and ported and built the SAS system for this platform.

Analytical Consultant—(E.B.)

Relevant Experience

SAS Institute, Inc.

With over 25 years of experience, E.B. has repeatedly demonstrated strengths in statistical data analyses and analytical consulting, with a successful career in coaching customers to run data mining projects.

- For 11 years, doing business oriented consulting specialized in SAS data mining technologies. Experience in supporting customers to plan and develop predictive models with statistical rigor.
- Mentors and supports SAS products and solutions used in the industry.

- Demonstrates strong skills set as instructor, writer and presenter in the medical and academic fields.

Recent Project Experience

- Provided epidemiological expertise for data analyses and mapping with the Federal Accounts associated with cancer and health.
- Has coached hospital customers in use of Enterprise Miner and SAS/STAT, helped model assessment and fine tuning when estimating disease rates
- Scoped, designed and crated a logical model to estimate fraudulent claims in an unemployment data bases;
- Done many pre-sales projects in health care area.
- Developed projects in SAS forecast server and Enterprise Miner to assist the prediction of enrollment drop-off rates in a health insurance agency
- Scoped and developed a SOW to estimate claims likely to appeal to the federal district court.

Previous employers include:

- Duke Clinical Research Institute, where she worked as a Senior Statistician for 2 years, in charge of statistical consulting involving research design and sample size calculation. She performed in-depth statistical analyses in large confidential data sets from clinical trials.
- Comprehensive Cancer Center , where she developed analytical models in SAS and performed statistical analyses in a population-based case-control study.
- Maternal Child Health Department, UNC Chapel Hill where she worked as statistician, analyzing large National Center for Health Statistics databases to calculate rates of birth outcomes and prenatal care utilization for the southern US.
- San Diego State University Foundation project HELPS. She worked as research associate and supervised personnel, developed data management systems and BMDP/SAS programs to manipulate data on longitudinal hypertension study.

Degrees and Credentials

- Obtained PhD in Epidemiology from UNC Chapel Hill, Chapel Hill, NC
- Obtained MPH in Biostatistics from San Diego State University, San Diego, CA
- Obtained BS in Statistics from the State University of Campinas-Brazil

SAS Engagement #1: Washington State Department of Labor and Industries

F. For responders submitting proposals to subject matter categories #1 through #11, a detailed description of data analytics services provided to two or more public sector organizations of similar size and scope to the State of Minnesota within the past three years ("engagements"), specific to the category(ies);

8th largest commercial insurance company in the US

In Washington State, the Department of Labor and Industries (L&I) administers the state-operated workers' compensation. L&I is the eighth largest workers' compensation insurance company in the country providing coverage for more than 2.5 million workers employed by 171,000 employers. This "State Fund" provides workers with wage-replacement and medical benefits to offset the financial impact of a job-related injury or occupational disease. This no-fault insurance protects employers from lawsuits when work-related injuries and diseases occur. Premiums paid by employers and workers finance the State Fund. L&I is one of four exclusive State Funds in the nation. Each year, the State Fund collects in excess of $1.4 billion in premiums and receives approximately 137,000 new claims.

Maximizing existing resources to further increase ROI

WA L&I purchased the SAS Fraud Framework for Government to address workers' compensation premium evasion by detecting unregistered employers that are not paying workers' compensation taxes for their employees. In addition, it will uncover the most serious cases of underreporting by employers that are part of its system. This will enable the agency to best focus its audit resources, increasing the return on investment (ROI) from every staff person aimed at preventing premium evasion.

Integration of data from a myriad of sources, including IRS data

WA L&I is in the middle of implementing the solution, with two phases in place. The first phase provides advanced identity resolution as well as a comprehensive employer profile and analytic screens for staff who review potential detection hits. The second phase built predictive models based on data from more than a dozen different systems across five separate Washington State agencies. The final two phases are nearing completion, and will be in place by the end of June 2011. That final phase includes IRS data in the predictive models, as well as integration with our auditing system.

Solution will pay for itself

The SAS Fraud Framework for Government is the cornerstone of the agency's fraud detection and prevention solution, leapfrogging the detection systems built in house. WA L&I expects the SAS solution to fully pay for itself within 12-18 months of implementation using conservative estimates, and improve on its current ROI of $8 for every $1 spent. For implementation, WA L&I focused on workers' compensation premium evasion, but expect to find valuable hits for its state unemployment insurance and revenue agencies as well, as their data is included within the system. WA L&I plans to share those hits, further increasing the potential return.

G. For responders submitting proposals to subject matter categories #12, a detailed description of data analytics services provided to two or more public or private sector organizations of similar size and scope to the State of Minnesota within the past three years ("engagements"), specific to the work intended under this category;

Not Applicable.

H. For each engagement, provide contact information for the individual responsible for the project from each public sector organization (or private sector for category #12, if applicable) that can provide additional information regarding the project and verify any representations made. Specifically, include the name of the organization; name and scope of project; dates of engagement; and name of contact person, including the individual's e-mail address and direct telephone number.

Washington State Labor and Industries (L&I)

- Workers' Compensation Premium Evasion Project
- December 2009 - Present
- Carl Hammersburg
  Fraud Prevention and Compliance Manager
- carl.hammersburg@lni.wa.gov
- (360) 902-5933

I. For each engagement, describe the efficiencies or results gained by implementation of the data analytics and, if applicable, any cost savings determined to be directly attributable to the project.

Leveraging information for other state agencies

The agency expects the SAS solution to fully pay for itself within two years of implementation using conservative estimates. For implementation, the agency is focusing on workers' compensation premium evasion, but expects to find valuable hits for the state unemployment insurance and revenue agencies as well, as the data that is included within the system. WA L&I plans to share those hits, further increasing the potential return.

8-to-1 return on investment and 80% increase in efficiency

Currently, the department is uncovering about $26 million of the premium revenue lost annually and is realizing a return on investment of about eight to one. In other words, for every dollar WA L&I spends investigating fraud, it gets eight back. Along with revenue recovery, the solution will make investigative work more efficient. As an example, a basic information search on an employer will be reduced from 30 minutes to 30 seconds. In 2009 alone, WA LNI collected more than $137 million from such things as claim overpayments and fraud and delinquent employer premiums and fraud, and saved the agency another $10 million in what would have been ongoing costs related to fraud. It has already resulted in a dramatic drop in the time it takes to research a case—within 30 days it went down by 80 percent.

J. For each engagement, describe how any such cost savings were calculated and how compensation for the work was structured.

Cost savings were calculated by the customer. SAS received compensation through a standard software licensing contract and a professional services contract with payment terms of net 30 days.

K. For each engagement, detail whether any disagreements as to savings generated or fees owed were encountered and if so, how resolved.

Not applicable.

L. For each engagement, to the extent compensation was based on a percentage of savings attributable to the effort; describe how the parties distinguished the amount of savings attributable to the work of the contractor versus savings realized from the efforts of the organization.

Not applicable.

SAS Engagement #2: Louisiana Workforce Commission

F. For responders submitting proposals to subject matter categories #1 through #11, a detailed description of data analytics services provided to two or more public sector organizations of similar size and scope to the State of Minnesota within the past three years ("engagements"), specific to the category(ies);

Louisiana chose SAS as its comprehensive strategy to address fraud across all state programs

Historically, Louisiana has been a hotbed of fraud in the U.S. A commonly retold joke is that half of the state is underwater and the other half is under indictment. The state's approach to detecting and mitigating fraud was fragmented. Agencies and programs did not communicate or share information–or at all, in many cases. The Governor wanted Louisiana to be a desirable place to move business and/or expand business, but the effect that fraud has on businesses makes the state a less-than-appealing destination. The state lacked the necessary resources and technology infrastructure to identify, manage and mitigate fraud. By not addressing this issue, the state would continue to lose business and opportunities to other states and would continue to have to borrow money from the federal government to prop up depleted trust funds.

WC and UI are the first programs addressed

The state is taking an enterprise approach to fraud management using SAS Fraud Framework for Government. SAS heavily emphasized fraud's relationship to the efficiency and solvency of government. Addressing fraud on a statewide level could directly impact tax rates, bond ratings, and economic development, and help reduce budget deficits. Louisiana is currently involved in a phase one project to address fraud in its unemployment insurance (UI) and workers' compensation insurance programs. The long-term vision is to aggregate the state's data and expand its fraud management efforts into other areas, including temporary assistance for needy

families (TANF), supplemental nutrition (SNAP), child support enforcement, child care, Medicaid, Medicare, tax and revenue.

First results in less than 100 days

The Advanced Analytics Lab employs scientists and domain experts to create fraud models for Louisiana. SAS Solutions OnDemand hosting solution provided a way to mitigate risk and gain faster time to value. In age of economic and budget crises, Louisiana did not have to purchase more hardware or hire more people to manage fraud – it just partnered with SAS. As part of the contract and deliverables, SAS is executing a quick-start program with the customer by performing manual analysis against the state's data to deliver results in less than 100 days. At same time, SAS is building a more permanent infrastructure for long-term fraud analysis. The quick start and robust infrastructure were attractive aspects of the proposal..

$454,000 check received without any litigation required

The SAS solution is breaking down barriers and silos of data and facilitates the sharing of information across agencies and boundaries. As a result of the quick start program, Louisiana received a check via FedEx for $454,000 from an offending company without a fight. In the long term, the state estimates an 8-to-1 return on its investment in SAS. Based upon documented success in other projects, SAS feel this ratio is very conservative and could go much higher. Efficiency gains are also realized in the automation of investigative activities. What has historically taken approximately 86 hours has now been reduced to less than 6 hours.

Citizen-state vector or master person index in the future

Louisiana's efforts around fraud will also produce the first real instance of a citizen-state vector by essentially create a master person index through identity resolution and other Master Data Management solutions. If "Person A" is a Louisiana citizen, the government could pull up a unique identification code and look at the program effectiveness, risk score, productivity index and other metrics of that individual citizen. Taking a longitudinal view of a student in terms of their educational life cycle is very common. It's not common in other areas of government, but there are many interesting benefits for the state and the citizens that can be derived from it.

G. For responders submitting proposals to subject matter categories #12, a detailed description of data analytics services provided to two or more public or private sector organizations of similar size and scope to the State of Minnesota within the past three years ("engagements"), specific to the work intended under this category;

Not Applicable.

H. For each engagement, provide contact information for the individual responsible for the project from each public sector organization (or private sector for category #12, if applicable) that can provide additional information regarding the project and verify any representations made. Specifically, include the name of the organization; name and scope of project; dates of

engagement; and name of contact person, including the individual's e-mail address and direct telephone number.

Louisiana Workforce Commission

- First fraud project addressed by the Statewide Fraud Detection System
- August 31, 2010 - present
- Wes Hataway, Director, Workers Compensation
- whataway@lwc.la.gov
- 225-252-0578

I. For each engagement, describe the efficiencies or results gained by implementation of the data analytics and, if applicable, any cost savings determined to be directly attributable to the project.

State expects and 8-to-1 ROI; investigative time reduced from 85 to 6 hours

As a result of the quick start program so far, Louisiana received a check via FedEx for $450,000 from an offending company without a fight. In the long term, the state estimates an 8-to-1 return on its investment in SAS. Furthermore, time dedicated to investigations was reduced from 85 hours to less than 6 hours, approximately.

J. For each engagement, describe how any such cost savings were calculated and how compensation for the work was structured.

Cost savings were calculated by the customer. SAS received compensation through a standard software licensing contract and a professional services contract with payment terms of net 30 days.

K. For each engagement, detail whether any disagreements as to savings generated or fees owed were encountered and if so, how resolved.

Not Applicable.

L. For each engagement, to the extent compensation was based on a percentage of savings attributable to the effort; describe how the parties distinguished the amount of savings attributable to the work of the contractor versus savings realized from the efforts of the organization.

Not Applicable.