4.3 Tax Collection, Fraud Prevention, and Detection

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’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.

The SAS Fraud Framework and/or its components are helping government and commercial agencies to recover millions of dollars previously lost to fraud. Highlights include:

- Kansas Department of Revenue—SAS centralizes information management and supports robust reporting.
- Rhode Island Department of Revenue—US state's audit team improves its tax collection rate with accurate, insightful reports built in seconds, not weeks.
- Wisconsin Department of Revenue—State revenue officials, with help from SAS, collected $32 million in revenue more quickly than ever and uncovered $5 million that might have otherwise gone uncollected.
- Los Angeles County, CA—highly accurate social network analysis powered the county's fraud-detection efforts, generating an annual return of nearly $30 million.
- The Commonwealth Bank of Australia—improved fraud detection efficiency and detected twice the level of check fraud, increased Internet banking fraud alerts by 60 percent and improved check and Internet fraud loss-to-turnover ratios by 50 and 80 percent, respectively.
- 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.
- HSBC—with SAS, this global financial leader has achieved significantly lower incidence of fraud across tens of millions of debit and credit card accounts, significantly exceeding aggressive objectives.

“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
**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 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.

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.

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.

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. SAS provides all the help customers need to drive project success.

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.
## Analytic Workshop

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.

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.
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.

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.

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

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

*In its 2010 Forrester Wave report, SAS was cited as a leader in Enterprise Business Intelligence Platforms*
• **Ad hoc Queries**
• **On Line analytical processing (OLAP)**
• **Use of Business Intelligence (BI) tools**

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

3. **Advanced Analytics**

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

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

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

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
4. Build Data Access Skills and Understanding (Foundational) Training
   - Generic and/or tools specific

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 center 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;

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.

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.

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:

➢ **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.

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.

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 tax fraud, but also solid customer relationships and organizational performance.

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 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 Tax Fraud

The SAS Fraud Framework provides advanced analytic techniques to solve the complex business challenges faced by organizations that have a fiduciary responsibility to ensure the integrity of payments of benefits or handling of financial transactions. The Framework is built on long established SAS technology which has delivered business intelligence, reporting, data mining and data integration capabilities. These capabilities are well known and regarded in the industry. This recognition includes industry analyst organizations such as Gartner and IDC.

In order to provide our customers with a robust fraud detection and prevention capability, we identified the need to incorporate our industry leading technology in an
integrated and end to end framework. In working with our clients and industry SMEs, we set out to create a framework that built key functional components on the foundation of BI, reporting, analytics and data quality/integration tools. These additional components are:

- Detection and Alert Generation
- Link and Association Analysis
- Alert Management
- Case Management

Figure 4.3.1. 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 sources include data exchange agreements with the IRS and information provided by other state regulatory agencies such as the Secretary of State, Department of Labor, and property tax records to acquire data. In states where we have deployed our method of using IRS and third party data records to complement state income tax data, we continue to be highly successful in maximizing the return on their investment in our solution. Our team’s staff performs an in-depth analysis of hundreds of data field record layouts, from state tax records, together with those from IRS’s Individual Master File (IMF), Information Return Transaction File (IRT), CP2000, Exam Operational Automation Database (EOAD), Business Master File (BMF), Business Return Transaction File (BRT), Information Returns Master File (IRMF), Immigrations and Customs Enforcement (ICE) data, and periodic data from other state agencies to identify potential cases. As opportunities are identified, we develop logic statements to manipulate the records based on state tax law.
The SAS Fraud Framework is a non-disruptive solution. It is designed to fit in an existing, heterogeneous environment. In the following diagram, you will note several key facts. We recognize that enterprises often have existing repositories of historical data and those may or may not be optimized for data mining techniques. In those cases where an investment is already made in a data warehouse or data mart capability, we will take advantage of it. You will also note that we fully appreciate and understand the value of business rules in the detection and prevention of fraud. We have also come to appreciate and understand their limitations. Business rules by their nature are excellent at finding known patterns of fraud. Because the nature of the evasion or fraud must be known to create the rule, business rules once established can then be worked around by perpetrators of fraud. It is for this reason we have taken a hybrid approach which uses business rules in conjunction with anomaly detection, predictive analytics and associative link analysis. We have found that the application of these different detection methods applied simultaneously yield significantly higher rates of detection. In some projects, we have seen the hybrid approach yield 32 times the rate of discovery over the use of business rules alone.

**Figure 4.3.2.** 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.
The SAS Fraud Framework is its usability and its configurability to meet specific needs for a given user community. This configurability allows different user groups from different LOB areas to use the system in the most productive manner for their particular case load. Many aspects of the Framework are configurable such as scoring methods, prioritization, case management, work flow and alert management.

The final tier of the SAS Fraud Framework is the unique incorporation of line-of-business (LOB) specific detection models which allow for the Framework’s extensibility and flexibility. These functions will detect both claims and premium fraud and can be applied to recipient as well as provider aspects of the program process. The government specific LOB functions are:

- Tax and Revenue
- Worker’s Compensation
- Unemployment Compensation
- Medicaid Benefits
- TANF Benefits
- Child Care Benefits
- Food Support/SNAP Benefits
- WIC Benefits
- Disability Services
- Aging Services
- Other Human Services

**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.**

SAS approaches each project as a partnership with customers. Therefore, we anticipate that the project team will include people from both SAS and the State who will have direct involvement with the project. 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. SAS team members performing implementation services have received extensive training on relevant SAS practices and procedures. When possible, SAS 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.

Once the details and schedule for a specific Statement of Work are finalized, the assembled team usually includes an account manager, a project manager, one or more technical consultants, and the applications developers subject to the project requirements. At appropriate points throughout the project as indicated by the project schedule, the SAS team may expand to include additional resources.
From working with other states, the SAS team has learned:

- Each State is unique, but there are many commonalities. Applications can be tailored to the structure of the State. For example, Washington State does not have a personal or corporate income tax. However, they do have a Business and Occupation Tax, Sales and Use Tax, Property Tax and Excise Taxes, and some applications can be translated.
- The programs will only be as good as the data. Inconsistency in data between different sources requires close scrutiny for soft matching criteria. You don't want duplicate data on one hand and you don't want to eliminate good leads on the other.
- Duplicates can be useful in Fraud searches by identifying patterns in behavior. Duplicates in revenue generation programs create unnecessary public contact and confusion and frustration on the part of the recipient.
- Data sources have different levels of reliability and prior to using the data for specific searches it is important to define how the data elements will be applied and what the output should look like.
- Clearly defined and well thought out requirements will save a lot of time and frustration. It also allows the opportunity to study whether the data sources can really be used to generate the desired outcomes.
- There is no substitute for thorough validation of the output prior to going into production. Confirm that the output meets the defined requirements BEFORE moving on.

In order for customer engagements to be as successful as possible, the SAS team has also learned:

- The customer needs to identify in advance, the resources and skill sets needed to work each program.
- Make sure that the function(s) responsible for the program clearly understand the goals and expectations and are committed to working the cases.
- The customer needs to have procedures in place (i.e. mailing schedule) to work the cases in a timely manner. The longer cases stay in the system the more difficult it is to collect.
- For high volume projects, prioritize the leads so the most productive cases are worked first.
- Several narrowly focused programs to isolate specific patterns or criteria are more useful than large umbrella programs.

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:
<table>
<thead>
<tr>
<th>SAS Role</th>
<th>Typical Responsibilities</th>
</tr>
</thead>
</table>
| **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 Assurance Manager - Advanced Analytics Lab** | ➢ Review and approve all State Quality Assurance test plans.  
➢ 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:

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytic Engineer (optional)</td>
<td>Design analytic applications (only if the State plans to design its own analytical work).</td>
</tr>
</tbody>
</table>
| 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 |
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 experienced in detailed consulting operations, applications development, system analysis and design, and project management.

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.

  ➢ Support for all statistical training and consulting support.

  ➢ 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.

  ➢ 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.

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
**Fraud 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

- 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**


- 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.

**Fraud 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.

Fraud 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.

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.

Project Manager—(M.Z.)

Relevant Experience
SAS Institute Inc.
Project Manager, SAS Solutions OnDemand 2007-Present
Project Manager, Customer Support Department 2007
- Current Project team supervision includes 20 resources across multiple time zones in addition to remote resources in India and China.
- Project Manager for the analytical fraud proof of concept of a large state employment agency.
- Project Manager for multi-billion dollar insurance company in the managed hosting of numerous SAS products and custom-developed software applications.
- Project Manager for the analytical fraud proof of concept of a large state welfare agency.
- Project Manager for the analytical bad debt model development for a multi-million dollar publishing company.
- Project Manager for the statistical marketing and modeling development for a multi-billion dollar telecommunications firm.
Project Manager for the deployments of enterprise applications to 30+ customer sites that were projected to save $500,000 annually.

**Relevant Skills and Training**
- All Phases of Database, Web-based, and Transactional System Development
- Project Management Professional, Project Management Institute, 2009
- Project Management Institute, 2010
- Consulting Managers’ Training Workshop, 1998
- Consulting Advanced Consulting Skills Workshop, 1994
- Price Waterhouse MCS Information Technology Training Program, 1990

**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

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**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 Analyst Lead— (B.M.)

Relevant Experience

SAS Institute Inc.
Software Development Manager August 2010 - Present
Financial Crimes Technical Lead December 2009 – August 2010
Responsible for the design and delivery of SAS Financial Crimes Solutions. This role involves leading teams of highly qualified developers in different aspects of the project life cycle. Included in this role are:
- Presales assignments specific to fraud, waste, and abuse
- Architecting solutions for integration with customer requirements
- Ensuring the quality of end deliverables.
- Mentoring junior consultants
- Working closely with customers to ensure that deliverables align with the project objectives and scope.

Zencos Consulting LLC
Project Lead / Solution Architect January 2006 - December 2009
- Primary responsibility is resource allocation, pre-sales, kickoff, design and implementation of projects focusing on Business Intelligence and Data Warehousing across multiple industries.

Senior Consultant / Technical Lead December 2003 - January 2006
➢ Led Zencos teams of highly qualified consultants on short and long term client engagements.

Consultant March 2001 -December 2003
➢ Lead developer for Zencos projects focusing on OLAP and interface design.

Relevant Skills and Training
➢ Ability to gather and comprehend business requirements in order to translate them into technical deliverables and resource requirements.
➢ Able to lead teams of qualified developers in delivering solutions that meet the requirements and deliverables for successful project completion and closure.
➢ Design and develop data warehouse models in Erwin or ER Studio
➢ Comfortable using command line/scripting on Solaris, AIX, Linux, HP-UX, and Windows
➢ Data mining and advanced analytics
➢ SAS skills

Fraud Analyst/Application Developer—(R.M.)

Relevant Experience
SAS Institute Inc.
Analytic Engineer 2010-present
➢ Design and configuration of customer applications for comprehensive fraud detection and prevention.
➢ Custom calculations and interface design for customer-requested scripts.
➢ Implementation of advanced analytics for fraud prevention and detection in Unemployment Insurance tax system, resulting in savings within weeks of receiving data.
➢ Design and development of production applications for inclusion in shipped software.
➢ Lead analyst on a team of fraud analysts developing applications for fraud detection in government programs, including disability insurance and tax.
➢ Time series forecasting, neural network models, nonlinear models, data mining, economic and financial analysis, techniques for large data files.
➢ Proficient in SAS and JMP

SAS Institute Inc.
Software Developer 2007-2010

SAS Institute Inc.
Technical Training Specialist 1999-2005

University of Missouri
Research Analyst 1997-1999

**Relevant Awards**
- JMP Fellowship: Educational fellowship awarded by the JMP division of SAS Institute
- Mu Sigma Rho Statistical Honor Society

**Fraud Analyst Application Developer—(N.N.)**

**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.

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

**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.


**General Dynamics**

Metrics Engineer 1998 – 2000

**ManTech Environmental**


**DynTel**


**Holcombe and Associates**

Actuarial Assistant 1994 – 1996

**Relevant Training**

- 2007, SAS®9 Base Certified, SAS Institute

**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.

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.

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.


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

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**
- 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.
Vinculum Solutions, Inc. (VSI) possesses deep domain expertise in Federal and State tax administration, systems, and data. In the 16 years since its inception, personnel have supported many key IRS modernization activities, including infrastructure shared services, risk management, data management, enterprise systems management, transition management, and the development and integration testing environments.

Through years of experience and knowledge depth of key IRS programs, VSI continues to assist a growing number of state tax agencies to collect unpaid tax revenue. In the states of New Jersey, Oklahoma and Ohio, VSI staff continues to develop and deploy customized applications to analyze data from federal and state tax agencies that identify individual and business non-filers and targets taxpayers who failed to report income for further audit contact. VSI's software solutions have collected over $100M dollars for our State customers annually that would otherwise be unpaid. In support of these work engagements, VSI staff liaised and consulted with state tax administrators to recommend methods where each state would substantially benefit from the collection of millions of dollars of outstanding, and seldom sought (or collected) tax revenue. In each case, VSI identified lost tax revenue by using each state's long-standing data exchange agreements with the IRS and information provided by other state regulatory agencies such as the Secretary of State, Department of Motor Vehicles, and property tax records to acquire data.

VSI staff continue to perform an in-depth analysis of hundreds of data field record layouts. As opportunities are identified, VSI develops logic statements to manipulate the records based on state tax law and automates the process for states to issue taxpayer notices, which fully explain the additional tax owed to each taxpayer. Prior to this effort, these states used a manual process that pursued approximately 6% of the available cases, which resulted in a partially enforced tax code and minimal revenue yield. One state worked only about 700 of nearly 12,000 cases received annually from only one of their data sources. VSI's detailed knowledge of IRS data records and IRS systems experience enabled VSI staff to draft and implement logic that automated a cost effective means to collect revenue from underreported income and non-filer cases. VSI’s solution created residual value as taxpayers were able to clearly understand and pay their owed tax without further costly and time-consuming explanation or correspondence.

VSI provides the following resumes for the State's consideration:
Tax Subject Matter Expert—(B.P.)

Relevant Experience

President, Vinculum Solutions, Inc.

- Developed 36 applications to identify non-filing, underreported income, civil and criminal fraud for State Government customers including New Jersey, Ohio, Missouri, and Oklahoma. Applied data analysis, matching, and data management techniques. To date, over $250 Million in additional, collected revenue has resulted. Developed proprietary fraud prevention techniques.
- Designed, developed, implemented, and managed large web-based infrastructures including Production, Development, and Integration Testing Environments for IRS. Helped develop and support irs.gov.
- Provide enterprise systems management, requirements management, and development and testing tools subject matter expertise to IRS.
- Developed applications to define and manage development and testing processes for IRS. Applications include Risk Management, Issue Tracking, Configuration and Change Management, Defect Reporting, Release Management, and Trouble Tickets for Help Desk operations.

Internal Revenue Service

National Director, Applications Design, Development, and Testing
Assistant Regional Commissioner (Data Processing)
Assistant Service Center Director

Chief, Processing Division

- Managed, operated, maintained, and enhanced complex systems deployed into 12 large Data Centers and numerous smaller facilities. Led several successful IRS filing seasons in both Submissions Processing and Information Systems leadership roles
- Led design and establishment of software development infrastructure using advanced development tools. Initiated IRS Field Development Centers.
- Developed and implemented enhanced IRS Electronic Fraud Detection, Collection, Examination, and Customer Service capabilities.
- Launched and led the initiative to improve IRS’ software engineering processes using the Software Engineering Institute (SEI) Capability Maturity Model.
- Led Fresno Service Center Total Quality Management (TQM) initiative, resulting in Presidential Quality Prototype Award. One of two civilian agency finalists for the President’s Quality Award.
- Initiated system to automate IRS case management and control, contributor to other systems redesign efforts, including Electronic Filing.
- Personally originated and developed conceptual design for, then as IT executive led successful development and deployment IRS Automated Underreporter system.
Tax Subject Matter Expert—(W.T.)

Relevant Experience

Vinculum Solutions Inc., Mt. Airy, MD
Consultant – Tax Subject Matter Expert
(March 2005 – Present)

❖ Provide technical expertise to the States of New Jersey, Oklahoma, and Maryland on the use of State and Federal income tax data, and information from third party sources, to identify new and expand existing compliance programs
❖ Developed 45 applications to detect individual and corporate non-filers and to identify individual State returns with discrepancies in reported income and/or expenses
❖ Produced logic to convert Federal adjustments for income and expenses to State returns where there are differences in the application of tax law
❖ Conducted knowledge transfer sessions to educate State personnel on the development and implementation of Compliance programs

Internal Revenue Service, Washington, D.C.
Special Assistant to the Commissioner Small Business/Self-Employed Division
(November 2001 – November 2004)

❖ Introduced new concepts into the examination process to improve the timeliness of examinations and the quality of service to taxpayers
❖ Developed new performance measures and management information reports to evaluate trends and assess improvements in overall program effectiveness
❖ Redesigned the annual Field Examination Work Plan for individual and business returns
❖ Re-engineer the compliance risk assessment model to improve workload identification and selection of returns for examination
❖ Coordinated all Field Examination activities for a National Research Program study designed to measure reporting compliance levels

Consultant to IRS Small Business/Self-Employed Division
(May 2001 – November 2001)

❖ Prepared preliminary and final assessments of Examination’s reengineering processes. Evaluated best practices and stakeholder analysis, identified short- and long-term targets for improvement, assessed vulnerabilities, and made recommendations regarding future implementation

Internal Revenue Service, Washington, D.C.
Deputy Chief Operations Officer
(December 1999 – September 2000)
Managed the day-to-day operations of the IRS field enforcement and assistance functions, a 70,000 person organization that included Submission Processing, Examination, Collection, and Customer Service activities

Chair an outreach effort to improve employment tax compliance with state and local government agencies that was recognized by the National Partnership for Reinventing Government

Internal Revenue Service, Washington, D.C.
Assistant Commissioner (Research/SOI)
(May 1993 – December 1999)

Supervised a multifaceted organization which included the Research Division, Statistics of Income Division and Projections and Forecasting staff, that provided information to the Treasury Department for formulating overall tax administration policy, and to the IRS for Strategic Business Planning

Led a joint study by Research/SOI and the Joint Committee on Taxation, involving a comprehensive review of noncompliance with the income tax laws

Developed an integrated approach for key strategies that leveraged resources by combining alternative treatments with enforcement techniques to enhance voluntary compliance

Relevant Awards

- Presidential Meritorious Executive Award (2)
- Internal Revenue Service Commissioner’s Award (3)

Tax Subject Matter Expert—(P.D.)

Relevant Experience

Internal Revenue Service - Criminal Investigation
Special Agent - Senior Program Analyst Washington, DC

Eighteen years direct involvement in the Electronic Fraud Detection System (EFDS), since its inception. This included reviewing system documentation, reviewing output when the system became operational and proposing the inclusion of additional information to identify additional areas of abuse. This was done to continually improve EFDS. Also involved in tax system fraud analysis for the entire period. Maintained a Top Secret security clearance for the last 4 years of employment. Continuously analyzed the electronic filing (ELF) system since its inception. Recommended and implemented many systemic changes to reduce the vulnerability of the tax system to fraud. Determined the criteria for the self-select PIN and was instrumental in its implementation. Reviewed all the documentation involving the Customer Account Data Engine (CADE) system to determine problematic areas for fraud. Suggested refinements to reduce the fraud potential.
Coordinated the initial Earned Income Tax Credit (EITC) studies for Criminal Investigation nationwide. Analyzed the results to identify the areas of abuse. Suggested improvements to reduce the abuse. Involved with the analysis of the data in the Electronic Fraud Detection System (EFDS). Responsible for the coordination and implementation of the data mining process on EFDS to identify potentially fraudulent tax returns being filed.

Obtained an extensive understanding of the processing of informational and tax returns in the service centers and how the information was used and posted to the various IRS Master Files.

Relevant Skills and Training
- Tax fraud detection analysis expert for 35 years
- Tax system abuse analysis expert for 18 years
- 1986, IRS Training, Mid-level management training
- Management Development Practices II
- 1972, IRS Training, Special Agent Training
- Training in all aspects of law enforcement and conducting criminal investigations connected to the laws enforced by the IRS.
- 1970, IRS Training, Revenue Agent Training
- Training in auditing personal, partnership and small corporation tax returns.

Tax Subject Matter Expert—(G.H.)

Relevant Experience

Consultant (2007 – present)
- Various overseas assignments, advising various governments, conducting anti-money laundering training, and more.

USAID, Jakarta, Indonesia
- Designed, developed and delivered anti-money laundering/combating the financing of terrorism (AML/CFT), and anti-corruption training and technical assistance to the government of Indonesia. Provided technical assistance related to revision of the country's AML laws and procedures. Major accomplishments included assistance in removal of Indonesia from the Financial Action Task Force Non-Cooperative Countries and Territories money laundering list in February 2005, two years ahead of schedule; assisted in development of a 5-year strategic plan for the FIU; and increased AML/CFT capacity through training of more than 1000 Indonesian professionals.
- Advanced anti-money laundering/combating the financing of terrorism and anti-corruption training and technical assistance to the government of Indonesia; Designed and developed *Train the Trainer* program (TTTP) for AML regime.

- Designed, developed and delivered *Illegal Logging/Corruption Prosecutions using the AML Programs* to 190 prosecutors in six different venues. Designed and developed Summary Assessment and Impact for all FCPP training (2005-2007).

**Department of Treasury, Glynco, GA**

FLETC – Senior Instructor, Behavioral Science Division, Federal Law Enforcement Training Center (2001 – 2005)

- Developed, managed and delivered advanced courses in interviewing for experienced financial and criminal investigators through the Departments of Treasury, Homeland, Defense and Energy and various Inspectors General Offices.

- Developed and delivered courses in interviewing for the White Collar Fraud Training Program and Criminal Investigators Training Program (CITP).

**Internal Revenue Service, Glynco, GA**

Special Agent (detailed to FLETC) – Resident Lead Instructor, Advanced Section, IRS Criminal Investigation Academy (1995 – 2001)

- Developed, updated, supervised and taught (facilitated) all phases of advanced training to over 500 Senior Special Agents in the Criminal Investigation Division. Courses included current trends in money laundering, currency crimes, asset forfeiture, innovative financial investigation techniques, undercover operations and ethical conduct.

- Additional duties included developing and delivering anti-money-laundering training to Special Agents from the Treasury Inspector General's Office and the Department of Labor.

- Evaluated instructors in the Advanced Training Program and trained new instructors in the Basic Instructor Training Program.

**Internal Revenue Service**

Special Agent (1975 – 1995)

- Developed and investigated precedent-setting legal and illegal income tax cases, white collar fraud (bank fraud, wire fraud, currency crime and money laundering cases) using all direct and indirect methods of proof (Net Worth, Expenditures and Bank Deposit).

- Assigned to Tampa Strike Force, High Level Drug Leaders Program and North Florida OCDETF cases.
Successfully prosecuted documented organized crime figures, state elected politicians and international narcotic traffickers using tax, money laundering and various drug and financial Federal statutes.

Undercover agent and case agent on successful investigations of domestic militant groups, international and domestic money launderers and tax evaders.

Operated a secondary financial institution in an undercover capacity for 10 months.

Testified as fact, summary and expert witness in federal anti-money laundering trials.

Case agent/consultant on international money laundering case which has resulted in over $52,000,000 in assets repatriated and forfeited to US government, conviction of two attorneys and temporary incarceration and disbarment of F. Lee Bailey.

Successfully worked with Customs and DEA Internal Affairs Investigators on corruption investigations on individuals at the senior level of their respective organizations.

U.S. Army, Special Forces (1968 – 1971)

Relevant Awards

- Anti-Money Laundering Professional of the Year (2005)

Tax Subject Matter Expert—(A.C.)

Relevant Experience

- A.C. manages an investigative practice, following 22 years with IRS Criminal Investigation, including 15 years as a Supervisory Special Agent. Supervised 12 - 15 special agents and support personnel in the investigation of various white collar crimes. Personally involved in planning, directing, participating in, and reviewing the investigative efforts and results of the investigations. Handles the liaison between agency and the United States Attorney’s Office and the other investigative agencies which participated in grand jury investigations. Served on several task forces including Defense Fraud, Health Care Fraud, Bankruptcy Fraud, Telemarketing Fraud, and Savings and Loan Fraud. Handled cases as varied as defense fraud, Foreign Corrupt Practices Act violations, telemarketing fraud, health care fraud, bankruptcy fraud, loan fraud (including forfeiture of assets used in the loan fraud), narcotics, money laundering and tax fraud. Testified before grand juries and at trials.

- Since 2000, worked as a California licensed private investigator on a variety of cases which include complex financial investigations. Many of the clients are Fortune 500 companies or high profile individuals or entities.
Served as the private investigator working for the outside counsel for a large investment bank that was the victim of a significant mortgage fraud case.

As a Supervisory Special Agent from 1984 to 1999, conducted numerous investigations resulting in criminal prosecution by the United States Attorney’s Office.

As a supervisor, successful at using a team approach to large investigations. Managed an investigation of a large defense contractor which resulted in a guilty plea and a criminal fine of $18.5 million, the largest criminal fine ever paid up until 1999 in the Central District of California.

Taught a comprehensive course for new first line managers on how to manage a group of investigators and investigations at the Federal Law Enforcement Training Center (FLETC). Also taught several CPE courses including Bankruptcy Fraud and Tax Shelters, and worked on a nationwide task force that created the CPE course on Tax Shelter investigations.

Given numerous presentations on Fraud Detection and Awareness to the IRS civil divisions at their CPE sessions as well as at the Regional Training Center. Helped train new fraud revenue agents. Taught a Financial Investigative Techniques course to local law enforcement officers. Served as facilitator for the course, “Achieving Your Potential” which was provided to cross-functional employees at the IRS.

**Relevant Training**

- Certified Fraud Specialist in 2008
- California Licensed Private Investigator in 2000

**Relevant Awards**

- Numerous performance awards—Outstanding and Distinguished
- CID Group Manager of the Year for the Western Region 1996.

**Tax Subject Matter Expert— (R.L)**

**Relevant Experience**

**Vinculum Solutions, Inc.**

Consultant (2005 – Present)

- Senior Process Consultant for redesign of University of Maryland University College Accounts Receivable Program – worked with team to map existing billing and collection processes and develop improvement recommendations. Final recommendations would result in additional annual deposits of $10 million through process acceleration and more effective use of information and staff.

**IRS SB/SE Division (2003 – 2005)**

Collection Process Reengineering GS-15
- Project Manager, Compliance Services Collection Operations (CSCO) Reengineering – Led project team in evaluating over 100 potential improvements to correspondence collection programs. Results included 15 systemic improvements with annual labor savings of $5 million.
- Lead, Collection Cycle Time Reduction CSCO Subteam – Led sub team addressing collection notice and correspondence programs. Developed recommendation for Internet responses to collection notices estimated to benefit 600,000 taxpayers annually.

- Managed staff of 10 GS-13 and 14 analysts providing policy and procedural guidance to five IRS Small Business/Self-employed Division campuses on full range of collection correspondence programs. Also continued to manage the development of annual return delinquency case creation criteria for Small Business/Self Employed Division Collection activity.

IRS Customer Service
- Managed staff of 10 GS-13 and 14 analysts responsible for developing annual return delinquency case creation criteria for the IRS Collection activity and providing policy and procedural guidance to ten service centers on return delinquency correspondence programs. These programs created 4 million individual and business cases annually and resolved 2.6 million cases annually through correspondence. The operation accounted for 68% of annual IRS non-filer case dispositions and 68% of delinquent returns secured by all IRS compliance activities.

IRS National Office, Washington, DC
Analyst and Senior Analyst GS-13/14 (1979 – 1997)
- 1 year as GS-14 Customer Service GAO/Internal Audit Coordinator
- 8 years experience as GS-14 Legislative Analysis Officer in Legislative Affairs Division. Included 6-month fellowship on staff of Congressman Sander Levin, on House Ways and Means Committee.
- 4 years experience as GS-14 Collection Legal and Technical Coordinator
- 5 years experience as GS-13 Collection analyst for Organization and Staffing, Offer in Compromise, and Federal Tax Lien program areas

IRS Baltimore District, Baltimore, MD
Revenue Officer GS 5/7/9/11/12 (1972 – 1979)
2 years as Special Procedures Advisor/Reviewer
3 years as Office Branch Section Chief and Assistant Branch Chief managing office collection staff of 100.
2 years as field collection officer

**Tax Subject Matter Expert— (H.O.)**

*Relevant Experience*

**International Monetary Fund**
Technical Advisor (2007 – Present)
- Developed risk assessment and return selection system for modernization of Indonesia income tax system. The system includes models used to detect fraud in electronically filed and processed tax returns. Work with international taxing authorities to identify and implement best practices.

**Internal Revenue Service**
National Director, Reporting Compliance (July 2004 to July 2007)
- Managed compliance audit and Automated Underreporter programs. Responsible for IT systems used to develop noncompliance and fraud programs. Responsible for 3.5 Million Taxpayer Contacts resulting in $8 Billion in Revenue. Consistently produced Improved Results and Growth in Compliance Programs.

**Internal Revenue Service**
Executive Senior Operations Advisor to Commissioner, SBSE (July 2000 – July 2004)
- Advised the Commissioner, SBSE on reporting compliance matters. Developed policy and procedures on taxpayer noncompliance. Oversaw implementation of business systems. Developed resource allocation models used to request budget initiatives and additional funding.

**Internal Revenue Service**
National Director, Compliance Research (August 1990 – July 2000)
- Developed IRS prototype systems such as EFDS, Telefile, Compliance Data Warehouse, Compliance Research Information Systems. Developed the yearly tax gap measurements. Implemented compliance measurement programs such as TCMP and NRP. Provided projections and forecasts for filed returns used to develop initiatives for tax administration.

**Internal Revenue Service**
Various Examination Division Positions starting with Internal Revenue Agent and ending with Chief, Exam Division (July 1972 – July 1990)
- Responsible for conducting and managing the audit of income tax returns. This included developing criteria for the selection of tax returns for audit and managing fraud programs including tax shelter abuse.

**Relevant Awards**
- Outstanding performance rating 16 of last 20 years in high-level IRS positions
- SB/SE Commissioner’s Award

**Tax Subject Matter Expert—(C.C.)**

**Relevant Experience**

**Certified Public Accountant (CPA)  (2007 – Present)**
- Provide accounting and tax services to a variety of small business and individual clients. Businesses are in corporate, partnership, limited liability company, and sole proprietorship form. Services include correcting past accounting and tax problems and resolving IRS issues.
- Volunteer to teach federal income tax law and use of tax preparation software to community volunteers; prepare federal income tax returns for low income citizens.
- In conjunction with the Washington State Society of CPAs, make presentations in Financial Literacy topics to schools and other groups.

**Internal Revenue Service**

**Classroom Instructor  (2001 – 2007)**
- Taught federal income tax law to newly-hired Internal Revenue Service field agents (Revenue Agents, RAs) in a formal classroom setting. Classes were progressively more difficult, beginning with individual taxation and progressing to corporations, partnerships and limited liability companies.
- Participated in course development to write and update material.

**CPA Firm, WA**

**Tax Return Preparer (2001)**
- Prepared individual, partnership and corporation income tax returns for Tacoma area CPA firm during 2001 filing season

**Accountemps, Inc**

- Completed various accounting and tax assignments through Accountemps, Inc. Performed various consulting, business, accounting and tax services for clients.
**Tax Subject Matter Expert—(L.H.)**

**Relevant Experience**

**Internal Revenue Service**
Re-employed Annuitant – Instructor (June 2001 – December 2006)
- Instructed a total of 20 classes, including two as lead instructor. Six of these classes were corporate classes and three were flow-through entities. I also served on five course development teams.

**Internal Revenue Service**
- Case manager for what is now LMSB. National industry specialist for forest products and the issue specialist for environmental issues.

**Internal Revenue Service**
Revenue Agent & RA Group Manager (July 1966 – July 1980)
- Revenue Agent and served in various positions, including Review Staff, Instructor, Employee Plans Manager, and General Program Manager. Instructed tax classes at Bellevue Community College.

**Internal Revenue Service**
Tax Auditor/Revenue Agent (July 1962 – June 1966)

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**Tax Subject Matter Expert—(T.S.)**

**Relevant Experience**

**Ag Star Financial**
Sr. Tax Specialist (2008 – Present)
- Preparation of individual, C & S corporate, partnership, and trust tax returns on a part time basis.

**Internal Revenue Service**
- SB/SE Classroom instructor throughout the United States. Taught individual, corporate and flow through entity tax law along with payroll tax and trust and estate tax law. Presented lectures utilizing power point projection and prepared handouts (paper & CDs). Evaluated and counseled the students.

**Self-Employed**
- Classroom instructor for the State of Minnesota Department of Revenue on a contract basis. Taught Federal tax law and auditing techniques to state.
agents. Prepared the entire lessons and materials. Taught the entire lesson to 25 students in a class room setting utilizing power point.

- Negotiated contract price with State of Minnesota Revenue Department.

**Internal Revenue Service** (1969 – 2002)

Revenue Agent & LSMB Examiner

- LMSB examiner from 1999 through 2002. Revenue Agent from 1969 through 1999. Examined the books and records of all types and sizes of taxpayer’s tax return. Managed a group of agents on a temporary basis. Completed many projects and special assignments. Trained many people with the IRS (both classroom and OJT). Teach and speak to taxpayers on a personal basis and using various types of media.

**Immanuel St. Joseph’s Hospital**

Supervisor of accounting Department (1968 – 1969)

- Develop one accounting system for the two newly consolidated hospitals. Supervise the accounting departments of both hospitals.

**Internal Revenue Service**

Revenue Agent (1967 – 1968)

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**Tax Subject Matter Expert—(B.M.)**

**Relevant Experience**

**Internal Revenue Service**

Team Manager, Acting Territory Manager (LSMB) (June 2000 – January 2008)

- Served as LSMB Manager for a Team involved in managing teams that audited large Corporate Audits. Managed the audit process from inception (Organization of team in pre-audit) to resolution of issues (arguing technical issues and resolutions).

**Internal Revenue Service**

Case Manager, Large Case (February 1987 – June 2000)

- Case Manager with many details for training and teaching.

**Internal Revenue Service**

Group Manager, SBSE type audits (March 1984 – February 1987)

- First-line supervisor included developing, evaluating and managing RA’s. Dealt with diverse groups of employee’s and taxpayer’s.

**Internal Revenue Service**

Section Chief, Review Section (March 1983 – March 1984)
 Responsible for managing a staff of Revenue Agents handling procedural and technical reviews. Performed all functions from technical and procedural reviews to Statutory Notice of Deficiency.

Internal Revenue Service
Revenue Agent/Reviewer (September 1973 – December 2000)
 During B.M.’s career, in addition to Revenue Agent, taught several technical subjects, and acted as Lead Instructor for various courses.

SAS Engagement #1: Wisconsin Department of Revenue

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):

Wisconsin Department of Revenue (WI DOR)

Like many states across the US, Wisconsin is dealing with a dramatic reduction in revenue as a result of the economic crisis. To complicate matters further, the era of one person living at one address and working for one employer for decades is gone. It's been replaced by workers who spend part of the year self-employed and the other part working for an employer, while also owning a small side business. Changes in how sales taxes are collected have also affected the state. The result: The data flowing into the state has increased dramatically, while the ability to organize and use that data has not.

If DOR staffers were trying to determine if someone owed back taxes, they needed to log on to multiple, separate systems. "We were crippled for a number of years with a large technical framework where each of our multiple systems did very specific things," explains Roger Ervin, Secretary of Revenue for the state of Wisconsin. "It was a challenge to navigate through all of the different systems." "And collection agents needed to be trained on every single one of them," says Susan Dukes, Program and Policy Analyst for the state.

With the SAS data warehouse, Wisconsin DOR has what Dukes calls “this really nice one-stop shop.” The warehouse is populated with a dozen data sources (expected to grow to 30) and approximately 2 terabytes of data. With SAS, the State can now:

 Collect more tax dollars more efficiently. For example, collection agents can create a Wage Certification Report and issue a wage attachment – a process that each agent does multiple times each day – in five seconds versus 20 minutes. In the first six months, the DOR's Compliance Bureau estimates it saved 1,500 personnel hours and brought in $5 million in collections that might otherwise have been missed with the previous process.
➢ **Prioritize to enhance collections.** By better selecting returns to audit and prioritizing those audits, the DOR collected $32 million in a short period of time. Without being able to focus their efforts, it would have taken well over a year to collect those same outstanding debts.

➢ **Stay on top of the federal audit reports.** These reports help the DOR both adjust state taxes and potentially find targets for state audits. Prior to establishing the data warehouse solution, the department received more audit reports than it could process in a year.

➢ **Provide better customer service.** The DOR can now respond to inquiries, such as when a refund will be processed, more quickly. And with all of the data at their fingertips, an auditor is less likely to need to repeatedly contact a taxpayer undergoing an audit.

"We needed a product that would bring all these processes together and do it in real time, but also give us the ability to look toward the future," Ervin says. The DOR selected SAS product was procured by the Wisconsin Department of Revenue through a competitive bid process. "It (the data warehouse) has helped us with strategic planning and bringing the right financial resources to the long-term operations of the organization," Ervin says. "It's also been great to see our IT staff and our business users working so harmoniously together."

It was also important that the solution be business-user friendly. The data warehouse solution gives IT the tools to be much more efficient and provides a framework for business users to access information without needing IT support. For instance, by utilizing the easy-to-use, point-and-click interface – rather than hand coding – the DOR's IT staff spends less time developing applications and reports. Because everyone codes in a slightly different way, changes previously had to be made by the person who originally did the work. With the SAS interface, the project's history is embedded in the code, so any team member can work on any project.

"In the past, people would wait and wait even though the data was sitting there," say Janna Baganz, Director, Business Intelligence Services. Only about 20 staffers requested reports from her department. With the new data warehouse in place, more than 500 employees can access data to help them with their daily jobs. The revenue department is also moving to a paperless system. Auditors no longer pull paper tax returns. Instead, they call them up online, where the point-and-click interface makes it easy to compare lines from one year's return to another year's.

Without needing to constantly submit a request for IT support, research and policy can spend more time looking at the big picture – using analytics to identify trends and understand how taxes affect economic development and different types of residents. In addition to helping auditors discover which taxpayers (or non-payers) should be audited, they are also using analytics to look at taxpayer burden based on frequency..."
of moves or length of time living in Wisconsin. The overall goal is to make taxation as fair and efficient as possible, and to (ultimately) avoid raising taxes. "With this data warehouse, we've been able to keep our costs low and our productivity high. It's what people expect from us and what we expect from ourselves," Ervin says.

**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.**

**Wisconsin Department of Revenue (WI DOR)**

- A department-wide data warehouse using SAS Business Intelligence, providing readily available and easily accessible data to help users perform more efficiently. Transforming raw data into information for expanding user groups, the solution facilitates back-end data processing and end-user reporting. WI DOR's information resource helps the entire organization comply with directives, initiatives and legislative mandates.
- July 2008 – present, with continued enhancements
- Amy Boutelle, Business Intelligence Services Manager
- amy.boutelle@revenue.wi.gov
- 608-261-8986

**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.**

The state of Wisconsin’s Department of Revenue (DOR) is saving time and money and has eliminated thousands of hours in tedious, manual data-matching activities with the SAS solution. It has implemented a collections prioritization system that is helping the state collect millions in tax revenue faster. State revenue officials, with help from SAS, collected $32 million in revenue more quickly than ever and uncovered $5 million that might have otherwise gone uncollected.

The production system draws from many data sources to offer a clear, multiyear, paperless view of the taxpayer, whether individual or corporate. The Wisconsin
Department of Revenue can thus prioritize collection opportunities, analyze complex sources of income and automate many processes. The agency is also analyzing property taxes, which can be difficult with data available only in aggregate and at the local level. Among other uses, the analysis can demonstrate the effectiveness of property tax relief programs on overall tax burden. In the fourth quarter of 2008, the system processed more than 150,000 queries, more than double the previous quarter. Customizable reports delivered through a web portal give some 500 users the answers they need to improve decision making.

The time spent analyzing and identifying audit opportunities has been drastically reduced. The Wisconsin Department of Revenue estimates staff time savings of more than 2,100 hours since July 2008 and financial savings of more than $6.7 million. In addition, the data warehouse solution allowed Wisconsin to stay on top of the federal audit reports. These reports help the DOR both adjust state taxes and potentially find targets for state audits. Prior to establishing the data warehouse solution, the department received more audit reports than it could process in a year.

The Wisconsin Department of Revenue is now able to provide better customer service. The DOR can now respond to inquiries, such as when a refund will be processed, more quickly. With all of the data at their fingertips, an auditor is less likely to need to repeatedly contact a taxpayer undergoing an audit. Wisconsin DOR’s IT department can now function more efficiently, as well. The data warehouse solution is business-user friendly; it provides a framework for business users to access information without needing IT support. Without needing to constantly submit a request for IT support, research and policy can spend more time looking at the big picture – using analytics to identify trends and understand how taxes affect economic development and different types of residents.

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

State revenue officials, with help from SAS, collected $32 million in revenue more quickly than ever and uncovered $5 million that might have otherwise gone uncollected. In addition, the Wisconsin Department of Revenue estimates staff time savings of more than 2,100 hours since July 2008 and financial savings of more than $6.7 million. 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.

\textbf{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: California Employment Development Department

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);

California is the fifth largest economy in the world, and California Employment Development Department (EDD) is the largest tax assessing and collection entity in the state. CA EDD offers a wide variety of services to millions of Californians under the job service, unemployment insurance, disability insurance, workforce investment and labor market information programs. As California’s largest tax collection agency, CA EDD also handles the audit and collection of payroll taxes and maintains employment records for more than 17 million California workers. Each year, CA EDD collects $40 billion in state employment taxes from 1.2 million employers. It disburses an average $4.8 billion in unemployment benefits to 2.2 million claimants.

CA EDD promotes the State’s economic growth by providing services to keep employers, employees, and job seekers competitive. Following federal and state laws with fairness and equity, and ensuring fiscal integrity, they:

- Operate the State’s employment service—connecting employers with job seekers
- Act as an economic stabilizer through the administration of the Unemployment Insurance program
- Provide prompt and accurate services that enable taxpayers to easily report data and meet their tax responsibilities
- Minimize the financial impact of non-occupational disabilities through the administration of the Disability Insurance program
- Provide partial wage replacement when workers must care for a seriously ill family member or bond with a new minor child
- Encourage self-sufficiency in the current and future workforce
- Serve as the central source for information on California’s labor market
- Plan, deploy, and manage technology to improve our business processes and access to our services
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.

California Employment Development Department (CA EDD)

- The agency uses SAS to boost revenue by reducing tax fraud, identifying collectible cases and improving unemployment insurance fund solvency.
- 2008 - present
- Darryl Young, ITB Section Chief
- Darryl.Young@edd.ca.gov
- (916) 654-8452

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.

Since August 2004, CA EDD has assessed more than $100 million and collected an additional $32 million. CA EDD has been using SAS since 2006.

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 #3: The Commonwealth Bank of Australia

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);

Commonwealth Bank of Australia

SAS allowed Commonwealth Bank to migrate all of its siloed information onto one platform in order to analyze transactions and customer activity, develop new models and tune existing models to improve fraud detection efficiency and create reports. The SAS Fraud Framework replaced the Commonwealth Bank of Australia’s existing Application and Check Fraud Detection system. The SAS solution, integrated into their current credit card and internet fraud applications, provides an auditable, single version of the truth, as well as a managed platform that automates many of their processes. It frees up staff resources, being able to implement preventative measures to combat fraud. The SAS and Teradata partnership helps the bank access customer information as it changes—in real-time—to quickly identify suspicious behavior and act on it as it is happening.

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.

Commonwealth Bank of Australia

- Financial Crimes Platform (including Fraud, Anti-Money Laundering, Counter Terrorist Financing and Sanctions)
- In production since 2007, additional ‘bolt-on’ projects on-boarding and additional fraud/compliance initiatives ongoing
- John Geurts, Executive GM and Chief Security Officer
- john.geurts@cba.com.au
- 02 9378 5406

Addressing fraud across the bank
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.

Using SAS, the Commonwealth Bank of Australia has detected twice the level of check fraud than in its previous system and had a 60 percent improvement in Internet banking fraud-alert volumes.

Check-fraud detection efficiency has improved from a false-positive rate of one in 2,000 to approximately one in 100—which is a 95 percent improvement, with a similar improvement in alert volumes. Commonwealth Bank is also detecting twice the level of check fraud in the SAS-based FCP [financial crimes platform]. Commonwealth Bank has achieved more than a 60 percent improvement in Internet banking fraud-alert volumes and is detecting a higher rate of fraud; they are consistently achieving a one to 12 false-positive ratio in cards fraud-detection platform, which again is better than industry benchmarks.

Most importantly, on an indexed basis, Commonwealth Bank’s check and Internet fraud loss-to-turnover ratios are 50 percent and 80 percent better, respectively, than five years ago, and our card fraud losses are marginally better. Given the sustained growth in business volumes in those five years, the reduced loss ratios have translated to a real and substantial reduction in fraud loss expense for the group since the FCP was implemented in July 2007.

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.