Budget and Control Board
Division of Technology
Billing System Upgrade
Introduction

In 1983, the Division of Information Resource Management was established as a division within the State Budget and Control. Its primary purpose was to promote efficiency and consistency in managing information technology within the State of South Carolina. After several name changes, in 2009 the division became the Division of State Information Technology (DSIT). In 2013, a major security breach occurred at the Department of Revenue resulting in the hacking of millions of citizens' personal information. As a result, many changes have occurred at DSIT in the past year including the establishment of a Division of Technology Operations (DTO), Division of Information of Security (DIS) and an Enterprise Privacy Office (EPO). With this expanded scope of responsibilities and services, the overarching name of the Division has been changed to the Division of Technology (Division).

The Division of Technology provides many different and constantly expanding information technology services to a myriad of customers, including state and local governments, K-12 school districts, colleges, universities, technical colleges and other entities that have reached out to the Division. As of year-end 2013, the Division provided a total of 1,083 different services to 139 customers. The Division charges these customers a rate for each of the individual services provided. In FY 2013, the Division billed approximately $20 million dollars to its customers for these services.

Problem Statement

These IT services are critical to successful operations of these individual customers. With the recent data breach at DOR the emphasis on the Division's services has never been
higher. Along with this emphasis comes reliability and trust in the services and amounts charges for these services. Customers must trust the fact that the billings that they receive each month from the Division are accurate, understandable and reflect the actual services that they in fact received. The Division uses a system known as the Customer Work Order Fulfillment (CWOF) system to generate customers' billing statements.

**Data Collection**

When I began my project, I understood this system as simply a billing system where customers' services were entered and associated with pre-established rates and an invoice generated and sent to the customer for payment. However, as I interviewed Division staff that maintain and operate the CWOF system on a daily basis, I quickly began to realize that this system is only one component in a very complex billing system landscape. While customers' billing statements are generated using the CWOF system, it serves many other roles in the overall management and distribution of critical information technology data.

As mentioned above, the Division provides a multitude of information technology services to its customers. These services are broken into four major categories including Network Services, Shared Services, Print and Mail Services and Security Services. Within the Network Services category, services are further broken down into sub-categories including Network Voice services, Network Data services and Contract Administration services. Shared Services are further broken into sub-categories including Main Frame services, Storage services, Hosting services, Technical services and Email services. Within these Network and Share Services sub-categories and the Print and Mail and Security Services categories, the Division offers 18 Lines of Service (LOS) with 54 individual billable components. Each of these
individual components has a separate billing rate. Refer to Appendix A for illustration of this services' architecture. This current billing architecture has been in place for only one year. Prior to this architecture, the Division managed over 400 individual billable rates. However, in 2012, the Division began a project to better structure its services and their associated rates. A part of this project was to develop a process that would capture expenditures related to individual services and combine them with an established unit of measure, such as capacity or units of sale and compute rates sufficient to recover the costs associated with providing these services. The unit of measurement information comes out of the CWOF system. The associated expenditure data is captured in the South Carolina Enterprise Information System (SCEIS). The SCEIS system also interfaces with the CWOF system and plays a key role in the generation of customers' invoices. The SCEIS system is an enterprise resource planning (ERP) system that the state purchased from SAP to replace its legacy accounting, procurement, human resources and payroll systems. Beginning in 2009, agencies, including the Budget and Control Board, began using the SCEIS system for all of these applications. I will explain the SCEIS/CWOF interface later in my report.

Several factors make the Division unique from an operational funding and financial reporting standpoint and impact decisions regarding the billing system. First, the Division's funding to provide these services to its customers comes from the revenue generated from the sale of these services. In fiscal year 2014, the Division's total authorized budget is $81,244,976. Of this amount, the Division is appropriated $39,078,853 to provide the various Network Services, Shared Services, Print and Mail Services and Security Service described earlier in the report as well as fund the newly formed Division of Security and Enterprise Privacy Office.
However, in order to utilize these budgeted funds, the Division must generate revenue from the sale of its services in an amount at least equal to this funding amount. It is important to realize that while the Division's primary purpose is to provide these information technology services to its customers, these customers are not required to purchase any of these services from the Division. These customers are free to develop and manage these services in-house or select another vendor to provide these services to them. In a sense, the Division acts as a vendor of information technology services, competing with other vendors who offer the same or similar services. Second, because the Division is a division of the South Carolina Budget and Control Board providing services to other governmental units, it is treated as an internal service fund for the purpose of accounting and financial reporting such as the completion of the annual Statewide Cost Allocation Plan.

An internal service fund is defined as a fund established to finance, administer and account for departments or agencies of government whose exclusive or nearly exclusive purpose is to provide goods or services to the government’s other departments on a cost reimbursement basis. [1] Careful consideration must be given to defining the specific activity included in this fund, the specific cost objectives and the development of pricing rates. Basically, this definition means the primary pricing/billing objective is to recover the costs associated with providing these services, not to make a profit.

It is important to understand the complexity of this overall billing system landscape in order to appreciate the multitude of factors that must be considered in selecting a replacement of or enhancement to the existing CWOF system. Refer to Appendix B for a diagram of the overall billing system landscape used by the Division. I have highlighted the CWOF system in yellow,
the KOMAND system in green and the mainframe system in blue. I will discuss the roles that
the KOMAND and mainframe systems serve in allowing the CWOF system to bill customers for
mainframe services later in my report.

The purchase and development of the CWOF system began in 1999 with initial
implementation around 2003 – 2004. Prior to the CWOF system, the Division used a system
known as the TIGER system. The TIGER system was an in-house developed system used for
managing cabling and for billing customers for these services. The primary reason to move
away from the TIGER system to the CWOF system was to be able to better manage the
telecommunications side of the Division’s operations. Initially, the CWOF system was
developed to manage over 30 telephone switches which served the Private Branch Exchange
(PBX) as well as the ESSX parts of 30 switches leased from ATT. Thousands of long-distance
records were managed by the CWOF system and converted to billed charges on a monthly basis.
The CWOF system managed all service numbers for these switches for three area codes in South
Carolina and all associated calling features such as call forwarding, call waiting, etc. as well as
the state government calling card. In addition to these services, the CWOF system provided a
paperless work order system for the Division’s cabling technicians and the management of
telecommunications cable pairs.

In 2009, the management of the PBX switches was outsourced to Spirit along with the
conversion of the ESSX switches with the conversion to Voice over Internet Protocol (VoIP). In
many ways, the outsourcing of these telecommunications services left much of the CWOF
system’s primary functionality unused. However, even with this outsourcing, the CWOF still
plays an integral part in the overall billing process. It interfaces with a number of
systems/databases within the Division as well as systems from vendors contracted by the Division to provide certain telecommunications services and the Division’s customers on a monthly basis. Within the Division, CWOF interfaces with KOMAND, Tivoli/Avamar (server backup), WebSphere (application hosting), and the CA Helpdesk systems. The CWOF system is still used to manage telecommunications cable pairs.

The monthly customer invoice process begins with a set of processes with the CWOF system. CWOF pulls all current monthly recurring charges (MRC), other charges and credits (OCC) and long-distance charges into a set of monthly files to begin preparing the monthly invoices. At this point, the interdepartmental transfer (IDT) process begins which will eventually be sent to the SCEIS system for the creation of the IDT documents that will be sent to customers. In addition, CWOF begins the process of creating the monthly statements which will be included with the IDT documents. Up to this point, all activity has taken place within the CWOF system. However, once these activities are complete, the billing process moves outside the CWOF system to the mainframe and SCEIS system.

First, the mainframe acquires all IDT transactions, statements and any customer data files from the CWOF system. The IDT transactions are loaded into an Oracle database and processed to generate the SCEIS IF384 transactions, which are the DTS receivable files for the associated monthly customer charges. The mainframe then pulls additional information from CWOF and joins it with the IF384 files to produce monthly revenue, financial and invoice audit reports. At this time, all invoice statements are placed on a Budget and Control Board common server as well as an internal web server to be reviewed and audited by the Board’s accounting staff and the Division’s technical staff. The mainframe then pulls the IF384 files (3 separate files) from the
Oracle database, along with an image load file which will allow the SCEIS system to eventually match up any imaged attachments with the invoices.

Once these mainframe processes are completed, a SCEIS interface application begins to transfer these files to the SCEIS server. The mainframe then waits for the SCEIS system to validate or reject each transaction. Any rejected transactions must be corrected in order for the process to continue. Once all transactions have been validated, the SCEIS system will send a file validation back to the mainframe. The mainframe will then perform a “3 way” reconciliation of the SCEIS totals, mainframe receivable totals and the CWOF invoice totals. All three must balance to continue. The mainframe then uses CWOF and SCEIS data to produce the SCEIS IDT and remittance forms. The CWOF monthly statements are processed into Advanced Function Presentation (AFP) files and attached to the IDT and remittance forms. All invoice packages and the image load file are sent to a SCEIS image server and transformed into Portable Document Format (PDF) documents. All higher education and “non-live” SCEIS customers receive their monthly invoice packages by email. All “live” SCEIS customers receive their monthly IDTs and statements through the SCEIS system. Once all invoice packages have been successfully sent to the Division’s customers, reports are generated and all information is archived.

The KOMAND system is another system maintained by the Division that has a billing component. However, with the implementation of the CWOF system, the KOMAND system was no longer used to bill customers. The KOMAND system is maintained to capture customers’ usage of mainframe services only. It captures time and utilization of mainframe services including Central Processing Unit (CPU) time, tape and disk storage. The KOMAND
system reads and breaks down Systems Management Facilities (SMF) records in order to associate them with a rate and charge the customer for these services. While a billing invoice is not generated from the KOMAND system, monthly "usage statements" are generated for many of the Division's mainframe customers. These statements are produced to provide details of the services used by the customers during the month since this detail is not in their CWOF billing statement. While all customers do not receive a "usage statement" from the KOMAND system, 132 statements are produced and sent to customers on a monthly basis. The KOMAND system maintains much of the same customer and services information as the CWOF system.

Customers' account information, mainframe service codes, account codes, and mainframe service rates are all maintained in the KOMAND system. The mainframe retrieves billing data from the KOMAND system and generates an OCC import file for the CWOF system. Once the CWOF system receives this text file from the KOMAND system, it is included in the monthly billing process.

In an effort to determine the customers' likes and dislikes of the current billing statements, I contacted a sample of agencies' IT departments. During these discussions, I received comments regarding both the CWOF and KOMAND statements. The common theme throughout revealed during my conversations with the agencies was that the statements were complicated and often difficult to understand. In several cases, I was told that the agencies had a full-time staff person whose job was to review the statements and ensure that they were accurate before processing for payment. Service descriptions seemed to be difficult for some agencies to interpret. I was told that agencies would have to refer to "service tables" to translate the statements to ensure that the services billed were actually services provided. Some agencies
were concerned that they were billed for services that were actually provided to another agency. Another comment was that at times, agencies believed that they had been billed for services that had been discontinued. All in all, I interpreted these conversations to say that the customers are not satisfied with the current billing statements and at times even distrusted them even though they had learned to use them.

**Data Analysis**

Based on my research of the information currently stored in the CWOF system, interfaces with vendors and customers, the needs of the customers and the requirements of the Division, I believe that three viable options exist:

**Option 1:** The first option is to upgrade the existing CWOF system (V.5.4.2) to the most current version of the Pinnacle software available which is V.6.4.3. In addition to upgrading the Pinnacle software, the Division will need to upgrade the Oracle server where the Pinnacle software runs. Currently, DTS is running Oracle 9.2.0.6. However, the newest version of Pinnacle operates on Oracle V.11.2.0.3. An Oracle upgrade will be necessary for two reasons. First, Oracle 9.2 is no longer supported by the vendor. This upgrade will be necessary regardless of the upgrade of the Pinnacle software at some point in the near future. Second, the more recent versions of the Pinnacle software must run on the higher version of Oracle. Moving to Oracle V.11 would provide more efficient backup and recovery processes, online data restoration and other useful database features. An advantage to using this option is that most, if not all, of the current processes will remain unchanged. Training would be limited to the enhanced features of the newer version. However, the disadvantage to this option is that many of the conversion steps
required to transmit information to and from the other systems and databases that interface with CWOF will also remain.

The Division's staff performs many steps on a monthly basis to configure information for these interfaces as I described earlier. One major conversion that would continue is the processes that take place to send and receive customer financial data from the SCEIS system in order to generate customers’ monthly billing statements. After many attempts to obtain a cost estimate for Pinnacle V.6.4.3, I was not successful. The vendor needs to better understand our specifications for configuration before they are able to provide a cost estimate. However, I was able to research the costs incurred to purchase the current version of the CWOF software for a reference. Based on my research, I determined that the Division paid $918,000 for the software plus an additional $31,500 for project consulting and $107,400 for maintenance. These amounts total $1,056,900. The Division already uses Oracle V. 11 on several of its servers and has a contract in place to upgrade other servers to this version at no cost. Therefore, it is reasonable to anticipate an upgrade cost for the Pinnacle V.6 to be approximately $1,000,000. I will continue to pursue a requirements document from agency staff in order to obtain an actual estimate. This estimate will be required before management can effectively assess this option.

Option 2: The second option would be for the Division to utilize the SCEIS Sales and Distribution (S&D) module to maintain the customers’ data and generate monthly billing statements. As mentioned earlier, the state has made a significant investment of general fund dollars in the implementation and maintenance of this statewide ERP system. The Sales and Distribution module was purchased by the state in the initial purchase of the SAP software. Several agencies already use the S&D module on a limited basis. This module has the ability to
house customer master data, customer transactional data, and generate customized billing
statements. A major advantage of this option is the fact that the S&D module already interfaces
with the other SCEIS modules. Therefore, many steps of transferring information to and from a
separate system, i.e. CWOF today, would not be necessary. Another advantage from a financial
standpoint is that the state has already purchased this module with the purchase of the SAP ERP
system. Upgrades and enhancements can be made utilizing existing SCEIS staff, IMB
professionals under the existing SAP Applications Management Services (AMS) contract which
is already in place to provide such consulting services to the SCEIS staff and SAP consultants.

An estimate already received for configuring the S&D module to meet the requirements
of the Division and its customers is approximately $400,000. Since the S&D module has only
been used on a limited basis to this point, additional training in the extended functionality of this
module will be needed for SCEIS staff and staffs of agencies' desiring to use this module in a
more comprehensive manner. A solicitation for such training would be required as there are
multiple companies that provide this training. A similar search for viable training options for the
SAP system revealed several potential vendors. An estimate received for this training was
approximately $10,000 plus material development costs. I believe that this estimate reflects the
potential costs for S&D training. A third advantage would be the ability to design the billing
statement in such a way that customers will be better able to understand. Fourth, due to the
integrated nature of the SCEIS system, the S&D module interfaces with the reporting modules of
SCEIS. This integration will allow the SCEIS reporting staff to create customize reports for both
the Division and agencies to use in analyzing billing and payment data.
This option will not eliminate all interfaces and data stored in the current CWOF system. As discussed earlier, the KOMAND system reads and breaks down System Management Facilities (SMF) records in order to associate them with a rate and compute a charge for the mainframe services. This information is received by the mainframe and converted to a text file which is sent to the current CWOF system. This conversion of SMF records to a text file will continue to be necessary with the SCEIS S&D option. Also, the SCEIS S&D module would not be able to store and manage cable pairs. This process will need to be performed in a database other than the S&D module.

**Option 3:** The third option would be for the Division to conduct a Request for Proposal (RFP) through State Procurement to determine if other versions of billing software exists that could meet the billing, data storage and interface requirements of the Division. Converting to a totally new billing system will require extensive research by many of the Division’s staff. A comprehensive requirements document will have to be prepared in order to complete the RFP solicitation. If a viable system is available, it will more than likely require substantial changes in the system infrastructure, billing processes, and interface designs. My research revealed a number of billing systems are available. Most of these IT billing systems are primarily for telecommunication services. However, the Division needs to be cautious with these billing systems as that was the basis of the current CWOF system and many of these features are no longer needed due to the outsourcing of the telecommunication services. At this point, only an interface with these vendors is used to exchange data. Therefore, based on the fact that a formal solicitation has not been conducted by the Division, it is difficult to determine the viability and costs associated with such a system.
Summary and Conclusion

In the near future, the Division will need to make a decision regarding the upgrade or replacement of the current CWOF billing system. Based on my research, options 1 or 2 appear to be the most optimal from a financial and process engineering standpoint. A detailed project plan and schedule will need to be developed to ensure that all required steps are identified, contingencies are determined and needed resources are identified. The Division will first need to complete a detailed requirements document. Once this document has been completed, additional, in-depth understanding of the SCEIS Sales and Distribution module and Pinnacle V.6.4.3, along with associated cost of implementing each system will need to be performed. Once this research has been completed and a decision made, an implementation plan can be developed and executed.
1. Governmental Accounting – Chapter 11: Internal Service Fund
http://www.quizlet.com
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<th>Description</th>
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<td>Voice Services (Local &amp; Long)</td>
<td>Contract Administration (Same Only with some exceptions for Payroll)</td>
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<td>Internet Services</td>
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**Network Servicest Administration**
(Includes Cable & Wiring Expenditures on Blanket)

- **Telecom Project Management**
- **Telecom Wiring Technician Hourly Rate**
- **CENTREX Port**
- **DS1 Internet - per Mb**
- **Data Center Network Port - Enterprise**
- **MetroNet MetroE - 10 Mb Fixed**
- **MetroNet MetroE - 100 Mb Fixed**
- **MetroNet MetroE - 1 Gb Fixed**
- **Router Management**
  - Small (134 Queue)
  - Medium (11 queue)
  - Large (11 queue)
- **Router Management**
  - Small (134 Queue) - Medium (11 queue)
  - Large (11 queue)
- **Network Integration Tech Hourly Rate**
- **Virtual Private Network (VPN) Access (99 users)**
- **VPN Tunnel Device (19 users)**
- **Firewall Management - Small**
- **Firewall Management - Medium**
- **Firewall Management - Large**

**Shared Services Administration**

- **Mainframe Base Cost**
- **TSO Session**
- **ADMIN Admin**
- **CICS Admin**
- **DB2 Admin**
- **CMS Admin**
- **Data Storage (MF)**
- **Tape Storage (MF)**
- **Server Storage**
- **Server Backup**
- **Web Hosting**
- **Disk Units**
- **Virtual Servers**
- **Server Management**
- **Application Hosting - Mainframe**
- **Application Hosting - Mainframe - A Host**
- **Application Hosting - Mainframe - B Host**
- **Application Hosting - Mainframe - C Host**
- **Application Hosting - Non-SCS Imaging**
- **Application Hosting - Non-SCS Imaging Teams**
- **Application Hosting - Database Hosting - DB2**
- **Application Hosting - Database Hosting - SQL**
- **Application Hosting - Database Hosting - Oracle**
- **Disaster Recovery - Open Systems**
- **Development - Identity Recurring Rate per User**
- **Application Development Hourly Rate**
- **Consulting Services Hourly Rate**

**Print Services Administration**

- **Print per printed image**
- **Paper per pagework**
- **Print Design (per hour)**
- **Offline Printing of Customer Printed Documents**