Extending Purchasing with Document Management, Workflow & the Internet

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Who We Are, What We Do

Sandia is a national security laboratory operated for the U.S. department of Energy by the Sandia Corporation, a Lockheed Martin Company. We design all non-nuclear components for the nation's nuclear weapons, perform a wide variety of energy research and development projects, and work on assignments that respond to national security threats – both military and economic. We encourage and seek partnerships with appropriate U.S. industry and government groups to collaborate on emerging technologies that support our mission.

Today, Sandia has two primary facilities, one in Albuquerque, New Mexico, and one in Livermore, California. We employ about 7,600 people and manage about $1.4 billion of work per year.

In 1995, a decision was made to move from our in-house developed systems to commercial software. This decision was driven partly by Y2K compliance issues associated with the existing operating system and support environment. Peoplesoft was selected for Human Resources and Oracle for Manufacturing and Financials.

We implemented Peoplesoft for our Human Resources (HR) in 1997. We then implemented 7 Oracle modules in Manufacturing in October 1998, including WIP, BOM, Engineering, Quality, Inventory, MRP, Cost Management and limited HR/Purchasing/Receiving functionality required to support Manufacturing. In March of 1999, we brought a portion of our Projects module up to allow for input of Project/Task information by our line customers and on October 1, 1999; we went live with the full-blown Financials package. We implemented Projects, GL, Receivables, Payables, Purchasing, Assets and incorporated our Manufacturing modules and HR. This paper will discuss the analysis and implementation of the Purchasing Module.

What We Had To Overcome

The combined Procurement and Logistics Organizations in NM and CA employ 287 people, 111 of whom are buyers and procurement specialists. In addition, any of 7,600 employees have the potential of becoming a Procurement/Logistics customer through the requisitioning process. Of the $1.4 billion laboratory funding, $405 million of those dollars were spent by the Procurement organization last year. Our relatively unique purchasing process presented several critical challenges in the Oracle Purchasing environment.

Sandia, having both limited manufacturing and significant research and development operations, has many purchases that are defined as Statement of Work instead of as line items. Also there are numerous compliance issues and contractual requirements as a result of the nature of Sandia's business. Given this, Sandia developed a special rules-based Document Production System (DPSR) to handle these requirements for the numerous purchasing documents (RFQs, Standard Purchase Orders, Blanket Purchase Agreements, and Contract Purchase Agreements). This system provided the valuable functionality of collating all sections of a Contract and allow for on-line faxing or printing. We wanted to retain this functionality as we moved into the Oracle environment.

In 1997 Sandia implemented a Procurement Card System for small value purchases. The Procurement Card System has grown to over 1,000 cardholders today with expected FY00 purchases in excess of $50 million.

In addition to the Procurement Card System, we also had a separate procurement system, integrated with our existing financial system, that handled procurements with our JIT (Just-In-Time) Suppliers. This system handled 80% of our transactions with these JIT suppliers or approximately 150,000 transactions per year. We had agreements with 50 JIT suppliers for procurement of many items, from office supplies to chemicals to gases. This

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JIT system, based on agreements with 50 key suppliers, maintained both the catalogs/items and the associated pricing/delivery of these repetitively purchased items and allowed our requisitioners to input orders directly with those suppliers. The suppliers were then able to download their orders and barcode labels, and then package and ship those orders to Sandia. The requisitioners had embraced this system and the Logistics organization had also received huge gains in productivity through the use of barcode receipts. As this was our most efficient Purchasing method we did not want to lose this capability in the Oracle environment.

Most of our requisitions, outside of the JIT system, were processed and managed using a largely paper-based process. Approximately 100,000 transactions (requisitions) were hand-written and hand-carried to obtain the necessary commitment approvals and special approvals. We had 7 levels of commitment approval based on dollar value, 120 special approvals required for various types of purchases and the financial organization also reviewed and input each requisition. These documents finally made their way to Procurement where they were manually assigned, input, and distributed to the appropriate buying department and then assigned individually to the appropriate buyer by the buying department manager. Clerks in the buying department then input the buyer assignment into the system. As we moved into the Oracle environment we knew we would need to streamline this process and then both automate it and put it on-line. We also wanted to limit the number of users required to access the complete Oracle Purchasing system.

In addition to these challenges we also had other "typical" challenges faced by large organizations in a conversion of this nature. We had a large volume of data to convert including: 20,000 suppliers, 1,500 requisitions, 8,000 purchase orders, 53 JIT agreements and 100 annual ordering agreements. This conversion was especially onerous because we were migrating from a system that captured accounting data at a requisition or order level to a system that provided for line item/shipment level accounting.

But undoubtedly our biggest challenge was that of changing our culture. We were moving from a system that was internally designed and developed to meet Sandia's specific purchasing needs to a commercial software package that, by definition, does not provide that level of customization. And, of course, we were also tasked with limiting the customizations to Oracle.

What We Did – Process Changes

This section of the paper looks at the major process changes that we made.

After analyzing Oracle functionality, we began by looking at our internal processes and policies. We recognized that we had to significantly change the process.

First, we reduced our commitment approval hierarchy from 7 levels to 2. This meant that every employee had a higher approval authority on a requisition. Managers with the proper authority had unlimited approval authority. To ensure that this efficiency did not impact financial controls, a management report was designed that allowed managers to view all purchases in their organization that they did not approve. In addition, we provide notification e-mail to all Project Managers where the value of a Project distribution on a line item is greater than a set limit. (See below for implementation details.) Finally, while all Purchase Orders would require an initial requisition, changes to a Purchase Order could be made with a phone or e-mail request from the line customer if the dollar value of the change was less than a set limit. These changes in Procurement Policies have provided a significant improvement for our customers and allow much more flexibility in meeting their needs.

We changed our Procurement organization to commodity (category/subcategory) based buying, thereby eliminating special approvals. The buyers have now gained a new level of knowledge about the products/services that they are buying and we have eliminated the need for the requisitioner to be familiar with all of the special approval/notification requirements. It also reduces the overall cycle time for purchases. Also, the organizations that previously required notifications for certain purchases have now been given the tools to query the system to identify purchases by category that they want to know about.

Just these three changes to our process significantly enabled us to successfully implement the Oracle software and make our purchasing process more efficient.

What We Did – Technical Changes

This section is a step-by-step look at how we implemented Oracle for Purchasing. We utilized standard Oracle functionality wherever possible. We included the query capability of the Self-Service Web Application, some internally customized components that worked with Oracle functionality utilizing open interfaces, bar-coding software (Loftware) and a third-party Oracle partner (170 Systems). 170 Systems became a key player in our Purchasing implementation providing us with Workflow, Imaging, Document Management, Faxing, Printing and Web Capability. They also provided the solution for managing work in the Payables module. I will try to identify throughout this paper what customizations were made by Sandia technical support and which our suppliers made.

There were three technical obstacles in defining how to input and process requisitions. First, we did not want to deploy Oracle "heavy" client on all 7,600 employees' desktops. Second, we wanted to utilize workflow capabilities that were integrated with Oracle and Oracle 10.7 did not support workflow. And third, the Web Req within the Self-Service Web Apps Version 2.0 did not allow for the use of Project distributions, a very necessary feature in our environment.

We decided to deploy Oracle to the desktops of approximately 1,000 employees including all secretaries and clerical staff as well as administrative assistants and budget coordinators. The standard configuration included: Oracle Shared Client, 16-bit version of SQLPlus, Oracle book reader, and Oracle installer. We also provided access to the requisition form to our Just-In-Time suppliers. This represented our population that would be allowed to input requisitions.

Our first customization occurred in the requisition form at the distribution level, changing the default display to bring up Project information instead of Accounting information. Then to properly complete this customization we also had to customize the Requisitions, Orders and Releases forms to display the line number on the distribution form. This greatly reduced the potential confusion regarding which line number was associated with the distribution data being entered. One other enhancement we made to the Requisitions form was to enable longlist. This significantly reduced the time it was taking to query list of values (LOVs) that contained thousands of rows of data.

We chose to use employee/supervisor instead of Hierarchy for requisition approval. The Oracle person table, updated nightly from Peoplesoft HR, identifies all employees and their supervisor. We then implemented the workflow, utilizing the 170 Systems technology, which corresponded to our new efficient approval process. At this point, if the requisition is less than the threshold, the preparer can approve the requisition at the time of input. If the requisition is greater than the threshold an e-mail notification is sent to the manager notifying them that they have a requisition to approve. By clicking on the attached URL, the manager can view a "rendered image" of the purchase requisition and can apply an "Approved", "Rejected" or "Forward-To" stamp and can also attach an electronic "sticky note" that allows them to input notes that apply to the action chosen.
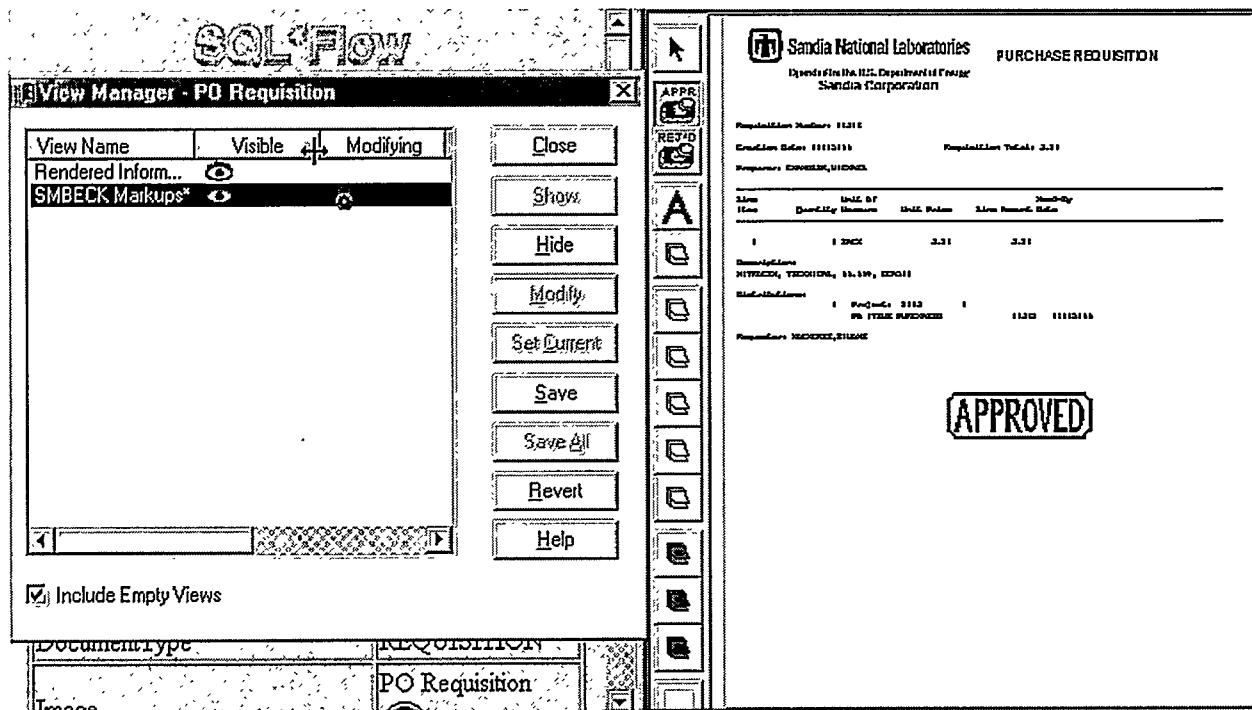
Oracle is automatically updated with the approved status if the requisition is approved. If rejected, an e-mail notification is sent back to the preparer. If the requisition sits in someone's in-box for more than two days, both the preparer and manager receive an additional notification until the requisition has been approved or forwarded to another manager for approval. For informational purposes, An e-mail notification with the same URL is also sent to the Project Manager if a project distribution is greater than $25,000.

Requisition Import is used to import all requisitions that are generated through the Manufacturing modules. These requisitions are approved prior to import and then follow the same path for Order/Release creation. Sandia also took advantage of the Requisition Import capabilities that Oracle provides by implementing a customized process for accepting large volumes of data from a single vendor and automatically creating transactions. For example, we process the company's entire cell phone billing transactions through the Requisition Import process.

To then improve the efficiency of routing the requisitions to the buyers, we took the following steps. First we created a custom form that allowed us to tie every category / subcategory (over 300) to a specific buyer instead of just being able to assign a single category to a buyer. Now when the requisition is approved, the buyer assignment is done and the buyer has immediate access to the requisition lines via the Autocreate function in Purchasing. Previously a purchase requisition might pass through 7 different person's hands before finally reaching the appropriate buyer. Also, any attachments to a Purchase Requisition such as a Word Statement of Work or Sole Source Justification forms are transmitted separately, via e-mail, to the buyer.

Requisitions now take different paths in the Purchasing Module to be placed as releases/orders.

First, I will discuss the automated method used to replace our Just-In-Time System (JIT). Blanket Purchase Agreements are set up in Oracle for each of our JIT suppliers. We then load supplier item information into the Item Master, Blanket Agreement Lines and Autosource Rules. Running the Create Releases job twice a day automatically generates a release for all newly created requisition lines that have been included on these Blanket Purchase Agreements. The results of the Create Releases job are transmitted to our JIT suppliers via Excel™, where the suppliers adjust quantities to match on hand inventory, and print the barcode labels required for shipment. We also enhanced the system to allow the supplier to ship partials by allowing them to adjust their downloaded spreadsheet and print the correct labels. They can then create subsequent barcode labels for backordered items.

The supplier then delivers the material to our Receiving dock, the barcode labels are scanned, and Oracle receipts are updated. The receiving transactions are edited and, if necessary, corrected prior to being loaded into the Receiving Transactions Interface table.

We are also using Evaluated Receipts Settlement (ERS) for supplier payments on all of our JIT Blanket Purchase Agreements.

Overall this JIT component has allowed Sandia to maintain many of the efficiencies realized in our previous JIT process. Yet we have had to work hard to resolve some key issues. The sheer volume that Sandia passes through the JIT process led to querying problems / inefficiencies in the PO and Payables modules. Also the ERS Payables approval job took extremely long to process. While we have been able to resolve some of the issues, we are still working to increase the efficiency of the overall system. At the conclusion of this paper is an attachment depicting the hardware and software specifications required in order to run Sandia's JIT bolt-on.

The next class of procurements that we process are those that do not require formal RFQs and have very few contract clause requirements. These are typically for one-time purchases of items or services that are below an established threshold. A phone quotation can be obtained and the order can be placed using the Autocreate function. Templates were established within Oracle, using Attachments, to accommodate the minimal number of standard clauses that are required for these orders.

We also have numerous purchases that require the inclusion of many contractual clauses in both the RFQ and Standard Purchase Order or Blanket/Contract Purchase Agreement that utilize the above mentioned Document Production System (DPSR). To accommodate the DPSR output, we had to identify a way to create the Purchase Order within Oracle utilizing the Autocreate function, create and validate the clause section in DPSR, and then bring these two documents together into a single supplier document set. We also needed to include a cover page (signature page) on each of these document sets based on a pre-defined set of rules.

The buyer first autocreates and saves the requisition line(s) into the Purchase Order and then a Draft Cover Page is created via the 170 Systems Markview software. Critical contract data is pulled from Oracle into DPSR where the buyer is then required to input certain additional data fields and prior to DPSR validating the contractual clauses. All mandatory and recommended clauses are displayed in DPSR and the buyer can then view the clauses, delete any non-mandatory clauses. When the buyer is satisfied with the clause validation, the contract clauses are saved to a file that is then automatically attached to the Oracle Purchase Order in the attachment form. These files are attached as a category "To Supplier" in the attachments form. The buyer then electronically collates, utilizing the MarkView technology, the three documents that have been individually created.

| Attachments - 3603			
		Main	
Seq	Category	Description	Data Type	M
0	To Supplier	PO 3603: Rev 0 - Supplier Document Se	MarkView Docu
.001	To Buyer	PO 3603: Archived Rev 0 - Draft Supplie	MarkView Docu
.002	To Buyer	PO 3603: Archived Rev 0 - Draft Cover S	MarkView Docu
1	To Supplier	PO 3603: DPSR file (Revision 0) 3603_0(	MarkView Docu

Attached to PO Header

Magnification 100%

Show MarkView Document   Associate MarkView Document...
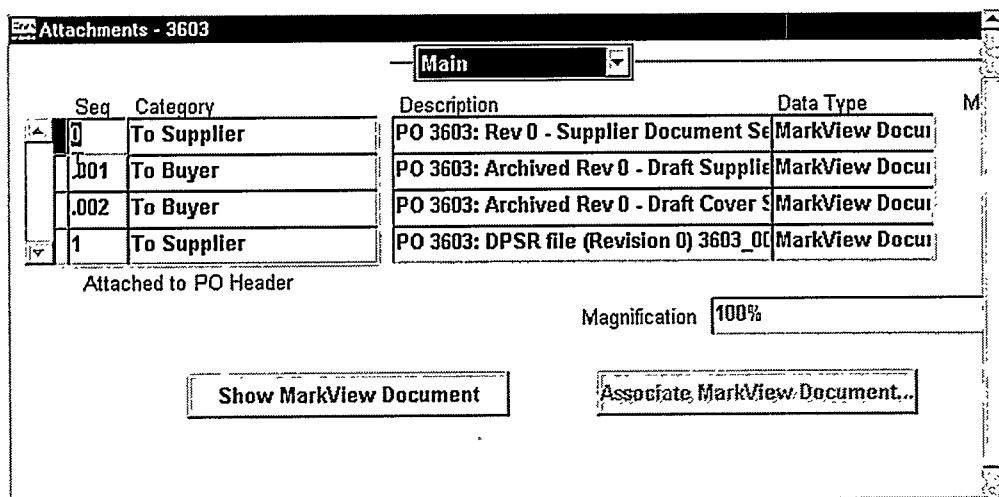
The buyer can now obtain any necessary Purchasing approvals. This is done by the approving manager who can access the document on-line using Oracle and applying the proper "sticky notes".   The manager also has the opportunity to have changes made prior to approval.
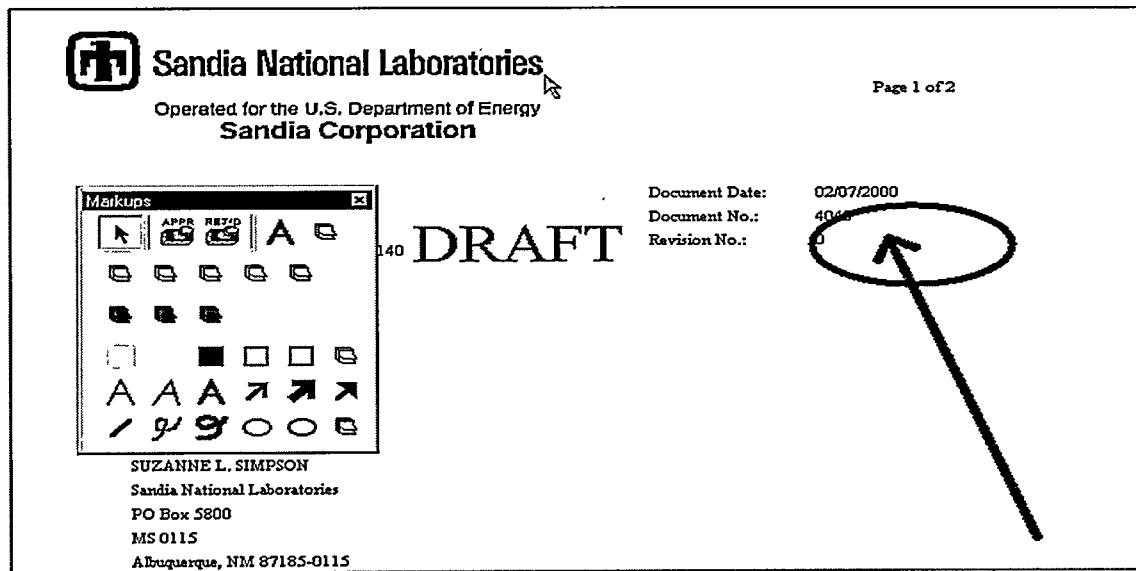
After the buyer has made all necessary changes to their document(s), the buyer approves the Purchase Order in Oracle. The buyer can then distribute the document set to the supplier, again using the Markview software. The buyer has the option to print and mail or fax the document set to the supplier. They just save to print or type FAX to fax to the number stored in the Supplier database.
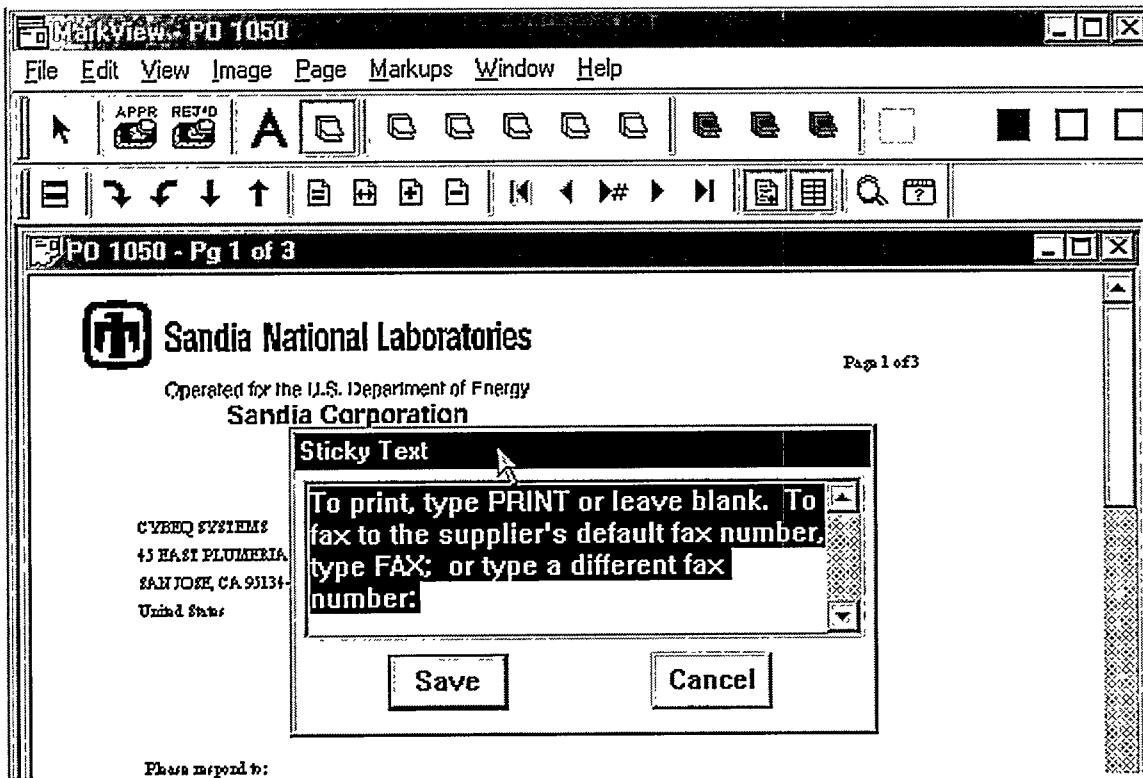
We configured our printing infrastructure to optimize this printing capability for our dispersed buying group. We are able to print throughout the labs including in both New Mexico and California. This process for creating and distributing a document set is critical to Procurement's success.

Now that we have releases and purchase orders in the hands of our suppliers, we needed to prepare for the auditors and for the administration of the contract. Procurement had long wanted to implement an imaging system for filing of purchase orders and associated documents. Utilizing the 170 Systems technology we are able to associate documents, in addition to the purchase order, with the transaction in Oracle. Documents, scanned or faxed, are categorized and automatically associated with the appropriate RFQ or Purchase Order section. The clerk is able to determine which section of the file the document should be stored in (based on our manual filing system and equal to tabs in a file folder). When an incoming fax is received, or a document is scanned and indexed, an e-mail notification is sent to the appropriate buyer that informs them which RFQ/Order and the corresponding file section in which the attachment can be viewed.

We expected to ultimately receive substantial cost savings associated with the elimination of filing paper documents and the required storage space. We also hoped to reduce the problems related to misfiling and the costs associated to retrieval of documents from files and archives. We now also realize that additional cost savings will be gained by reducing travel costs associated to audits. Purchasing, internal and DOE auditors are now able to view complete contract files on-line for both our New Mexico and California sites.

Finally, our Supplier, Requisition and Purchase Order data conversion effort went quite well because of proper planning. Had we not recognized early on in the Project that data conversion was going to be a significant task, this might have ended up in the Lessons Learned section. We did, however, start working on data conversion issues and began supplier and data cleanup almost a full year before implementation. We ended up converting 8532 suppliers, 190 requisitions, 5425 purchase orders and their associated lines, shipments and distributions. We decided early on that we would not convert receipts and only converted remaining balance on purchase orders to avoid overstatement of commitments and prevent overpayments to suppliers on converted orders. Probably the most challenging part of this conversion was associated with our accounting data. The line organizations were required to provide case to project mapping for all open orders. The file created from this mapping was then used to convert Requisition and Purchase Order Line Distributions.

What's Next

We expect to move to Oracle Version 11i in April 2001. With 11i we will incorporate the Strategic Procurement capabilities including all catalog functionality. The full integration of the Web Applications, Projects and Workflow will open the Oracle capabilities to all employees and our suppliers.

By the time of this presentation, we expect that our suppliers will have the ability to view and print their documents using the WebApps and Markview imaging capabilities.

Lessons Learned

Begin work on conversion and cleanup early, very early.

Have your training team begin documentation early so that critical resources are not overwhelmed at the time of implementation.

Involve your technical resources early in the project. Make sure that includes your technical infrastructure team.

If using a 3rd party vendor, go with their recommended architecture and utilize them in the area of their expertise. Begin planning and requirements definition early.

Minimize customizations. If you do make customizations, copy then modify, do not ever change Oracle code.

Keep current on mega patches. But take into account the impact on customizations due to mega patches. The customizations discussed in this paper take an experienced technical resource approximately one week to re-apply.

Minimize custom/ad-hoc reports. The data and the relationships, both inter and intra module, is difficult to understand thus making it extremely difficult to get consistent, accurate results.

Establish a minimum of three instances to work in during development of the project. Recommend: a development instance to do coding, a test instance, and a production instance

Oracle Hardware/Software Environment:

Oracle 10.7 SC
HPUX 10.2
OAS 3.0
OAS Netscape V2.01
Web Supplier 3.0
Web Employee 3.0
Listener
FTP for Internal Access
HTTPS for External Access
CD Jukebox
Database 8.0.5 using 7.3.4 code tree
Concurrent Manager
Markview Workflow
Markview Document Server
Markview Database Objects

JIT Hardware/Software Environment:

PCs running NT
Eltron Barcode Printer
Office '97
Excel (and Excel macros)
Netscape 4.6
Loftware Bar-coding Software
Eltron Print Driver
ICA file
Plug-in (for ICA file)
Dial-up Script
Network Configuration (IP addresses)
Accounts (system and user)
ODBC Drivers V4.0