

New York City Office of the Comptroller New York, New York

North America Excellence Award: Workflow, Gold

Executive Summary

New York City was experiencing record numbers of claims and contracts, and at the same time the resources allocated to processing them decreased. The New York City Comptroller's Office, with the assistance of its consultants Xerox and Universal Systems Inc. (USI), utilized imaging, workflow, and other client-server technology to enhance revenues and decrease operating costs.

NYC processes over 30,000 claims and incurs a quarter of a billion dollars in claim costs annually. Billions of dollars are spent on City contracts. The implementation of the Omnibus Automated Image Storage Information System (OAISIS) has significantly improved the work processes and productivity within the City's Office of the Comptroller to process contracts and claims. NYC plans on saving over \$20 million dollars by the Year 2000 using Document Management Technology.

Innovative Use of Technology

The following are examples of how technology was used in OAISIS:

- The scan system used automatic page detection which alleviated scan operators from manually setting page sizes.
- Barcode technology was used to further automate the indexing process.
- Daily mainframe downloads were used to further automate contract indexing.
- A graphical outline control was deployed to provide an easy graphical method for indexers to manage large batches of images.
- The import fax server alleviated the need for scanning fax paper into the system.
- OAISIS integrated a custom payment system along with imaging and workflow that generated about \$1 million in claim settlements per year.
- Softscan technology was integrated. Softscanning is the process of turning a document, such as a Microsoft Word document, into an image. This image is subsequently stored on optical disk and provides a permanent, unalterable record of the document. Integration of this technology removed the step of printing and then scanning.

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- The OASIS Wide Area Network (WAN) was created on the existing Information Technology infrastructure to support the bandwidth required for moving images across a network.
- The OASIS file servers employed a hard disk system to cache optical images. This provided very quick image response times for the most frequently used images.
- Engineering size drawings were integrated with OASIS. Documents larger than 11"x17" were imaged by the engineering scanning sub-system. Group IV Tiled TIFF was the compression format used.
- Photographs were integrated with OASIS. Photos of accident scenes were stored along with the rest of the electronic claim folder. JPEG was the compression format used.

Degree of Complexity in the Underlying Business Process and IT Architecture

There were numerous organizations from NYC involved. They include:

- Bureau of Law and Adjustment
- Office of Contracts/Administration
- Management and Accounting Systems
- Financial Information Systems Agency
- Office of Management and Budget
- Bureau of Accounting
- Bureau of Labor Law
- Bureau of Information Systems

OASIS was delivered to support all these NYC organizations. In addition, these organizations had sub-organizations. Because there were no business processing standards across them, the delivery of one seamless solution was complex. One of the many challenges that OASIS faced was re-inventing and standardizing how NYC worked.

For example, within the Bureau of Law and Adjustment, there were seven divisions. Even though each division processed claims, each processed them differently. What Xerox/USI did with NYC management was create one master method to manage claims electronically. Therefore, the way a Personal Injury claim is processed is identical to a Property Damage claim.

OASIS also had to deal with the existing IT infrastructure, such as:

- Enhancing the existing network to sustain the bandwidth necessary for images

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- Educating NYC MIS personnel who mostly had mainframe backgrounds
- Educating NYC end users who were primarily familiar with mainframe or DOS applications
- Educating NYC MIS developers with client-server development technology

Advanced Workflow and Imaging Concepts

OASIS employed Documetrix Workflow. Through the use of Documetrix Workflow the following automation was implemented:

- Automatic printing of Acknowledgment Letters. These letters are printed by OASIS automatically as soon as a claim enters workflow.
- Simultaneous routing of documents to more than one user
- Automatic removal of disallowed claims which unclutter electronic workflow baskets
- Joining of additional documents in workflow and the subsequent notification to all users who has the claim/contract in workflow. Thus if a medical transcript is sent by a claimant, the workflow system, in conjunction with OASIS, will join them together and notify the personnel working on the claim.

OASIS employed many imaging concepts. They include:

- Group IV TIFF - up to 8.5"x14" documents
- Group IV TIFF Tiled for large documents, such as e-size documents
- JPEG for photographs
- Network optimized for approximately 36,000 images/day
- WAN capable of supporting imaging
- Automatic page detection during the scanning phase
- Fax out and fax in technology; OASIS converted from fax format Group III to Group IV
- OASIS also supports the annotation of an image without physically modifying the original image. Annotations are stored as overlays to the image. Images can be viewed with or without the annotations. Annotations can be secured, prohibiting users from creating, modifying or viewing annotations. Printing of images with annotations is fully supported.

OASIS supports the following types of annotations:

- *Redlining*, to create lines to point to areas on the image that require referencing
- *Highlighting*, to highlight an area of the image that requires attention

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- *Post-it notes*, to create "sticky" notes that can be positioned anywhere on the page
- *Black-out*, to "black-out" an area on the image that should be kept confidential
- *White-out*, similar to "black-out", except the area is *overlaid* with a white block
- *Inline Text*, to create text that can be positioned anywhere on the image

Implementation Approach

NYC and Xerox/USI used a standard methodology for deploying all Documetrix Document Management Systems. It focused on customer intervention and feedback as the principle axiom. As Business Process Analysts and Integrators, Xerox/USI acts as a facilitator by collecting the requirements and desires of the users and developing alternative processes for enhancing worker productivity and efficiency.

The Requirements Verification and Process Reengineering Tasks were utilized to analyze and evaluate critical processes to enhance their productivity. The tasks associated with each phase of the project are listed below.

Project Tasks:

- Orientation/Kickoff
- Requirements Verification
- Process Reengineering
- Technical Design Specification
- System Development
- Site Preparation
- User Testing and Acceptance
- System Installation (includes: Acceptance Test, Documentation, Training)

The following discusses some of the details of the implementation process and methodologies.

Requirements Verification

The principal objective of the Requirements Verification task was to confirm the information contained in the RFP and determine whether any unidentified requirements or assumptions exist, and to resolve any open issues. This was a formal process during which USI studies the client's operations, procedures, and infrastructure. An important component of this process was interviews with representative client staff.

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During the requirements phase, USI personnel observed current procedures and discussed current and new procedures with the end-user and technical staffs. The Requirements Verification process helped USI gain an indepth understanding in areas such as indexing requirements (fields, sizes, and types), document relationships, user familiarity with GUI specific screen layouts, mainframe usage and processing, and other system interface requirements.

Upon completion of the Requirements Verification task, USI conducted a working session to review system requirements and objectives, provide input to the system design, and identify system constraints. The objectives of this session were to:

- Review proposal requirements;
- Identify additional requirements;
- Review system processes;
- Gain concurrence on an initial Logical Model; and
- Provide input into the Detailed System Design Specification.

System processes were discussed, relevant procedural documentation reviewed, sample documents collected, and workload estimates verified. This information provided USI with an in-depth understanding of the operational environment to design and develop the system accurately to meet NYC's needs.

The Requirements Verification Task is closely related to the Process Reengineering Task and provided it with pertinent process information. Some of the activities of these two tasks were performed in parallel.

Process Reengineering/Workflow Analysis

NYC recognized that the deployment of imaging, as an investment in technology, required the detailed analysis of the organization's business processes and current workflows. USI performed a high level process Reengineering effort for NYC.

USI system success in deploying new technologies is directly related to our ability to redesign our client's organizational workflow and the subsequent application of technology to achieve strategic objectives. The process utilized by USI is reflected in the following outline:

Workflow Implementation Process

- Current Processes
- Benchmarking/Best Practices
- Organization and Culture Assessment
- Technology Availability

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- Visioning
- Redesign
- Prototype Review/Testing
- Cost/Benefit/Risk/Analysis
- Migration Planning

Detailed Design

Specify

- Performance
- Output
- Structure
- Organization
- Culture
 - Current Flows vs. Reengineered
- Recognized Benefits
- Human Performance Gains
 - Transition
- Systems Content
- Short-term Opportunities

Process/System Building

- Empowerment/Process Preparation
- Organization Preparation
- Training Development
- Progress Monitoring
- Acquire Software/Technology
- System Construction

The detailed work processes developed provided the foundation for the redesign efforts during the Process Reengineering Workflow Analysis Task. Additionally, the detailed work processes provided NYC a measurement for the validation of the cost/benefit analysis performed for this application.

Reengineering:

- Eliminated/Streamlined tasks
- Eliminated bottlenecks and delays between steps
- Enabled work to be processed in parallel rather than serially

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- Provided simultaneous access to documents by multiple departments/people
- Provided greater control and security over the documents
- Allowed for quick, simple access to information, and
- Eliminated rework/retyping, while providing broader responsibilities

Resulting in:

- Improved productivity
- Reduced cycle time to complete work
- Reduced costs
- Improved customer service and public access, and
- Improved quality, accuracy, and consistency of results.

Technical Design Specification

Information collected during the Requirements Verification and Process Reengineering Tasks were used to develop the Technical Design Specification (TDS). The TDS included the following:

- Final version of the imaging hardware configuration
- Final version of the Detailed System Design (including the Database Design, Data Dictionary, Sample Screen Layouts, Menu Hierarchy, Information Flows)
- Project Completion Schedule (approved by the USI/NYC technical team)

The first step in the Technical Design Specification Phase was to gain formal acceptance and approval of the requirements and reengineered process specifications captured during the previous tasks. This acceptance was key to developing a successful system. Based on the original design concept developed in the Logical Model, USI developed a detailed Technical Design Specification that validated the system hardware and software architecture and system configuration for each Phase. This specification documented the application system inputs/outputs and system interfaces, database design (Entity/Relationship diagram), data dictionary, screen designs, indices, access methods, procedures, and processes, and report formats. Illustrations were provided detailing the hardware configuration, software components, and system links.

System Development

Upon acceptance and approval of the Technical Design Specification, USI began the System Development process. USI adopted NYC programmers as part of the development team. Assignments were given to NYC programmers in all aspects of Documetrix Document Management/Workflow development. USI's goal was for the NYC

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programmers to be self-sufficient in using the Documetrix product once the project was complete.

During the software development period, many prototype reviews were conducted at NYC to allow end users feedback on the system while it was developed. This hands-on interaction gave end users and managers an opportunity to become familiar with the system, and ensured that the functionality of the system clearly addressed NYC's requirements.

Change Management Process

OASIS presented a major cultural change. This is due to the fact that for the last 100 years, NYC operated under a paper-based data-distribution process.

To ease this transition period, many initiatives were put into place. These included:

- Involving middle-management and subordinates in the prototype reviews
- Providing forums for questions and concerns of NYC employees
- Meeting early on with the NYC Labor representatives to give an overview of the project to get their *buy-in*

As the implementation date drew near, NYC published newsletters and Xerox/USI/NYC provided extensive training on OASIS functionality.

Level of Overall System Complexity

Implementation of OASIS was very complex for a variety of reasons, such as:

- Intensive Requirements Analysis
- Integration of NYC developmental staff
- Volume requirements of claim/contract paper documents
- Remote site network connections
- Conversion of millions of records from the CIMS/CATS mainframe systems
- Interaction with other mainframe systems
- Graphical user interface that provided an intuitive look and feel

Requirements Analysis

Requirements analysis for OASIS started in August 1992. The claims application came on-line in August 1994. Xerox/USI along with NYC spent almost two years performing requirements, design, development, and installation.

Integration of NYC developmental staff

NYC developers were engaged as skills-transfer staff. One of the goals was for NYC to learn how to maintain, enhance, and develop new imaging applications. The NYC developers chosen as part of this task came from a mainframe background that presented a challenge to the Xerox/USI team to educate them in client-server developmental techniques such as SQL.

Volume requirements of claim/contract paper documents

The system needed to be sized correctly to handle the tremendous volume of paper that comes to NYC per year. NYC receives approximately nine million images per year, equating to about 36,000 images per day.

The massive volume of images proved a challenging effort in the development of the input sub-system along with storage of these images. It is a tribute to NYC and Xerox/USI that there is currently only a 24-hour backlog for daily, scanned images.

Remote site network connections

OASIS is accessible to many NYC locations. Most of the locations were in Manhattan. However, there were other locations in Staten Island, Brooklyn, and Queens.

The integration of NYC's communication resources (DOITT, Nynex, and BIS technology) along with Xerox/USI WAN experience proved a challenging network project. Today, all these locations are part of the Document Management System accessing the same optical resources. Most optical queries result in image display in under five seconds. The performance of the OASIS network, alleviates the old method of hand-delivering documents to these sites.

Conversion of millions of records from the CIMS/CATS mainframe systems

The following were some of the steps/issues that were addressed when Xerox/USI converted the mainframe database.

Mainframe Operations

- Discussed all mainframe preparations, to include:
- Storage space required
- Listing all jobs that interact with the mainframe system
- T-1 line preparation-the transference of data to the LAN

Extraction of Mainframe Data

- Extract format (comma delimited, fixed length)

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- Print the test scripts used to verify each extract
- Approximate storage space per extract
- Approximate time to export per extract
- Person/department responsible for running the programs
- Reports that were (or could be) developed to test the validity of data when imported into Oracle (such as the number of cases, sum all cases settlement amounts, number of cases per insurance company, etc.)

Transfer Mainframe Extracts to NYC LAN

- Allocate enough storage space on the Novell File Server for the mainframe extract files
- Allocate enough storage space on the RS6000 for the mainframe extract files

Create Oracle tables

- Identify the Oracle database size
- Print the control files per extract file
- Print the Oracle table creation scripts
- Print the Oracle index creation scripts
- Run the table creation/index scripts
- Load the extracts into Oracle using a Loader utility
- Verify data has been loaded correctly (log files)
- When validated, export the tables. Will be stored away for future/historical use.

Issues that were addressed

- Translation Issues, such as:
 - disposition codes, user identities
- Audit trails and history items that may be *archived*, and need to be reloaded
- Cleanup Issues
- Creation of statistical reports that previously operated on the mainframe.

Interaction with other mainframe systems

Both the claims and contract systems have been integrated with other NYC mainframe systems.

For example, OASIS generates all data associated with the payout of claims. However, NYC has a warrant system (IFMS) that produces the checks. OASIS has an automated job transfer server that sends vouchers

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to IFMS daily. The job server also receives information from IFMS that updates OASIS with information such as warrant creation date. OASIS averages over one million dollars daily.

Another example is the contract information comes from an NYC mainframe system called the Integrated Comprehensive Contract Information System (ICCIS). Each night information is downloaded from ICCIS to OASIS. This greatly aids the Contract Indexing process.

Other examples of integration include Integration with a Mainframe System for the:

- Parking Bureau
- Office of Management and Budget
- Human Resources Department
- Law Department
- Building Information System
- Department of Environment Protection

Graphical user interface

OASIS was tailored specifically to the needs of a large claims and contracts processing environment, with intuitive 'Tab' motif screens that resemble the file folders that users can easily relate to. Items that have been routed through the Workflow to a particular user are placed in an electronic basket. A variety of queue types can be chosen, such as a Manual Fetch Queue, in which users pull items from a public area; or Automated Queues which route documents to specific workstations based on decisions which the system can make automatically

Level of Integration with Other Advanced Technologies

OASIS integrated with many technologies. They include:

- The scan workstations are integrated with a separate SCSI hardware component that provides an automatic page detection mechanism which alleviates the scan operators from manually setting page sizes.
- Barcode technology is used to further automate the indexing process.
- A graphical outline control was developed to provide an easy graphical method for indexers to manage batches of images.
- Documetrix workflow was used to electronically route claim/contracts to system users.
- Automatic printing of Boilerplate Letters were integrated with OASIS.
- A Workflow device server was integrated.

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- Transfer of data between OASIS (client-server) to many NYC mainframe systems was delivered. Rumba was the mainframe emulation software integrated.
- Fax out technology was integrated.
- Fax in technology was integrated. This basically removed the scan step.
- Softscan technology was integrated. Softscanning is the process of turning a document, such as a Microsoft Word document into an image. This image would subsequently be stored on optical and provide a permanent, unalterable record of the document. Integration of this technology removed the step of printing and then scanning.
- Two 12" Sony Jukeboxes were integrated.
- Two Tricord Enterprise Novell File Servers were integrated.
- An IBM RS6000 database server was integrated.
- A wide-area network throughout the NYC area was implemented.
- A photograph scanner using JPEG compression was implemented.
- An engineering scanner was implemented using a compression format of Group IV Tiled. These are for paper that are up to E-size.

Scope and Scale of the Implementation

OASIS is designed to provide the City of New York with an Electronic Document Management System, utilizing document imaging and workflow processing technology to support contract registration and claims processing functions.

The OASIS scope included the following:

- Provided a Document Management Solution
- Replaced the paper-based claim files with image-based files
- Replaced the paper-based registration and storage of City contracts
- Replaced the Claim Information Management System (CIMS) mainframe application with a client-server database that includes CIMS functionality with the indexing and image management required for OASIS
- Replaced the Contract Administration and Tracking System (CATS) mainframe application with a database that includes CATS functionality with the indexing and image management required for OASIS
- Automated the workflow for claims investigation, approval, payment, and management
- Automated the workflow for contract registration and registration management
- Reengineered the entire claims and contracts processing activity

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- A Wide Area Network that allows the New York City Borough offices access to the Optical System
- Incorporation of The NYC Comptroller's MIS staff (primarily mainframe backgrounds) as part of the USI/Xerox Development Team.
- Interoperability with mainframe and client-server based systems.

There are over 200 users of the system throughout New York City, primarily consisting of users from The Bureau of Law and Adjustment (BLA), and The Office of Contract Administration (OCA).

Impact

Extent and Impact of Demonstrated Productivity Improvements

The New York City Office of the Comptroller has realized extensive productivity gains using OASIS. The number of new claim filings increased to record levels (The City is averaging over 30,000 new claims annually), while the number of employees has declined significantly. In 1990, before the system was implemented the Bureau responsible for claim processing had 142 employees. It currently has 93. This represents a total decrease in staff of 34 percent. During the same period, new claims have risen 13 percent over the same time.

Despite the severe decrease in staffing and the increased workload, since the system has gone into production, the active caseload has roughly halved. There are many reasons for this. OASIS is a powerful tool that NYC employees can use to efficiently complete their investigations, but what really helped was the system's ability to process many work items that previously had to be done by hand. For example, OASIS automatically closes out cases that have reached a particular statutory time limit. This used to be an extensive clerical task which always was behind and erroneously inflated current backlogs.

Immediately after OASIS implementation, management was able to redeploy ten employees who earned a total of \$300,000 annually to other areas of the Comptroller's Office. This worked out extremely well for the agency because it was a way to replace employees who had left City service because of early retirement incentives without productivity shortfalls.

But this is only part of the story. The system also has allowed management to use existing staff in better ways that have helped both to enhance revenues and control claim costs. For example, NYC was never able to find the resources in their paper-oriented operation to staff a unit totally dedicated to detecting and uncovering claim fraud. Not only have productivity improvements allowed management to create a position to coordinate fraud investigation operation, but the system has allowed them to uncover patterns of fraud and compare documentation in a way that they

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could never do using paper files. Since this one-person unit was created, the comptroller's office has identified over \$200,000 in claims that it did not need to pay.

In another instance, for the first time, the Comptroller's office was able to create a unit to develop claims against other parties that damaged City property. Instead of this office paying out claims only for damage for which the City may have been responsible, the City now has a source of revenue collection. Since the effort started, over \$180,000 in revenue has been collected.

The claims operation intention was always to settle personal injury claims at an early stage, however, resource shortages prevented management from implementing a program for early settlement. Analysis shows that if claims are settled before litigation starts, the average claim settlement is approximately halved. Using OASIS, the Comptroller was able to establish a pilot project where nearly 150 claims were settled at an early stage. Over \$1 million in settlement costs alone has been saved (this does not include further investigation and litigation expenses had the claims eventually gone into litigation). Based on the success of the pilot program, management plans to expand efforts in this area significantly.

The system performs many functions that were previously labor intensive and really subtracted from the quality and efficiency of investigations. Claims are now screened through workflow to determine if they have been filed in accordance with statutory requirements. Acknowledgment letters are generated automatically. Claims are assigned and routed to specific work locations automatically with little or no resource allocation. Status letters are automatically generated by the system for certain claim types, thus allowing the Comptroller's office to keep claimants informed of their claims two months, five months and one year from the date of their filing the claims. All this is done automatically by the system.

The system allows multiple users to process different aspects of the claim at the same time. For example, an electronic claim file is routed to the hearing division for hearing scheduling at the same time it is routed to a claim examiner for investigation. Both tasks can be accomplished simultaneously without the physical transfer of a paper file.

Workflow tools allow management the ability to schedule individual systematic claim review without a disruption to the investigation. Management can also see the entire claim process graphically and determine bottlenecks. Thus, additional resources can be deployed where they are needed without a management analysis of a particular process problem.

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Workflow allows management to modify business processes in real time. Users can streamline processes by essentially drawing a graphical line between two points on existing workflow models. Additionally, individual files can be transferred on line from one employee to another within seconds. This enables management to resolve immediately problems that arise in the course of business when an employee is out for extended periods or is reassigned to other tasks.

Claim files are now valuable investigative tools. There are no duplicate copies of documents and each document is indexed and sorted into a particular location in the electronic file. Users have access to "libraries" which contain incident reports that are systematically collected from other city agencies. These reports can be placed in individual claim files as appropriate.

The Comptroller's office has access to a number of city and state agency computer systems. The staff is able to automatically transfer images of these systems' data to a particular part of the claim file for permanent record. This has saved countless hours in additional processing time. Users have the ability to create documents in a word-processing application and, through a process known as "softscan," add the document automatically to the claim file and simultaneously print a copy out for mailing.

As a result of the nature of the system backup processes, the City will be able to withstand damage caused by fire or flood to claim files. Data that appears in files is secured in ways that are not available using paper files.

The staff's ability to respond to telephone inquiries, which represents a substantial part of a claim examiner's day has been greatly enhanced. A claim examiner can retrieve virtually any claim file within five seconds and is able to answer callers without an unreasonable delay or call back.

OASIS also captures images of all city-registered contracts. claim examiners can access and use contract information to investigate claims, specifically certain claims may involve losses due to a contractor's performance on a particular city job. The contract can be used to identify the availability of contractor insurance to indemnify, exonerate or defend the city.

Significant Cost Savings

Overall the City estimates that it will either save or generate revenues of over \$20 million over the next five years. OASIS has already:

- Saved \$300,000 in direct labor costs annually by redeploying 10 employees.
- Identified over \$200,000 in fraudulent claims.

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- Saved over \$2 million in settlement costs by settling claims early. This initiative was supported exclusively by OASIS.
- Saved over \$1 million annually in mainframe system support costs.
- Saved \$130,000 in storage and reproduction costs during the first year of operation.
- Collected over \$250,000 in affirmative claims.

Culture Change

Before the City implemented OASIS, they operated in virtually the same way as they operated prior to and during the twentieth century. They relied mainly on manual processes to deal with an ever-increasing workload. Before the system was put into production, only one personnel computer was assigned to the claims area. They were supported by a mainframe system that was not interactive and basically maintained data that was used to calculate the City's long term liability but gave little support to the claim investigation and settlement process.

The Bureau's files were located in approximately seven locations throughout the City. Much of their clerical resources were spent keeping track of and locating files. Only one person was able to work on a file at a time. When litigation started, the Bureau lost control over its own files, which were transferred to the City's attorneys. Three people were devoted exclusively to locating and preparing files to go to the Law Department.

The Bureau was running out of room to store claim files and they were susceptible to fire or water destruction. The lack of adequate file space caused the Bureau to keep them boxed in hallways and work areas. In fact, the file storage conditions made Bureau offices the backdrop for a number of television and film screenings (*Law and Order* and *Q&A*). Certainly it was not a great environment for employees to maximize production.

Most of the Bureau's efforts were devoted to moving paper files from one office location to another. There were no resources available to conduct fraud investigations, early settlement programs and affirmative claim actions. The ability to conduct a thorough and comprehensive claim examination was limited. The claim files themselves were replete with duplicate copies of every document and filed in a standard first in, last out order.

OASIS has empowered employees. They are no longer exclusively concerned with maintaining the paper file. They are now looking at claim files with a view toward settlement at an early stage, as well as conducting more in-depth and comprehensive investigations. Claim examiners were basically performing clerical functions before OASIS was implemented. Today they have the tools to conduct a professional claim investigation.

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Question 1 Describe the system application. What is the system used for, who are the users and what does the job entail? How often or how many hours is the system in use on a daily basis?

The Omnibus Automated Image Storage and Information System (OAISIS) is designed to provide the City of New York with an Electronic Document Management System, utilizing document imaging and workflow processing technology to support contract registration and claims processing functions.

To summarize briefly, the OAISIS project entailed the following:

- Provided a Document Management Solution
- Replaced paper-based claim files with image-based files
- Replaced paper-based registration and storage of City contracts
- Replaced the Claim Information Management System (CIMS) mainframe application with a client-server database that includes CIMS functionality with the indexing and image management required for OAISIS
- Replaced the Contract Administration and Tracking System (CATS) mainframe application with a database that includes CATS functionality with the indexing and image management required for OAISIS
- Automated the workflow for claims investigation, approval, payment, and management
- Automated the workflow for contract registration and registration management
- Reengineered the entire claims and contracts processing activity
- Integrated a Wide Area Network that allows the New York City Borough offices access to the Optical System
- Incorporated the NYC Comptroller's MIS staff (primarily mainframe backgrounds) as part of the USI/Xerox Development Team.
- Integrated mainframe and client-server based systems.

There are over 200 users of the system throughout New York City, primarily consisting of users from the Bureau of Law and Adjustment (BLA), and the Office of Contract Administration (OCA).

The system is in use from 7:00am-midnight. A second shift of City users working in the Central Imaging Facility (CIF) makes up the majority of the later hours.

Question 2. What were the key motivations behind installing this system?

The New York City Office of the Comptroller's Bureau of Law and Adjustment had been operating in an early twentieth-century business environment. Up until 1975, the office did not use computers for processing any claim work. Even when the first mainframe claim database (Claims Information System) was installed in 1975-6, its use was confined to keying in basic claims information. This was a duplication of work being done on the paper file itself. The improved system that followed the Claim Information System was another mainframe application known as the Claims Information Management System. This system involved more user input and increased the integrity of the claim numbering system. It also allowed for the monthly production of claim productivity statistics and form letters by division. It, too, required duplicating work which had already gone into the paper file.

The New York City Office of the Comptroller had a need for an integrated computer system that would allow the staff the ability to perform all their work at one terminal. The creation of software that permitted a multi-tasking work environment, the improvement in scanning technology and the use of workflow software all combined to enable the City to envision a new work standard. Combined, these technologies transformed the work environment and the product produced. The City had to find ways to perform its mission more efficiently and effectively, which translates to reducing upfront costs in the creation and investigation of claims to the final resolution and payment of claims at the best possible cost, involving the least number of work steps and staff necessary to accomplish the task.

With this scenario in place, the City could concentrate some effort in reducing its liability by analyzing the claim base for fraudulent claims. It instituted early settlement processes which traditionally involved less cost in settlement payouts, provided extracts of the database to other City agencies with collection authority to allow data comparisons that would identify claimants who owed the city money for one reason or another. The City could also aggressively seek affirmative claim situations whereby the City could recoup moneys when other parties were found liable for damage to city property.

Question 3. Please describe the current system configuration (number and type of software, servers, scanners, printers, storage devices, etc.)

NYC and Xerox/USI conducted a comprehensive review of the entire process of claims and contracts within the Comptroller's office. The new system needed to handle a multitude of documents in a range of sizes. In addition to meeting the current requirements, the system needed to interface with other city organizations, as well as various computer and database

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systems that were already in place. OASIS needed to be a comprehensive image and workflow management system, tailored specifically to the needs of the Comptroller's office and designed around the established information infrastructure.

NYC worked with Xerox/USI's engineers to make significant enhancements to the network in place so that it would be able to handle the tremendous increase in bandwidth that an image processing system demands. The OASIS WAN spans over five sites, with well over 200 users. Two Tricord Novell file servers are employed.

Software Used

Documetrix software was used to develop the Document Management System. The Documetrix solution is built upon an open systems environment client-server architecture. The open systems approach enables the support of a variety of databases (e.g., Sybase, Oracle, Informix, Ingres, etc.), a variety of networking environments (e.g., Novell NetWare, TCP/IP, Banyan VINES, Microsoft, LAN Manager, NT) or operating environments (e.g., UNIX, NT, Novell). The client-server architecture provides NYC with the modularity, scalability and flexibility that the client-server solutions can offer.

Documetrix is scaleable because it is based on a client-server architecture. Client-server architecture spreads functionality across separate servers to optimize the workload for the system. The open client-server architecture of the Documetrix solution enabled Xerox/USI to provide NYC with a solution that provides the core functionality as more applications are developed and come on-line. The following are the Documetrix software utilized.

Documetrix 2000 Server
Documetrix Desktop Client
Documetrix Workflow
Documetrix Workflow Client
Documetrix AutoIndex Server
Documetrix 2000 API
Documetrix Workflow API
Documetrix Scan Software
Documetrix/Teamworks Print Server

OASIS was tailored specifically to the needs of a large claim and contracts processing environment, with intuitive 'Tab' motif screens that resemble the file folders that users can easily relate to. Items that have been routed through the Workflow to a particular user are placed in an electronic basket. Any of a variety of queue types can be chosen, such as a Manual Fetch Queue, in which users pull items from a public area; or Automated

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Queues which route documents to specific workstations based on decisions which the system can make automatically. A series of device servers are present throughout the workflow which perform automatic processes such as printing acknowledgment letters and automatic removal of disallowed claims.

File Server Used

OAISIS employed the Tricord PowerFrame Enterprise server. This server has a 64-bit internal system bus that is transparent to all operating systems and provides a bandwidth of 267 Mbytes/second. This server is running Novell NetWare.

The Enterprise Server comes with ten PowerBus slots that are used to accommodate a dedicated MMS (Main Memory SubSystem), IMS (Intelligent Management SubSystem) processor, a slot is also used to accommodate the ISS (Intelligent Storage SubSystem) and a CCS (CPU/Cache SubSystem) leaving slots for expansion.

The SYS volume of the "Tricord" server is duplexed using two 3GB drives. The SCAN and CACHE volumes are configured on a RAID 5-disk array covering 9 of the remaining 3GB drives. The SCAN volume is 10GB, the CACHE volume is 11GB. The remaining two disk drives are configured as on-line hot spares which automatically get used in the event of failure of any of the other drives in the server.

The CCS provides high-performance multiprocessing. The MMS supports up to 1 gigabyte of 128bit ECC DRAM (most PC based servers utilize 64bit) can be installed on the MMS. All of the components on the PowerBus can access this memory at 267 Mbytes/second. The OAISIS file server is configured with 254 Mbytes of RAM.

The ISS (Intelligent Storage SubSystem) is Tricord's SCSI controller that dedicates an Intel microprocessor to handle disk I/O tasks. By utilizing a dedicated processor, the ISS typically offloads 90 percent of disk I/O processing which in PC based server platforms the CPU itself must handle. The OAISIS file server is configured with over 21 gigabytes of hard disk. With approximately 11 gigabytes used to store temporary scanned images, and eight gigabytes used for an optical cache.

Database Server Used

The OAISIS contract and claims applications use an IBM RS/6000 as the database server. The advanced RISC architecture allows the RS/6000 to support the OAISIS contract and claims applications. RISC computers feature low-level instructions, all of which are executed in hardware. For an RS/6000, the RISC hardware takes the form of a proprietary set of three chips. This RISC implementation combined with wide bus paths, high clock

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speeds, and large cache memories, provide OASIS superior database performance.

The RS/6000 runs the AIX multi-user operating system. AIX provides the benefits associated with UNIX, including standardization that eliminates worries about continued support for the product by IBM.

The architecture for the RS/6000 is the 580 model with 14 GB of RAID5 magnetic disk in two Data General Clarion disk subsystems. The disk size is based on Xerox estimates and experience and based on the complexity and size of the database. This is an estimate for three years' processing based on a table space of 12K per file for claims and contracts as well as an additional 2K per claim page and 20K per contract file for annotations. The 12K includes index as well as workflow data.

The unit is configured with an FDDI network interface card for attachment to the OASIS FDDI ring.

Scanners

The scan capabilities are extensive, with four main Bell and Howell 6338 top-of-the-line high speed scanners acting as primary source of document conversion, as well as several off-site scanners in various department including Legal, Engineering and the Hearing Department. High-throughput scanners are needed given that the average daily volume is 36,000 images per day. The scan workstations are configured with an automatic page detection mechanism that alleviates the scan operators from manually setting page sizes. In addition, bar-code technology is used to further automate the indexing process.

After the documents are indexed, they are injected into workflow. OASIS uses Documetrix Workflow to route claims and contracts electronically. Workflow allows documents to be routed and tracked across the Wide Area Network to various buildings throughout the city via several high volume T1 connections. An IBM RS-6000 acts as the database server, housing the Oracle RDBMS. Document archival is handled using one of two Sony Optical Jukeboxes, one for claims and the other for contracts.

Storage Devices

The purpose of an optical subsystem is to handle requests for images which are passed to it from the application. The optical subsystem is comprised of two SCSI interface cards installed in the Tricord server. Each of these SCSI controllers is attached to a Sony 930 jukebox. The subsystem is controlled by a series of NLMs which are loaded on the Tricord.

The subsystem receives and queues requests for data stored on the optical jukebox requested by OASIS workstations..

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Write Once Read Many (WORM) technology is used to provide permanent archival storage. The Documetrix software running on the server, controlling the optical subsystem is designed specifically for a multi-user imaging environment. Specific caching and addressing schemes have been developed to optimize throughput. In addition, as the OASIS requirements expand and the technology continues to evolve, new storage devices and media types are easily incorporated into the Documetrix platform via the incremental addition of document servers.

The jukeboxes are configured to support 12" WORM optical media. This size of disk was chosen because of the resulting capacity, performance and management characteristics. A 12" platter holds 6.4GB of data, 3.2 on each size as opposed to a 5.25" disk that holds 1.4GB, 700 MB on each side. The selected jukeboxes also have a faster disk-swapping mechanism, spin-up time as well as higher throughput than smaller media jukeboxes.

The claim jukebox is configured with three 12" optical disk drives and a storage capacity of 57 platters. The contract jukebox is configured with two drives with a capacity of 67 platters. The difference in jukebox configuration is a reflection of the differences in requirements of image data retrieval and storage between OCA and BLA. Contract's optical requirements are based on storage requirements rather than retrieval. Claims is based on retrieval first, storage second.

Workflow Server

The workflow server is the set of programs that "run" the workflow. The workflow server populates and maintains the workflow in-progress tables and the workflow history tables. In addition, the workflow server is responsible for distributing work items to groups of users or devices.

Fax Server

The fax server has the function of receiving or sending fax images. This allows Documetrix users to choose a page of a document and have it faxed. For example, users may select an image or a form letter (such as a request for information from a claimant/attorney) and have it faxed automatically without having to leave their desks. Additionally, having documents faxed-in alleviates the need for scanning them into the system.

Barcode Server

The OCR barcode server receives data containing barcodes needing recognition. A function to be performed is encoded into the barcode which the OCR barcode server can recognize. The barcode server can then decode the barcode and perform the encoded function.

The OCR barcode server is attached to the network and is dedicated to recognizing barcodes. The Documetrix software running on the barcode

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server is designed to work with most common barcode formats, such as code 3 of 9 or code 128. Xerox has barcode server products which support either code and has chosen code 3 of 9 because it is becoming a de facto industry standard.

OAISIS index information is encoded into the barcode. The OCR barcode server recognizes the information encoded into the barcode. During the scanning process a barcode sheet can be scanned along with contract and claim files. The barcode contains contract or claim document divider information. The barcode server then begins the process of indexing this contract or claim information into OAISIS. This reduces the amount of indexing information needed to be data entered during the indexing process.

Printers

Most print servers installed for OAISIS are those connected to a standard HP LaserJet 4 printer. A special board is required to allow the LaserJet 4 to print images at its rated speed of eight pages per minute. This board is an image decompression board which is installed in the expansion slot of the printer. The image decompression board has a standard parallel port on it which allows for a variety of connection methods for the printer to be accessible to OAISIS users. OAISIS has over two dozen print servers.

Question 4. How is this system integrated with the company's other information processing systems?

OAISIS had to be integrated with the existing infrastructure of NYC, to include not only the components on the Wide Area Network (WAN) but also other NYC mainframe applications.

WAN integration

The OAISIS WAN has been designed to support all users of the OAISIS imaging system using the most cost effective, highest performance components available in the market.

The Municipal Building at 1 Centre Street in Manhattan serves as the central hub for the OAISIS WAN. Communication lines from the Municipal Building to the satellite locations will service the connections to the imaging system from each of the remote locations.

The selection of communications link speeds and media is based on cost, performance and capabilities. The number of workstations at the remote location determines the speed and bandwidth required for acceptable response times on the imaging system. The preferred method of connection of all workstations is through the use of media that can support the highest speeds. For OAISIS, the preferred method of connection of remote sites is through a hard-wired (fiber) link that will support

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communications at Ethernet speeds (10 Mbps). Xerox will use this capability where it exists, between the Municipal Building and the Comptroller Engineering/Real Property offices at 2 Lafayette Street. Fiber cable has been installed between the buildings and sufficient strands are available for OASIS use.

Barring the availability of existing communications lines capable of supporting the OASIS protocols (IPX and IP), installation of one or more lines has taken place. Installation of fiber optic links between the Municipal Building and the remote locations would be the optimum method of connection of all sites. These lines can support high speed and bandwidth communications and are not subject to monthly payments or as susceptible to outages or performance problems. Unfortunately the installation of dedicated fiber links is extremely expensive and often logistically impossible because of the path the fiber must travel from point to point.

The most frequently used remote transmission technologies include dedicated T-1 and fractional T-1 lines. These lines are available in increments of 56 Kbps up to T-1 speed which uses a speed of 1.544 Mbps. These lines are available from NYNEX through CityNet. The initiation of such a line requires a one time installation charge and a recurring lease cost for monthly usage of the line. The use of dedicated leased lines provide a more stable means of data communications than dial-up lines

One large aspect of OASIS was to use the existing network infrastructure as the basis for the Document Management System. To this end, OASIS was built upon the existing network of NYC to create the WAN. The success of the OASIS WAN integrated with the existing network can be attributed to the teamwork environment between Xerox and NYC.

Mainframe integration

Both the claims and contract systems have been integrated with other NYC and New York State mainframe systems.

For example, OASIS generates all data associated with the payout of claims. However, NYC has a warrant system Integrated Financial Management System (IFMS) that produces the checks. OASIS has an automated job transfer server that sends vouchers to IFMS daily. The job server also receives information from IFMS that updates OASIS with information such as warrant creation date. OASIS averages over one million daily.

Another example; the contract information comes from a NYC mainframe system called (ICCIS). Each night information is downloaded from ICCIS to OASIS. This greatly aids the Contract Indexing process.

Question 5. Describe how the company has been impacted by this system. Be as specific as possible: What productivity improvements have been realized? How has the business workflow been affected (compared to before system implementation)

OASIS has made a dramatic impact at every level of processing claims in every division. It has transformed traditional workflow concepts into graphically mapped and logically linked tasks and flows. There are many templates that cover the entire spectrum of claims processing. Workflow allows for instantaneous modification of any divisions task or flow for maximum efficiency and effectiveness.

The system, for the first time, allows management the capability to measure and quantify staff productivity. It allows management the ability to maintain workflow and intercept bottlenecks before they become insurmountable problems. OASIS provides a complete claim processing environment from the intake and coding of new claims to the disposition, settlement and payment of claims. In the event of a disaster, the entire system is backed up and can be restored to a disaster recovery site to allow the continuation of work.

Statistical analyses of the claims database have improved significantly with OASIS. The system is open and modifications such as other new applications can be integrated into the work environment with minimal cost.

In sum, OASIS has transformed the New York City Office of the Comptroller's Bureau of Law and Adjustment into a twenty-first century claims operation.

Question 5A. What cost savings of increased revenues have been realized since the system was first installed?

Immediately after OASIS implementation ten employees who earned a total of \$300,000 annually were redeployed to other areas of the Comptroller's Office. A unit was created to develop claims against other parties that damaged City property. A pilot project was implemented to claims at an early stage.

Question 6. Describe the implementation process and methodology, the project team and any change in management and business process reengineering issues addressed.

NYC and Xerox/USI used a standard methodology for deploying all Documetrix Document Management Systems. It focused on customer intervention and feedback as the principle axiom. As Business Process Analysts and Integrators, Xerox/USI acts as a facilitator by collecting the

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requirements and desires of the users and developing alternative processes for enhancing worker productivity and efficiency.

Requirements Verification and Process Reengineering Tasks were utilized to analyze and evaluate critical processes to enhance their productivity. The tasks associated with each phase of the project are listed below.

Project Tasks:

- Orientation/Kickoff
- Requirements Verification
- Process Reengineering
- Technical Design Specification
- System Development
- Site Preparation
- User Testing and Acceptance
- System Installation (includes: Acceptance Test, Documentation, Training)

The following discusses details of the implementation process and methodologies:

Requirements Verification

The principal objective of the Requirements Verification task was to confirm the information contained in the RFP and determine if any unidentified requirements or assumptions exist, and to resolve any open issues. This was a formal process during which USI studied the clients' operations, procedures, and infrastructure. An important component was interviews with representative client staff.

During the requirements phase, USI personnel observed current procedures and discussed current and new procedures with the end-user and technical staffs. The Requirements Verification process helped USI gain an in-depth understanding in areas such as: indexing requirements (fields, sizes, and types), document relationships, user familiarity with GUI specific screen layouts, mainframe usage and processing, and other system interface requirements.

Upon completion of Requirements Verification task, USI conducted a working session to review system requirements and objectives, provide input to the system design, and identify system constraints. The objectives of this session were to:

- Review proposal requirements;

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- Identify additional requirements;
- Review system processes;
- Gain concurrence on an initial Logical Model; and
- Provide input into the Detailed System Design Specification.

The Requirements Verification Task is closely related to the Process Reengineering Task and provided it with pertinent process information. Some of the activities of these two tasks were performed in parallel.

Process Reengineering/Workflow Analysis

NYC has recognized that the deployment of imaging, as an investment in technology, required the detailed analysis of the organization's business processes and current workflows. USI performed a high-level process reengineering effort for NYC.

The process utilized by USI is reflected in the following outline:

Workflow Implementation Process

- Current Processes
- Benchmarking/Best Practices
- Organization and Culture Assessment
- Technology Availability
- Visioning
- Redesign
- Prototype Review/Testing
- Cost/Benefit/Risk/Analysis
- Migration Planning

Detailed Design

Specify

- Performance
- Output
- Structure
- Organization
- Culture
- Current Flows vs. Reengineered

Recognized Benefits

- Human Performance Gains
- Transition

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- Systems Content
- Short-term Opportunities
- **Process/System Building**
- Empowerment/Process Preparation
- Organization Preparation
- Training Development
- Progress Monitoring
- Acquire Software/Technology
- System Construction

The detailed work processes developed provided the foundation for the redesign efforts during the Process Reengineering/Workflow Analysis Task. Additionally, the detailed work processes provided NYC a measurement for the validation of the cost/benefit analysis performed for this application.

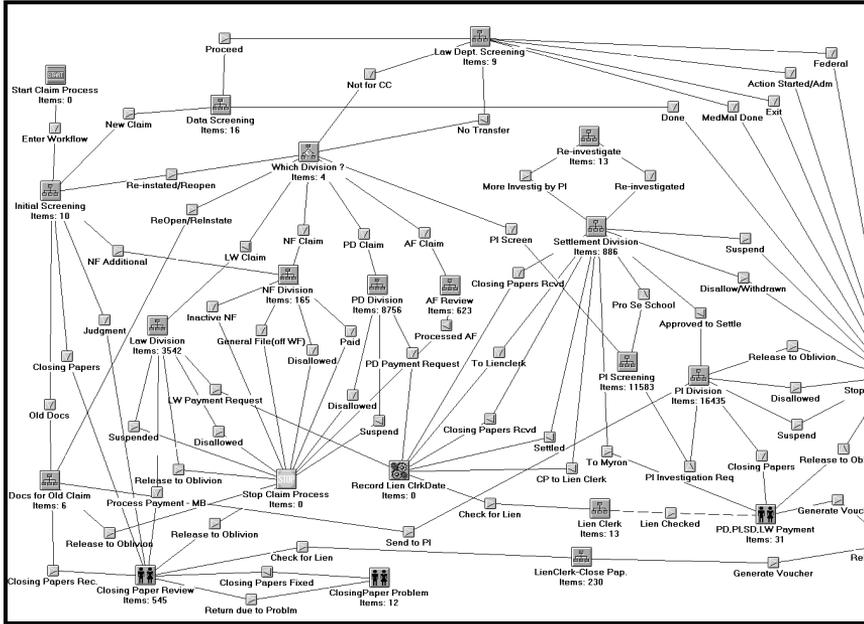
The benefits of this reengineering included:

- Eliminated/Streamlined tasks
- Eliminated bottlenecks and delays between steps
- Enabled work to be processed in parallel rather than serially
- Provided simultaneous access to documents by multiple departments/people
- Provided greater control and security over the documents
- Allowed for quick, simple access to information, and
- Eliminated rework/retyping, while providing broader responsibilities

Resulting in:

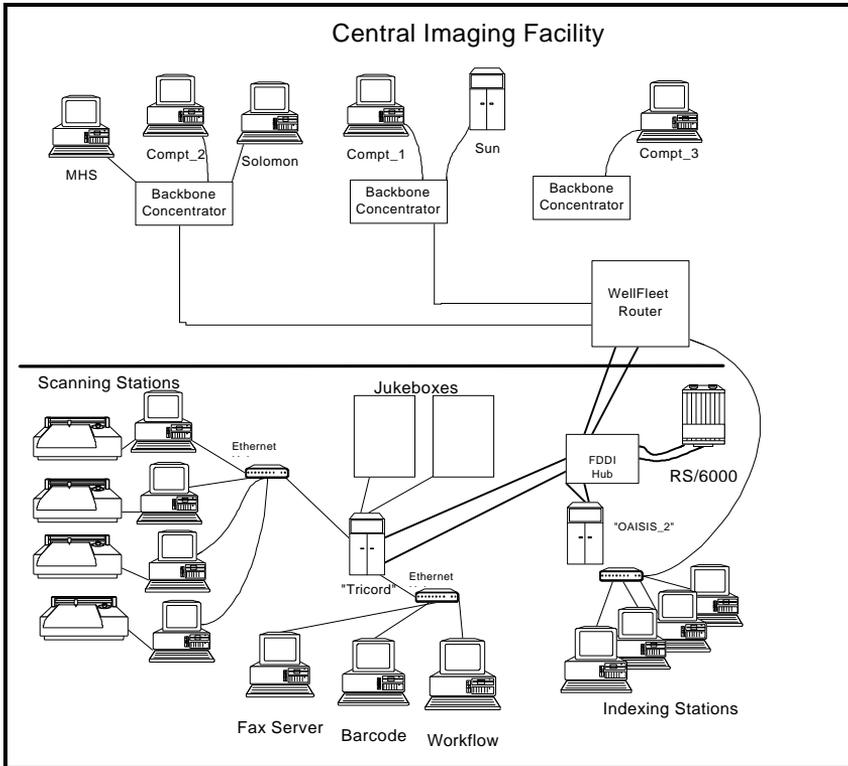
- Improved productivity
- Reduced cycle time to complete work
- Reduced costs
- Improved customer service and public access, and
- Improved quality, accuracy, and consistency of results.

OAISIS Diagrams



OAISIS Top Level Claim Workflow Template

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OASIS Municipal Building Network located at 1 Centre Street

OASIS Wide Area Network Locations of New York City

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