The ORION Project: Staged Business Process Reengineering at FedEx

By: James W. Candler, Prashant C. Palvia, Jane D. Thompson, and Steven M. Zeltmann

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Abstract:
Technical innovation, process reengineering, and organizational adaptation of the ORION project are described.

Article:
Obsolete and rigid business processes have rendered many large organizations inefficient and inflexible. In fact, many of the recent problems of inflexibility and turmoil in large corporations can be attributed to the complexities and pathologies of size and outdated processes. In an attempt to acquire strategic and competitive advantage, many large organizations are searching for organizational simplicity. Organizational simplicity can be reintroduced to complex organizations through a radical reengineering of their business processes. The radical reengineering of business processes, commonly referred to as *business process reengineering* (BPR), has been the subject of several recent articles and books [3–6, 8, 9].

Michael Hammer [8] defines BPR as the use of the power of modern information technology to radically redesign business processes in order to achieve dramatic improvements in performance. The premise is to depart completely from the existing ways of doing business or conducting functional activities and to focus on the most effective ways of performing the "business process." While the rethinking of systems and procedures is not an entirely new concept, modern advances in information technology give it new importance and potential for change [6]. Significant organizational changes can be achieved by combining the power of information technologies with business process redesign [4]. The renewed emphasis on BPR supports Keen's [10] notion that a new focus of information technology is to create organizational health through the design of adaptive, responsive, and flexible organizations.

In their search for organizational simplicity and responsiveness, Federal Express Corporation has effectively utilized new and modern information technologies in the reengineering of some very significant business processes. One of the BPR projects being pursued at Federal Express is the Optically Recorded Information Online Network (ORION). ORION is an excellent example of the synergistic fusion of technological and process innovation in the pursuit of organizational simplicity, flexibility, and responsiveness.

ORION was conceived in response to the increasing inability of alternative methods (paper, microfilm, microfiche) to cope with the massive employee documentation requirements of an ever-increasing worldwide work force, currently at over 90,000 employees. ORION provides the ability to scan paperwork and store digital images on optical disk. However, ORION is substantially more than an archiving system. For example, ORION:

- eliminates virtually all manual data entry through the innovative use of modern scanning technologies,
- provides secured and instant access to documents worldwide, and
- allows bidirectional transfer of documents traditionally handled as hard copy to and from an image database.

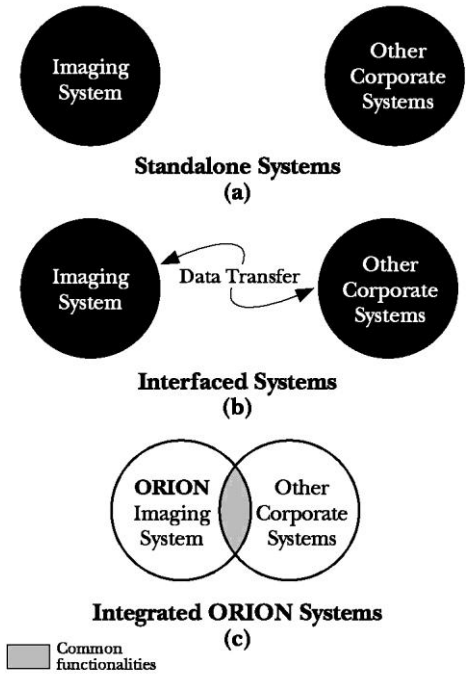

Figure 1. ORION's Integrated systems concept

The ORION project, while significant in concept and scope, is a realistic implementation of the emerging wisdom on the application of BPR. The intense interest in BPR has led to myths and unrealistic expectations. Davenport and Stoddard [5] explore several such myths and note that high expectations and ensuing frustrations have contributed to the failure of many promising reengineering efforts. They go on to say that BPR is not synonymous with total organization transformation; at best it involves the transformation of a few work processes. ORION's scope is consistent with this pragmatic observation and includes the document-handling processes within the human resources division of Federal Express.

The ORION description in this article embodies two elements: the technical innovation itself and its adoption in an organizational environment ([18, 19]). ORION's technical innovations are discussed in the next two sections to provide a basic understanding of the technical aspects. It is important to note, however, that the project did not dwell on technology per se; ORION was conceived and implemented in order to effect a comprehensive reengineering of organizational processes. The project team understood the possibilities offered by newly emerging technologies and utilized them effectively for process redesign. The third and fourth sections describe the process reengineering aspects; subsequent sections describe specific organizational benefits and key factors for ORION's success.

Technical Overview

Archival storage of paper documents is massive and their processing inherently slow. The concept of the "paperless office," therefore, is an attractive option to organizations. Yet its implementation to date remains largely elusive. Complete process automation by the elimination of paper documents now appears to be highly improbable. The fact that many organizations have invested in imaging systems may constitute as further evidence that the concept is currently untenable.

However, major steps can be taken toward this goal. ORION is a good example of a properly conceived and implemented project that can be a major contributor to the quest for the "paperless office." ORION recognizes that document imaging and electronic signatures will not totally negate the need for paper documents. However, once created, these documents can be converted to their electronic forms and all subsequent processing can be "paperless" and increasingly automated.

The weaknesses of paper-intensive processes include the time delays and errors associated with the *physical movement* of paper, not just the existence of the paper itself. Whether across the room or across the globe, the electronic, instantaneous movement of documents eliminates many of the negatives of paper processes while preserving the benefits provided by paper documents.

Many document-imaging projects under way today fail to recognize the full power of imaging technology because of a limited perspective. The ORION project team, while well versed in technology, did not allow this familiarity to obscure the mission of reengineering the process. The team fully examined the goals of existing organizational processes from the perspective of optimizing them. This approach allowed the team to exploit technologies to a level previously not conceived. In their effort to provide maximum ease of use and functionality to their constituents, the project team developed an integrated systems approach in designing ORION. The result is a user-friendly and functional system that either eliminates or vastly simplifies many unwieldy manual processes.

Integrated Imaging Systems

There are three primary approaches to the creation of imaging systems (see Figure 1). Most computer-based imaging systems are standalone systems, which replace manual archive systems. Standalone systems can provide compact storage of huge numbers of documents, typically by utilizing optical disks. These systems can also serve as an efficient means of locating documents through the use of computer-based indexing schemes and direct-access storage devices. In fact, these two benefits are the primary attractions of the vast majority of computer-based image storage and retrieval systems in use today (see Figure 1a).

More advanced computer-based imaging systems have interfaces with other corporate systems, which provide for the *inter-system transfer of data*. Each of these systems functions independently, but they have the capability to work together in specific ways. For example, an imaging system capturing accounts payable documents might have access to accounts payable data files (such as an authorized vendor list or other vendor masterfile data). These advanced systems can automate some clerical duties and provide various checks before an image is committed to disk (see Figure 1b).

The most advanced computer-based imaging system is designed as an integrated system to work with one or more other computer-based systems (see Figure 1c). Such is the case with ORION. ORION is integrated with the Federal Express corporate human resource (HR) system. This HR system was described in detail in [13]. The advantages of an integrated system are numerous:

- The operation of the imaging system is “seamless” with other systems within the integration. The imaging component appears as just another system feature to the user. ORION’s technology is “behind the scenes” and transparent to the user.

- Data is stored in system databases and accessed directly, and need not be transferred between systems. There are no delays and no multiple protocols to be invoked.

- Another advantage of single system-wide databases is enhanced data integrity. Data integrity includes minimization of data redundancy, improvement of data maintenance, and elimination of multiple versions of data.

Functionality

The ORION system is completely integrated with the corporate human resources system. In effect, ORION has “image-enabled” the HR system. ORION’s function is to record, store, and disseminate electronic images of HR documents to and from authorized parties as determined by the HR system. Integration between ORION and corporate HR applications is so effective that there was no need to modify existing security and audit features to control and monitor ORION activity.

ORION appears as a "document-handling" application of the HR system. The user makes all document requests to the HR system. Completely transparent to the user, these requests are translated internally by the system (i.e., by the intersection slice in Figure 1c) into ORION requests. These requests are then executed by ORION with appropriate storage or dissemination actions.

Process reengineering has allowed ORION's functionality to go significantly beyond simple document storage and retrieval. For example, ORION can transmit images to and receive them from any facsimile machine through use of the common carrier network. Images can also be transmitted to and received from image-capable workstations on the company's global telecommunications network and can be printed on image-capable network printers. ORION is also designed to work with local-area net-works (LANs) that have access to the global network.

The Stages of Reengineering in ORION

The reengineering effort in ORION is pragmatic and realistic. Prevailing myths and anecdotal remarks ([8, 9]) suggest that process reengineering calls for total organizational transformation and obliteration of existing processes. Davenport and Stoddard [5] observe that while these myths have rhetorical power, they are fundamentally false. In accordance with this pragmatic perspective, ORION was planned to have a three- stage development path, the stages corresponding to anticipated technology acquisitions by Federal Express. Each stage introduces higher levels of reengineering into the process. Currently, most organizational subunits are at the end of the second stage, and pilot implementation of the third stage has begun.

	Customers	Input	Output	Indexing scheme	Network
STAGE 1 30,000 character-based terminals	Individuals local	Prism Document scanning centralized	Fax Local printers	Manual entry	SNA/ SDLC
STAGE 2 20,000 character-based 10,000 GUI	Individuals local Organization	Prism GUI Document scanning centralized and Fax inbound	Fax Local printers "Glass Fax"	Manual entry Some electronic OCR (not from paper)	SNA/ SDLC
STAGE 3 2,000 character-based 28,000 GUI	Individuals local Organization Global	Prism GUI Inbound Fax Inbound GUI	Fax Local/remote printers "Glass Fax" Windows appl. Total GUI integrator	Minimal manual entry Some electronic OCR (not from paper)	X.25 packet switching

Figure 2. Factors contributing to the staging of ORION

Several factors contributed to the staging of ORION (Figure 2). First, a computer network capable of transmitting high-volume image-based traffic is required to fully utilize ORION's capabilities. The size of a typical image page (averaging 40KB) is too large for the current character-based network to handle. The second factor was the lack of wide availability of networked computer terminals with a graphical user interface (GUI). GUI terminals, configured to process high-resolution electronic document images, are now being positioned within the company to support projects of corporate-wide and global impact. ORION is one such project. Finally, staging has allowed designers and implementers to effectively plan for the massive change caused by the reengineered processes. This strategy has allowed the organization to keep the scope of change manageable at every stage, both organizationally and technologically.

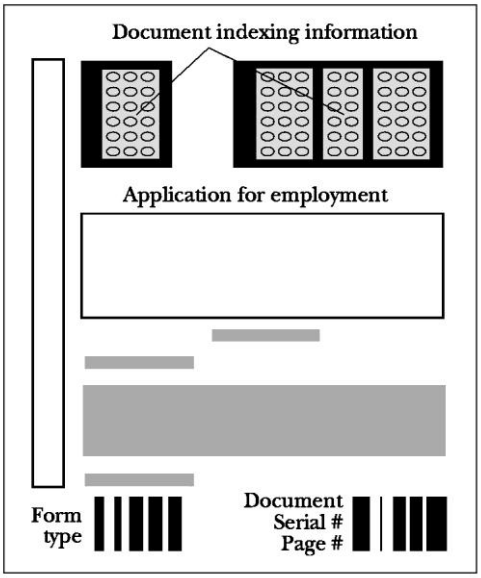

Figure 3. ORION "auto indexing" and mark sense

The completion of the third stage will maximize process change and yield optimal global effectiveness. At this stage, LANs will be able to support high-speed, high-volume, synergistic wide-area links. With expanding networking capabilities, ORION will be positioned to take full advantage of the move to a client/server architecture with its LANs, GUI terminals, and access to the high-speed global network. The process changes introduced in each stage are summarized in the following subsections.

The Three Stages of Input

Stage 1 is global in scope, but due to network delivery constraints, volume is low. The 35,000 character-based terminals process requests for documents with-in the ORION database, which contains over 7.5 million page images. User access is gained via the HR system. Because documents are delivered via relatively slow facsimile gateways, the number of pages per request is limited to 10. This constraint is alleviated by the display of all relevant image indexes on the character-based terminals. The user can browse through the indexes and select the appropriate documents. Even the low-volume delivery capability of stage 1 is viewed by users as a dramatic improvement over traditional systems.

Stage 1 document input takes place primarily through a central scanning facility. High-speed scanners are used to input documents into the image database.

Stage 2 is enhanced by the existence of a larger number of terminals with GUI capability, but still constrained by the lack of an image-capable wide-area network. GUI terminals fitted with facsimile boards can directly transmit and receive images to and from the image database. Images are displayed on the PC monitor and printed only if necessary. The term "glass fax" is used for GUI terminals equipped with facsimile boards. Although a low-volume system, this capability offers the user the first step toward electronic browsing of actual document images. This browse capability provides a window into the paperless environment of future image systems.

Stage 2 document input can be made directly from user GUI terminals or facsimile machines in addition to the central scanning facility. User access to the image database is still controlled through the HR system. Accepting inbound document images eliminates many document movement constraints. Inbound documents with auto-indexing capability are handled completely without operator intervention (to be discussed in the Document Indexing subsection).

Stage 3 takes full advantage of the image-capable network. The wide availability of GUI terminals and the ability to deliver images rapidly through the upgraded network greatly increases system effectiveness. Document input takes place primarily through GUI terminals, though previous methods are supported as needed. Workflow management issues can now be widely addressed, *since a document needs to exist in paper form only at its source.* Thereafter, the document is available in electronic form. The pitfalls of physical document movement are completely eliminated. Moreover, the document image is available at multiple locations at the same time to facilitate simultaneous processing.

The Three Stages of Output

Stage 1 ORION relies on the relatively slow but reliable fax machines to deliver documents to requesters. The processing of document requests via any of the 35,000 character-based terminals on the global network enhances this ability. Although not capable of transmitting document images, the existing network serves quite well as a processor of requests and as the deliverer of status information. These functions are accomplished by linking the character/record-oriented database with the image database. In essence, ORION "image-enables" the existing character-based system. Using this concept, document image requests are processed from any user and presented to the image system for retrieval and subsequent delivery via fax machines. From the user perspective, the character-based mainframe HR system is the source and the delivery mechanism of the document.

In addition to the automated transmission of documents to facsimile machines, users can also have documents printed at the central facility.

Stage 2 supports paperless image delivery directly to GUI terminals with facsimile boards, in addition to the traditional paper-based facsimile and central facility delivery.

Stage 3 takes full advantage of the large GUI terminal population and the high-speed image-capable network. Most document images are delivered directly to GUI terminals in stage 3. Facsimile is still supported but infrequently utilized, as is the central imaging facility. Users throughout the world can securely browse through images contained at the central site and selectively request transfer to local storage.

The Three Stages of Document Indexing

The **Stage 1** indexing scheme for document images is primarily manual. Documents are centrally scanned and then viewed in electronic form by an operator. A simple index including document type, date, and employee number is appended to the image within the database. This index is stored with the record-oriented database as well as with the image database. When the record-based HR application processes an output request, it passes the index to the image server. The image server then delivers the image.

Stage 2 begins automatic indexing through forms redesign and enables process reengineering. The redesigned Auto Index-capable form is shown in Figure 3. This form contains preprinted bar-coded information at the bottom to determine form type, serial number, and page number. Context-specific information is entered by the user as "mark sense" data. Mark sense is the current best technology for providing machine-readable data with the human hand as the sole input mechanism. While redesigned documents are automatically indexed, older documents are permitted and are indexed manually.

In **Stage 3**, the redesigning of documents should be complete. All indexes are automatically generated from the image. No preprocessing of documents is required before they are committed to image. Mark sense and barcoded information is automatically "lifted" from the electronic version of the page and appended as a character string to both the imaging database and the record-oriented database. This means that no human intervention is required at any point subsequent to the original document input.

In conclusion, the three stages of ORION uniquely position the system to take full advantage of emerging technological advances in telecommunications, networking and workstations. Through careful planning of the

stages and sound implementation strategy, ORION can put these improvements to work without delay. Constantly pushing the envelope but never exceeding practical limits, ORION provides a glimpse of how businesses will manage work flow in the future.

The Reengineered Process and its Characteristics

Reengineered processes have far-reaching consequences that are not always easily quantifiable. It is worthwhile to note, however, that reengineered processes offer huge leaps in productivity not possible with other management approaches (e.g., the total quality management approach [7]), and that they yield significant strategic advantages [9, 16]). The following summary review demonstrates the significant manner in which work-flow process is altered with a full-scale implementation of ORION. While specific organizational benefits will be examined in subsequent sections, the strategic implications of the enormous process change should be apparent.

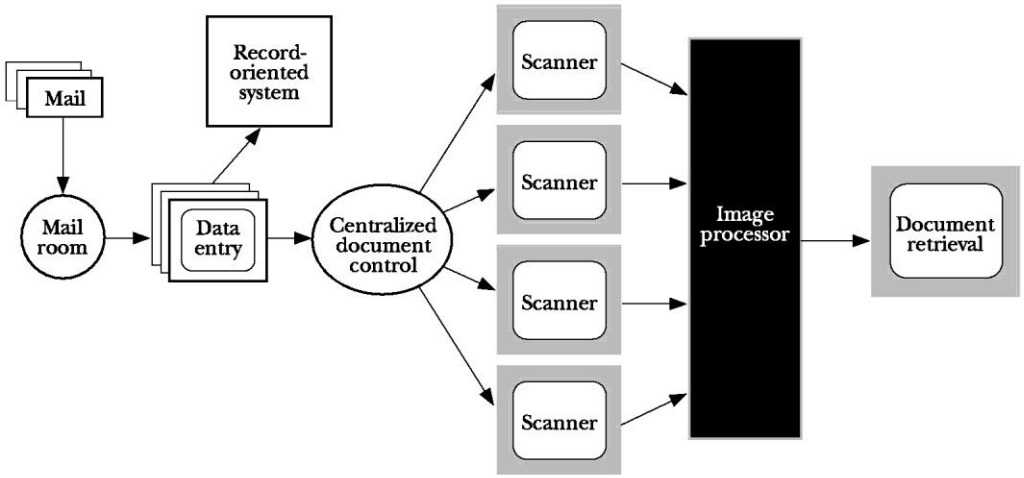

Figure 4. Non-reengineered work flow process

The traditional approach to paper-based work-flow management is to handle work serially and to "hand off" work from one workstation to the next. This approach is inherently slow and error-prone, because each subprocess must wait its turn; interactions between subprocesses are minimized because they slow the process even further. Necessary documents are often "in process" and cannot be quickly located; some documents are lost and never emerge from the process; and backlogs may build up at each stage of the process.

One way to employ imaging technology is to speed individual steps of the work flow. However, this approach is suboptimal, as it does not address the entire work flow. To optimize the process, the entire work flow must be reengineered. In fact, the emerging literature on imaging emphasizes the importance of reengineering the work flow [1, 12, 17].

Figure 4 shows the early use of imaging technology (before stage 1) at Federal Express. This non-reengineered environment has little effect on existing processes. Paper documents arrive in the mail room, where they are sorted and key data is entered by data entry personnel into a record-oriented system. Documents are then forwarded to a centralized document control office, where operators scan the documents, creating the image database. Typically, the documents are retrieved from the image database by a centralized staff pool. The non-reengineered process has replaced paper and microfilm methods of storage primarily with optical scanning. Benefits such as faster document retrieval, reduced storage space, and longer document life are achieved, but little changes in the way work is accomplished.

Figure 5 shows the reengineered process that will be in effect at the end of stage 3. In the reengineered process, documents enter the system from any of a number of sources. Documents can come directly from fax machines, glass faxes, and image-capable workstations (GUIs) via the corporate network, or they can be entered through

the central facility. Along with the images, ORION automatically obtains character-indexing data using mark sense and barcode technologies. ORION images are retrievable directly via glass faxes and GUI terminals without having to be committed to paper. Images are also available through fax machines in situations where appropriate terminals are not available. Operator intervention is required only for handling exceptions or error conditions.

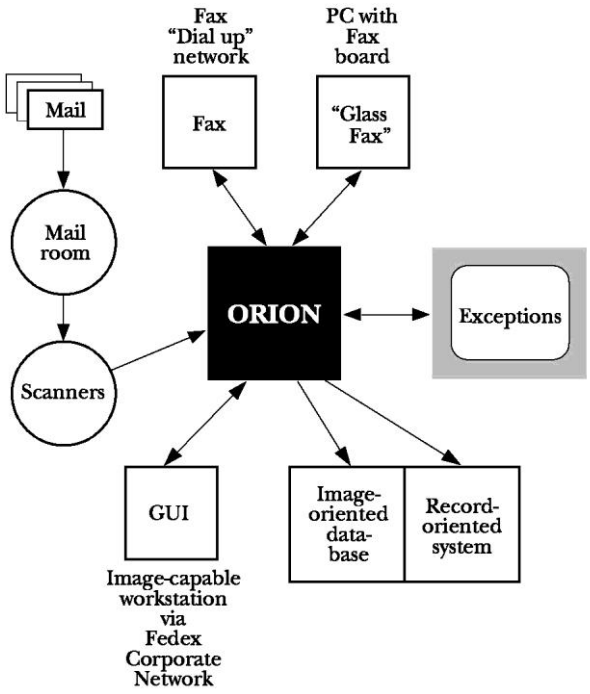

Figure 5. Reengineering work flow process

The reengineered work-flow process provides quantum benefits. Almost all data entry tasks are eliminated; all work is automatically sorted and assigned by system-determined priorities; and many tasks can proceed simultaneously. Electronic backup copies of documents are maintained to an extent that was not possible before. Stacks of documents are gone, and the misplacing of documents is eliminated. Documents are available instantly on demand. These benefits have decidedly had a strategic impact on organizational functioning.

Based on our experience with ORION, some generalizable principles of BPR stand out. Most important, as underscored before, BPR does not necessarily require starting from a "clean slate" or total organizational transformation [5]. Such was not the case in ORION; each stage of ORION built on the strengths of the previous stage, and transformation was aimed primarily at the HR function. Further, the new process capitalizes on many of the principles advocated by Hammer [8]. For example, the process is organized around outcomes and not specific tasks; information is captured once, at the source; decision-makers who use process outputs perform much of the process; traditionally sequential tasks are performed in parallel; and geographically dispersed resources are used synergistically to maximize resource utilization.

Organizational Benefits

ORION benefits can be divided into five categories: productivity improvement, financial benefits, ad hoc business applications, security, and government regulation.

Productivity Improvement

ORION improves productivity in many ways. The system virtually eliminates misfiling, loss, and destruction of documents. The need for most HR paper files is eliminated, since documents are always electronically available and paper versions can be easily generated. Staff is no longer required to maintain the paper files. Moreover, optical-based imaging provides for a much longer document life-span than does microform or paper.

A substantial improvement in productivity is realized due to secured and worldwide online access to millions of documents. The paperless environment allows direct access to a document with no wasted time or lost opportunities while trying to locate a document, copy it, and deliver it. User anxiety is reduced because a document can be easily located whenever the need arises.

Financial Benefits

Typically, innovative systems are justified based on "qualitative value" alone, and not on "quantified dollars." The value of ORION has been demonstrated by the many qualitative benefits discussed earlier. It is unusual for a system with the potential strategic impact of ORION to be cost-justifiable from a traditional accounting perspective, but such is the case. ORION has saved the company millions of dollars in labor and equipment costs. It has reduced current document management costs by over 20%. The current savings in storing and delivering the massive documentation required by the federal government alone is about $1.7 million annually. When all HR documentation is converted into electronic image form, the annual savings will top $3 million. Further, an additional annual $1/2 million savings is expected with the completion of automated form indexing. Finally, the physical storage space savings is estimated at $100,000 annually.

In summary, the project team estimates that the expenditure in ORION will be recouped within three years using cost savings alone, and with the long life of the system, benefits will be reaped well into the next century. But, as the next section explains, the investment will actually be recovered much earlier.

Ad Hoc Business Applications

While ORION was developed to support current HR processes, it is turning into a platform investment that can enable many new and creative business applications. For example, the personnel division recently signed a new contract with an unemployment claims processing vendor. The vendor was provided improved communication and documentation retrieval support by the secure use of ORION and the HR system. As a result, the estimated savings in taxes paid and favorable decisions in unemployment claims is over $3 million per year. Other profitable applications are constantly being sought or discovered. Further, it is expected that ORION's success will be emulated in other functional areas of the company.

Security

Security is cumbersome in both paper-based and microform-based systems. In both, a document can be removed and utilized in its stored form. Accordingly, both methods require secured storage. ORION, on the other hand, requires only the traditional mainframe computer controls. ORION's optical disks require specialized equipment and software, rendering them much less usable to unauthorized personnel. Furthermore, documents are retrieved far away from the physical storage media and are accessed through the host HR system, with its existing security provisions. Very few individuals ever come into physical proximity to ORION storage hardware.

A critical aspect of security is disaster recovery. An effective disaster recovery plan requires the maintenance of an exact duplicate filing system. Disaster recovery ranges from poor to fair with paper-based and microform-based filing systems. For these systems, the creation and off-site storage of duplicates is expensive and time-consuming. Then there is the critical problem of the delay between document creation and secured archiving, which places recently created documents at risk. ORION eliminates these problems. Exact duplicates are created *at the same time* as the original images. Any document available through ORION is also available through archive backup, including the very last document. This duplication, necessary for disaster recovery, is the only data redundancy in ORION and is achieved at the minimal cost of storing an additional set of optical disks.

Government Regulation

Government regulations require a staggering amount of documentation for any large business. This is especially true if the federal government also happens to be a customer. More than two million of the four million documents targeted for the ORION database exist due to government regulations. Without ORION,

maintenance of these documents would put Federal Express in a precarious position. The increase in staff alone would cost an estimated $1.7 million, and the document retrieval times would become simply unacceptable.

Key Factors for Success

Several factors have been critical to the success of the ORION project. Any organization considering the application of imaging technology for BPR should carefully review these factors in light of their own needs and circumstances.

Project Sponsors

Major innovations, such as BPR projects, require senior executive sponsorship for protection from unpredictable pitfalls and risks—a champion serving as a visionary who can identify opportunities for innovative uses of technology. The champion also provides organizational and financial commitment for the project [4]. According to Rockart [15] and Boynton et al. [2], this leadership role is best filled by a senior line executive.

In ORION's case, the project sponsor is a line managing director who reports directly to a senior vice president. The sponsor has the strong support of the senior vice president. The sponsor has expertise in both line functions and information technology. This distinctive combination has given him the unique capability to constantly push technology to its limits for business advantage and yet never exceed practical limits.

The literature also describes the role of an operating sponsor, to implement new technologies and management systems [20]. The operating sponsor addresses short-term issues and is often a senior manager well versed in technology and system development. The operating sponsor for ORION is a managing director in an information systems (IS) division with responsibility for projects that run the gamut from day-to-day and short-term development activities to long-term business-critical applications. The executive sponsor and the operating sponsor have forged a close working relationship and work as a team to shape the direction of HR systems.

IS Support

While the leadership in reengineering efforts is provided by senior line executives, the role of the IS department should be that of an enabler and facilitator. This is consistent with Davenport and Stoddard's observation [5] that IS must relinquish its leadership role in reengineering projects. So much of the business process lies outside the IS domain that reengineering should not be under the control of the IS function. The best scenario is to have a solid working partnership between IS and the direct managers of the process, as was the case with ORION.

Seamless Integration

In order to achieve the full potential of the imaging technology (or any major new technology), it is imperative to integrate it with existing or newly engineered business processes and computer applications. ORION is tightly integrated with the HR system, so that the user interfaces only with the HR system; the connectivity to the ORION system is completely transparent. Such seamless integration enhances service levels and responsiveness and provides the basis for organizational effectiveness [14]. The trend toward integrating imaging systems with existing applications and the benefits of such integration have been noted by Mann [11].

Staged Development

By definition, BPR introduces massive change in an organization, as opposed to incremental changes [3, 4, 8, 9]. The management and implementation of massive change is difficult, if not insurmountable, for many organizations [5]. A staged development and implementation approach can alleviate these difficulties. ORION's staged development allowed smoother management of change, as well as periodic evaluation of risks and implementation of corrective actions.

Additionally, the nature of emerging technologies itself is a reason for staged development. New technologies, such as the imaging and telecommunications technology used in ORION, create organizational turbulence for

two reasons: The technology itself continues to evolve, and the impact and consequences of the technology are unpredictable.

The concept of staged development is different from both the systems development life cycle and prototyping methodologies. In staged development, each stage is essentially a complete implementation of the technology. Each subsequent stage builds on the previous stage and utilizes newer technology as appropriate. Continuous learning occurs at each stage, leading to the refinement of future stages.

Technology Review and Readiness

An important aspect of technological innovation is a constant review of technology to keep current with the latest developments. In fact, Davenport and Short [4] recommend the identification of information technology levers as an explicit step in their five-step BPR methodology. Computer, communications, imaging, and other information technologies are changing and advancing at exceptional rates. This change makes it necessary for project sponsors to continually identify and evaluate new products as they become available. At times, it might even be necessary to seek specific products unique to project needs, or to encourage vendors to develop such products. The ORION development team proactively sought new and relevant technologies.

Network Infrastructure

A mature network infrastructure is necessary to take full advantage of the imaging technology. Imaging offers advantages even with existing telephone networks. However, for greater impact, the key technological pieces include a high-bandwidth telecommunications backbone network, smart terminals/PCs/workstations, enforcement of network protocols and standards, and appropriate network software.

The telecommunications network used by Federal Express is one of the largest in the world. Originally designed for the COSMOS customer package tracking application, the network has adequate capacity to handle traffic from other applications, such as the HR system. Plans call for expanding the use of fiber optics and implementing the X.25 packet-switching network protocol. The multifold increase in capacity and quality of the network will ideally suit future ORION applications.

Additional Factors

Several other factors are critical to BPR and innovations in technology. For example, corporate culture has a strong influence on the conceptualization and implementation of process and technological innovations. The corporate culture must encourage innovation (group and individual), tolerate risk-taking, be farsighted, and be willing to empower employees.

Another factor is high initial investment. Systems like ORION require significant investments in technology and considerable effort in development, maintenance, and refinement. The associated costs can be forbidding unless the organization is financially sound.

Other critical factors include user friendliness of the system and the need for the system to operate at high levels of availability and reliability.

Conclusions

This article has described the Federal Express ORION project. Federal Express has experienced impressive improvements in organizational flexibility and responsiveness by reengineering the way it disseminates, processes, stores, and retrieves HR documents. The success of this project has far-reaching implications for other processes and systems within the company.

The Federal Express design team used a staged approach in designing the project, which allowed the company to manage huge amounts of change as well as to embrace new and emerging technologies. The ORION project exemplifies the value of an IS strategic perspective and a design staff that can creatively exploit an organization’s emerging technologies without being disillusioned or myopic. A primary reason why this project

was such a success is that the design team never lost sight of its goal: to create an optimal document processing system. Technology was not adopted only for its own sake or for its ostensible benefits, but was innovatively exploited to create a truly unique corporate resource.

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