PROFITING FROM WASTE PREVENTION: MEASURING THE BENEFITS

A Report to the

Alameda County Source Reduction and Recycling Board

by

Community Environmental Council, Environmental Planning Consultants, Global Futures

December, 1999

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EXECUTIVE SUMMARY

This report is the second in a series of projects to identify, describe and evaluate the measurement of benefits derived from waste prevention activities implemented by businesses, industries, and institutions. Specifically, the study provides details on waste prevention mechanisms implemented by retailers, achieved through changes in transportation packaging, and through expanded use of electronic communication. The study also identifies challenges faced by these businesses and institutions in attempting to implement these activities.

Waste management professionals generally evaluate waste prevention benefits based on reductions in the amount of waste collected and disposed. However, there are much larger savings from a reduction in the amount of materials used to produce a product or deliver a set of services, and even greater savings from a reduction in resources consumed in the production of the product or the delivery of the services.

Profiting from Source Reduction

The first report in this series, *Profiting from Source Reduction*, presented a set of measurement tools, including both county-wide (macro-level) and company specific (micro-level) measures. Four key measurement tools were identified. The measurement tools are 1) basic source reduction cost analysis, 2) productivity modeling, 3) resource productivity, and 4) waste intensity. These measurement tools focus on *materials use costs*, rather than *materials purchase and disposal costs*. These measurements are designed to help businesses reduce the amount of materials required for production, while maintaining or enhancing the services they provide.

Basic source reduction cost analysis identifies the purchase price and disposal cost reductions resulting from source reduction activities. Productivity modeling systematically examines changes in labor and materials cost resulting from reductions in materials handling requirements. Resource productivity measures the production or service output created for each material, labor or other input used. Waste intensity measures the amount of waste generated per unit of production or service provided.

As an example of the micro-level measurement, the study contrasted the costs of white paper purchase, disposal, recycling and waste prevention. The report identified that disposing of a ream of white office paper costs only about $0.13, while recycling that ream may yield a value of as much as $0.25. The cost to purchase that paper is about $2.50, or 10 times its value as a waste material. However, the most significant waste prevention savings are derived from the time saved by not transferring information to paper. A savings of about $25.00 per ream of paper used is achieved through reduced labor requirements.

The report also identifies savings from reducing packaging waste by the retail industry in the way clothing is packaged for shipment to and displayed at stores. The report describes the soft-lines de-trashing program of Target Stores. For every 100 shirts shipped, the report identified a disposal cost reduction of 32%, packaging materials cost savings of 83%, and labor cost reduction of 83%. Similar savings have been achieved throughout the business sector, by companies looking to improve their bottom line.

The first report also identified potential reductions in the amount of wood required to construct new housing. For an average home, efficient design, better planning and management of raw materials, can reduce: 1) the amount of wood waste disposed by as much as 76%, a savings of about $325 at $25 per cubic yard, 2) the amount of wood needed for construction by as much as 35%, a savings of over 5,000 board feet, and 3) the cost of labor to use the wood by 63%, a savings of over $5,000 at an average labor rate of $20 per hour.

Finally, the report identified recommendations for further research. The report recommended that Alameda County identify additional target industries for analysis, identify diversion strategies specific to these industries, identify barriers to improvements in source reduction, identify mechanisms to promote source reduction, identify economic benefits, identify implementation strategies, continue to provide technical assistance to businesses, and disseminate information about successful source reduction activities.

Profiting from Waste Prevention

This second report, *Profiting from Waste Prevention,* provides information on three elements of commerce. In addition to the descriptions of these model programs, detailed measurement of the cost benefit of the waste prevention activities is provided. Where the data are available, the measurement of savings includes the benefits per unit of product delivered, or the savings in labor for delivery of services.

This report describes:
1) benefits from standardization in the retail sector ordering practices,
2) benefits of changes in use of transportation packaging, and
3) benefits from increased use of electronic information delivery.

SECTION 1. Waste Reduction in the Retail Industry

The retail industry has introduced a series of guidelines to increase efficiency in the delivery of goods from suppliers, through distribution centers and stores, and on to customers. These procedures are designed to speed up the flow of merchandise from the supplier to the sales floor, to reduce merchandise handling, and reduce space requirements. They have the added benefit of reducing waste generation. These tools include the application of Universal Product Codes, Electronic Data Interchange, Quick Response technologies, and the Voluntary Interindustry Commerce Standards (VICS) Association Floor Ready Merchandise (FRM) Guidelines.

This section introduces the efforts of one retailer, Federated Department Stores, Inc., to streamline the flow of merchandise through their retail "pipeline." By implementing the VICS FRM standards throughout their divisions, Federated Department Stores was able to balance the cost of purchasing additional equipment and training staff, with savings realized from getting merchandise to the sales floor in less time, with less handling, and less wasted materials.

The report provides an overview of the industry-standard hanger specifications program, the process of implementing the hanger specification program from Federated's corporate headquarters, to the regional distribution center and a local Macy's West store. The challenges

and results of implementation are presented to provide information that other companies might employ to reduce wastes and operating costs.

Through the application of these tools, Federated Department Stores and their Macy's West store at Southland Mall in Hayward, have been able to significantly reduce handling time and costs associated with moving merchandise from suppliers, to their distribution centers, to their retail locations, and to the sales floor. These actions have reduced the amount of wastes generated.

SECTION 2. Waste Reduction in Transportation Packaging Systems

Transportation packaging refers to the cartons, crates, pallets, skids, wraps, ties and totes that manufacturers use to ship products to their customers or between operating facilities. Because of its sheer volume, manufacture and disposal of transportation packaging has become environmentally significant. There is increasing concern over the amount of wood required to manufacture pallets, crates, packaging paper, paperboard, and cardboard.

This section analyzes pallet and cardboard case use by Granny Goose Foods, Inc. at their headquarters facility in Oakland, California[1]. It provides an evaluation of the resource intensity of the transportation packaging systems used to get the company's product to their distributors and direct sales retailers. About 70% of Granny Goose Foods' products are delivered to distributors who directly stock store shelves. The remaining 30% of products are shipped to direct sales retailers who stock the shelves themselves.

The resource intensity of the distributors' part of the system is much lower than that of the direct retail sales part of the system. Distributors return about 96% of the pallets used to ship product to them, compared with a return rate of about 75% from direct sales retailers. Additionally, a much larger portion of the pallets returned by distributors are reusable. The result is that for Granny Goose Foods, the cost for each pallet shipped to a direct sales retailer is four times as high as the cost for each pallet shipment to a distributor.

In addition to the pallets returned which are immediately reusable, some pallets must be repaired before they can be reused. Other pallets are too badly damaged to make repair a cost-effective alternative. These pallets are discarded and end up as mulch from the wood grinding operation at the Davis Street Transfer Station in San Leandro. Also, many of the pallets returned by the direct sale retailers are not the same pallets originally shipped to them and might not be reusable by Granny Goose Foods. Pallet losses are partially offset by the receipt of pallets from product vendors that supply Granny Goose Foods with production materials for making their products.

Granny Goose Foods has a rebate and incentive program to encourage the return of cardboard product cases from their customers. Despite the success of their cardboard rebate program, Granny Goose Foods still uses cardboard boxes that have an average life of five trips before they have to be replaced. Use of a more durable product shipping container has the potential for further reducing costs and waste generation.

[1] After this Case Study was prepared, Granny Goose Foods decided to close their Oakland facility. However, this study still provides insight into the savings that would have been achieved if this project had gone forward.

Two alternatives to further reduce cost and waste from elements of Granny Goose Foods' transportation packaging system, are described at the conclusion of this Section.

SECTION 3. Reducing Paper through Technology

Several years ago, the concept of a paperless office was believed to be just around the corner. The reality thus far has been quite different – we are using more paper than ever before. With the increased use of computers, paper consumption has gone up, not down. It is easier now than ever before to create and print documents. However, there are technologies available – hardware and software – that could move us closer to a paperless office by reducing the need for forms, creating electronic files, and producing and routing memos, manuals, and reports electronically. This report provides an overview of trends in paper-reducing technology and a series of case studies of the application of these technologies in both the public and private sector.

New technologies such as email, the Web, and Intranet are not replacing existing systems, they are adding on to the flow of information. We need new ways to handle and process the vast amounts of information received each day. Electronic document management technology such as scanning, electronic storage, computer output to laser disk (COLD), imaging, and retrieval systems can reduce reliance on paper, improve efficiency and productivity, improve quality, and reduce costs.

The electronic document business is now well developed.[2] There are several trade associations and a large number of hardware, software, and consulting businesses that specialize in creating and implementing these technologies. The number of companies and public agencies that have implemented various paper-reducing technologies is growing also. Most of the companies and agencies did not implement these technologies solely to reduce paper use, and in most cases, paper reduction was only one of the benefits. The potential benefits from improved efficiency, better customer service, reduced storage space, reduced errors, and reduced distribution costs far exceed the waste reduction benefits of decreasing paper consumption. While there are some efforts to measure the paper reduction and other impacts of these technologies, measurement is not systematic or well developed. Typically, those benefits or costs which are most easily calculated, or which are already calculated by the business for some other purpose, are quantified and highlighted. As long as the benefits of the system outweigh the costs, there is no attempt to do a detailed assessment.

Private companies ranging from large manufacturers like General Motors to a small bank, St. Johns, have realized significant savings with electronic filing systems, imaging, COLD technology, and Intranet report systems. The Southern California Water Company utilized an Intranet reporting system for accounting and other internal reports and saved $80,000 a year just in reducing distribution costs.

Silicon Graphics expects savings of $2.1 million one year after implementing an electronic system for reports and ordering. EVEREN Capital Corporation improved customer service and eliminated microfiche with their COLD system.

[2] There are many organizations and businesses described in this report. Their inclusion here does not represent an endorsement by the author or the Alameda County Source Reduction and Recycling Board.

Public agencies have also realized huge benefits with electronic systems. The Defense Finance Accounting Service was able to cancel a $680,000 a year microfiche contract and eliminate $100,000 a year in courier costs when their reports were available through an Intranet system. The New York Office of the Comptroller implemented an electronic workflow system for claims and was able to reduce staff from 142 to 93 while increasing the number of claims processed. They also were able to identify false claims more easily. The University of California, Irvine has reduced paper consumption by 7.3 million sheets per year through a variety of programs.

Not every story is a complete and instant success. There are costs and time involved with implementing these technologies and it takes significant effort and commitment on the part of staff at all levels. Alameda County Social Services Agency has been unable to implement a promising technology that would reduce 100,000 sheets of paper a month and the filing of that paper because they do not have the time or resources to resolve implementation issues. To smooth the implementation of new technologies, businesses and agencies must carefully evaluate the needs of the new system, the current flow of paper and information, and the ideal flow of information (with or without paper). Ideally, information technology staff or vendors should work closely with the users of the new system to identify issues and concerns such as access to information, data reliability, viewing reports, training, and access to adequate equipment. The technologies are available and there are significant opportunities for businesses and agencies to reduce their reliance on paper and to reduce costs.

SECTION 4. Findings and Recommendations

The study provides details on waste prevention mechanisms in the way retailers do business, through changes in transportation packaging, and through use of electronic communication.

Federated Department Stores realized significant labor and cost savings by eliminating the multiple handling of garments that were shipped from vendors on hangers that were not of the quality and size to be displayed on the sales floor. Adopting the floor-ready merchandise guidelines allowed Federated to get garments to the sales floor, ready for display, more quickly. Eliminating the below standard hangers meant that the vendor no longer had to purchase non-approved hangers. The return and reuse of the hangers reduced the cost of using the higher quality hangers. Other changes in shipment of clothing from vendors to Federated further reduced handling and warehouse space requirements, and reduced handling by Federated staff at both the distribution center and individual stores.

Granny Goose Foods implemented a financial incentive program to recover a higher percentage of the product cases shipped to distributors and retailers. The rebate on cardboard cases, saved them about $0.25 per box returned to them for reuse. This program has eliminated the purchase of approximately 7,500 boxes per day. At about 3 pounds per box, the purchase of over 10 tons of fiber per day is avoided. This program saved the company over $1,730 per day in the purchase costs of boxes. Granny Goose Foods encourages distributors and direct handling vendors to return their pallets to them for reuse, but no incentive program has been implemented.

Computers have made it easier to create and print documents, so paper use has actually increased as new technologies have developed. Technologies are now available – hardware and software – that could move us closer to a paperless office by reducing the need for forms, creating

electronic files, and producing and routing memos, manuals, and reports electronically. Electronic document management technology such as scanning, electronic storage, computer output to laser disk (COLD), imaging, and retrieval systems can reduce reliance on paper. These technologies can also improve efficiency and productivity, improve quality, and reduce costs. The potential benefits from improved efficiency are better customer service, reduced storage space, reduced errors, and reduced distribution costs. These benefits far exceed the waste reduction benefits of decreasing paper consumption.

Next Steps

Studies of waste prevention practices that have already been implemented by Alameda County businesses provide insight into the labor and resource savings that can be achieved, and potential for additional reduction in the amount of materials being disposed of to landfill. The identified practices are not generally implemented by businesses to reduce waste collection and disposal costs, but rather to operate more efficiently. Reducing the amount of materials consumed reduces the amount of waste generated and the cost of buying the materials. But the primary savings to the business are in reducing the labor costs associated with handling those materials.

For example, the efficiencies gained by transmitting data electronically are significant, especially when these costs are compared to the costs of printing and then distributing documents. By changing our focus to show the benefits of the efficient use of materials, these Studies present a much more compelling waste reduction message to businesses than identifying how much that can reduce the costs for disposal of their wastes.

Waste management industry professionals have often promoted increased business efficiency on the basis of avoided disposal costs. However, for most businesses, avoiding disposal costs has a very small impact on the cost of doing business. The cost of buying new paper is approximately ten times the value of that paper when it is recycled, and as much as 20 times the cost of disposing of that paper. For other, higher value added products (i.e., hangers, boxes or pallets), the cost disparity is much greater.

In funding these case studies, the Alameda County Source Reduction and Recycling Board has provided a stronger basis for those individuals working in the waste management field to approach businesses about implementing additional waste prevention measures in their operations. Development of additional waste prevention case studies will provide additional assistance in reducing wastes by businesses.

Next steps in this series of case studies would be to work directly with selected companies to identify and implement additional waste prevention activities. Companies could be selected from those who are already engaged in business outreach projects of the Agency. Implementation steps would include:

1. selection of companies from target groups
2. identification of existing waste prevention activities
3. identification of additional appropriate waste prevention activities
4. definition of required tasks, time-lines, resources, and budget
5. implementation of appropriate activities
6. analysis of programs, data, and report of findings.

SECTION 1. WASTE REDUCTION IN THE RETAIL INDUSTRY

INTRODUCTION

Retail sales refers to the sale of goods in small quantities directly to consumers. The retail industry is very competitive and highly changeable. Merchandise suppliers, distributors and retailers must institute efficient and cost effective processes in order to viably compete. The flow of goods from suppliers to distributors, retailers, and consumers must be quick, convenient and cost effective. Gone are the days when it was a relatively simple matter to move goods from point A to point B. Today's retail industry employs sophisticated processes of "supply chain management" to optimize production and delivery of goods to consumers. One example of successful supply chain management is the concept of "just in time delivery" which eliminates the need for expensive storage space for merchandise and a supply retrieval mechanism.

Supply chain management involves a set of philosophies and tools that can result in improved efficiency, quicker goods-to-market cycle times, improved customer service, reduced costs and less wastes. "Supply chain management is all about having the right product in the right place, at the right price, at the right time, and in the right condition," says Roger Blackwell, a business professor at Ohio State University and the author of several best-selling books on the subject. For supply chain management practices to succeed, a real cultural transformation must occur inside and outside an old style company. Companies must reject the traditional view that the company, its partners and its component parts, are distinct functional entities. Instead, the real measure of success is how well activities coordinate across the entire chain. Roles change, jobs change, and information must be shared, not hoarded. Implementing supply-chain management processes can be costly, complex, and labor-intensive, but the payoff can be very lucrative.

The following case study profiles the implementation of supply chain management practices that have resulted in waste and cost reductions. This study introduces the efforts of retailer Federated Department Stores, Inc. and one of their divisions, Macy's West. Details of the programs in place at Federated's Hayward Distribution Center and Macy's West Southland Mall store in Hayward are provided. Federated Department Stores has streamlined the movement of goods through the pipeline by employing advanced technology tools of the retail industry, including implementing an industry standard garment hanger specification. The study provides an overview of the industry standard hanger specification, the process of implementing the hanger specification program throughout all levels of the store including corporate headquarters, the regional distribution center, and a local Macy's West store, and the results of implementation. The goal of this study is to present information so that other companies might employ the same or similar systems to also reduce wastes and cut costs.

FEDERATED DEPARTMENT STORES, INC.

Federated Department Stores Profile

Federated Department Stores, Inc. (FDS) was founded in 1929. FDS has brought together some of the nation's best-known department stores under one parent company. Currently, FDS, headquartered in Cincinnati, Ohio, is the nation's largest operator of department stores. At the end of October 1999, FDS operated over 400 department stores in 33 states under the divisional names of Bloomingdale's, The Bon Marché, Burdine's, Macy's East, Macy's West, Rich's and Stern's. FDS also operates as Bloomingdale's by Mail, Macy's by Mail and Macy's.com. FDS corporate philosophies focus on shareholder interests, quality and value to customers, ethical business practices and good corporate citizenship. 1998 corporate-wide sales were $15.8 billion.

Macy's Southland Store "START" Team

SOUTHLAND MALL EFFICIENCY IMPROVEMENTS

At Macy's West Southland Mall store, management staff monitor efficiencies and productivity of their store's pipeline. In an efficiency and productivity improvement program called START ("Strategic Teams Achieve Results Together"), teams of employees are charged with creating more efficient and productive process. Through the START program, for example, Macy's West and FDS management were invited to spend "A Day at the Dock" to see and experience first-hand the procedures and challenges faced by Shipping and Receiving Department staff of Macy's West Southland Mall. Management actually participated in the tasks of the Shipping and Receiving Department for one day. This special event helped convince management that some significant changes should be made in order to increase efficiency and reduce waste.

Macy's West Profile
Macy's West, a division of FDS, began in 1945 when the company established a presence in San Francisco. From the landmark Union Square location, Macy's Department stores eventually reached into other California markets and the western region. As of the end of October 1999, Macy's West operated 85 stores throughout states in the West, Southwest, and Minnesota. Division sales were $3.9 billion in 1998 -- nearly 25 percent of all FDS sales. Macy's West employed nearly 26,000 people in 1999. Macy's West division headquarters are still located in San Francisco.

VICS FLOOR-READY MERCHANDISE HANGER APPLICATION

Background and Definition
The Voluntary Interindustry Commerce Standards (VICS) was initiated in 1986 by an association of retail industry suppliers, manufacturers and distributors to improve the efficiency of handling merchandise in the retail industry. VICS Association members knew that timely, accurate and standardized flow of products and information through the supply chain "pipeline" could improve competitive positions, facilitate better customer service, achieve excellent returns and minimize wastes. From this concept, VICS Association members established standards that simplify and guide the flow of product and information among suppliers, distributors and retailers. [See Appendix A for information about VICS]

As VICS association members developed improvements for the supply chain pipeline, a model for quickly and efficiently preparing merchandise for the sales floor evolved in 1992. This model, called the Floor-Ready Merchandise (FRM) model, defines preparation of merchandise for presentation to the consumer. FRM refers to goods that are ready for sales floor display when received at the retailer's location. FRM guidelines were established to reduce the time required to move goods received from vendors to the retail sales floor. The guidelines include merchandise pre-ticketing, hanger application, shipment accuracy and container labeling.

The VICS FRM Hanger Application guidelines define specifications for hangers acceptable to both suppliers and retailers. Guidelines specify hanger characteristics such as color, durability, composition, appearance, size, and weight-bearing capacity. Hanger characteristics are defined for ten product categories including tops, bottoms, jackets, coats, intimate apparel, swim wear, children's clothing and sleep wear. For each product category, there may be up to four hanger sizes. [See Appendix B for details]

The VICS FRM Hanger Application guideline is intended to reduce garment handling (i.e., time and costs) by standardizing hangers that the store would use on the display floor. Formerly, suppliers shipped goods with their own hangers pre-attached. If a retailer deemed a supplier's hanger unacceptable for display on their sales floor, the retailer had to remove and discard the supplier's hanger and replace it with an acceptable hanger. The retailers incurred costs related to vendor purchase and shipment of unwanted hangers, delays in the flow of merchandise to the sales floor, labor to prepare the merchandise to be displayed on the floor, and disposal of millions of hangers annually.

VICS-FRM – Process at FDS Corporate

In 1992, in their continuing efforts to retain their lead in a competitive retail market, FDS commissioned an outside evaluation of their operations. FDS management wanted to know how to increase profits, reduce costs and save time in operations. The study's results showed that incoming goods were being held at FDS's distribution centers for long time periods. The FDS distribution center process included:

1. Opening boxes and removing garments
2. removing unnecessary packaging
3. removing unacceptable hangers
4. placing garments on correct hangers
5. affixing price tags
6. data entry and inventory control
7. storing garments prior to shipment to individual stores
8. gathering up, re-boxing and shipping garments to fill a store order

This lengthy process not only kept garments away from the sales floor for many days after they were received at the distribution center, the process also introduced inefficiencies, such as handling garments more than once, and loss of goods in the system. Additionally, large quantities of boxes, packaging materials and unwanted hangers were thrown away every day resulting in expensive garbage bills. The study results were particularly poignant in an industry continuously heralding the virtues of quick response and low costs for highest profits. In response to the study results, FDS immediately implemented several new supply chain management processes throughout all divisions.

Federated launched the FASST (Federated Accelerated Sales & Stock Turn) Plan later in 1992, as a means of helping the company and its vendors work together more effectively to manage merchandise inventories. FDS introduced the VICS FRM specification to their suppliers for the first time in 1994 as part of the FASST Plan. The FASST Plan includes employing a set of supply chain management technologies including Universal Product Codes (UPCs), Electronic Data Interchange (EDI), and Quick Response Manufacturing (QRM) technologies. [See Appendix C for details on these technologies]

In 1994, the Federated Logistics & Operations (FLO) division was created to coordinate merchandise distribution, logistics functions and vendor technology across all divisions. FLO's primary mission is to reduce costs and processing time in merchandise distribution.

Federated's FRM guidelines require suppliers to ship merchandise to distribution centers in UPC-labeled cartons. Hanging garments must contain a VICS FRM-standard hanger for immediate placement on the sales floor. Hangers can have neither size indicators nor logos. Retail price tickets listing garment size and price are to be pre-affixed and located in a place clearly visible to customers and Sales Associates. Pins, tape, clips, foam inserts, excessive tissue paper, cardboard or any other unnecessary material that requires removal prior to sales floor display are prohibited. In 1995, FDS notified their suppliers that conformity to the VICS FRM specifications was mandatory. In 1996, FDS began assessing suppliers $0.25 for each garment not shipped in conformance with the VICS FRM hanger specifications. By 1999 a 70% FRM compliance rate had been achieved.

In inaugurating the VICS FRM process throughout their divisions, it was FDS objective to keep the entire process revenue-neutral. FDS projected additional costs for the initial purchase of floor-ready hangers from A&E Products,[1] shipping boxes to return the hangers to A&E, and the small mobile hanger caddies used throughout the stores. FDS provided staff training and anticipated some down time as staff adjusted to the new procedures. FDS also projected savings from getting merchandise to sales floor in less time, with decreased labor handling, and less wasted materials.

It was FDS' goal to fully comply with VICS FRM specification throughout their divisions within six months. The implementation process took the following steps:

1) FDS Corporate decision to implement VICS FRM program companywide.
2) Purchase of supplies and equipment.
3) Train all divisional managers.
4) Train all Distribution Center staff.
5) Notify Sales Associates and Receiving Department staff at all stores that the FRM program was forthcoming. Notification was through electronic mail and through the company's weekly internal communications packets.
6) Train all Sales Associates.
7) Provide specialized FRM program training for all Receiving Department staff. Training included how to identify FRM-compliant hangers; remove and replace non-standard hangers; retain, sort, and store hangers on the display floor; collect hangers from the display floor; and load hangers into collection boxes for return to the DC.
8) Hold store-wide rallies when the program officially begins.

The fledgling FRM program was closely monitored at each store for the first three months following kick-off as part of the store's "report card". [2]

VICS-FRM - Process at Hayward Distribution Center

Merchandise for Northern California Macy's West stores is first received at the 386,000 square-foot FDS Distribution Center (DC) in Hayward. The merchandise is then shipped to 38 Northern California Macy's West store locations from one of the 43 warehouse loading docks. Before the FRM program was implemented, 87,000 square-feet (nearly one-quarter) of the Hayward DC was dedicated to garment sorting, preparation and inventory.

Prior to implementing the current system, suppliers shipped garments of the same size and style in each box. DC staff opened the boxes, removed the garments from their boxes, and removed and disposed of transportation and protective packaging. Staff then affixed price tags, removed

[1] A&E Products, a Tyco Company, is the largest manufacturer of garment hangers for vendor programs [www.aehangers.com]. Macy's West returns recovered hangers to the Santa Fe Springs, CA manufacturing plant.

[2] In August, 2000 Federated Department Stores issued a letter to all of their vendors that they were eliminating the use of vendor hangers. After February 1st, 2001 FDS will accept garments only on 100% clear VICS standard hangers (see Figure 3, page 15). FDS has also issued a warning to vendors to not use counterfeit polystyrene hangers (see Figure 4, page 16).

and replaced unacceptable hangers, and otherwise prepared merchandise for display on the sales floor. Once prepared, garments were hung together in groups according to identical style and size on one of hundreds of garment racks in the DC's processing area. Hanging garments were then inventoried for quantity, size, and style and compared to the supplier's packing slip. DC staff then entered merchandise data into a computerized inventory of merchandise available. When a store placed an order, garments were gathered and re-packaged into cardboard boxes with protective packaging for shipment to the requesting store.

Recycling Other Materials: Film Bags

If merchandise is shipped in "dry-cleaning style" film plastic garment bags, Store Associates stuff 15 – 20 bags inside another re-used plastic film garment bag. The full bag, called a "big pack", weighs approximately 5 pounds. Approximately 15 big packs, weighing about 75 pounds, are bound together on a pallet. These pallet loads are sent back to the Hayward DC about four times per week. From the DC, plastic film bags are baled and sold to an independent recycler. This process of collecting and selling plastic film bags replaces the former process wherein Macy's West and FDS DC staff were throwing the bags into the garbage and paying for disposal.

With the implementation of the FRM program, suppliers ship merchandise to the Hayward DC in corrugated cardboard boxes ready for delivery to individual stores. The vendors label each box with a UPC barcode sticker indicating the supplier's identity, the box's contents and the targeted Macy's West store. Boxes are not opened at the DC. Instead, boxes are routed electronically by their bar-code sticker on the 4.3 miles of automated conveyors through the DC's processing area to the shipping bay designated for a particular store. FDS's Hayward DC conveyor system manages up to 3,600 merchandise boxes per hour. When boxes arrive at the appropriate shipping bay, staff load the boxes by hand from the conveyor into waiting delivery trucks. To maximize the load, no pallets are used.

In the former distribution system, most of the transportation packaging (such as corrugated cardboard, polystyrene "peanuts", bubble-wrap and hangers) were collected at the DC and sold or given to independent recyclers whenever possible. As a result of implementing electronic routing at the DC (wherein boxes are not opened), nearly all of the transportation packaging materials now end up at individual stores. The company had to devise processes to effectively recover a significant increase in transportation packaging materials at the stores. This task has been an impetus for individual stores to create new cost and time-saving processes.

VICS-FRM - Process at Macy's West Southland Mall Store

Merchandise from the Hayward DC is received at Macy's West Southland Mall store Receiving Department three to five days per week. Store Associates remove boxes from delivery trucks and place them on a conveyor which moves the boxes to a preparation area. Store Associates then open the shipping boxes, remove merchandise, and remove any transportation packaging. The empty boxes are flattened and loaded into an on-site baler. Each week, the Southland Mall store ships four to five 800-pound cardboard bales back to the Hayward DC. The cardboard is sold to a local paper recycler. While individual stores are not given direct financial credit for the

cardboard recovered, the sales are tracked and stores are given an internal acknowledgment of their contribution.

In the preparation area, unboxed merchandise is further prepared for display on the sales floor. This process includes removing film plastic bags protecting clothing from wrinkling or soiling, if necessary, and verifying compliance to the VICS FRM standards. Currently, about 70 percent of garments are received at Macy's West Southland Mall store with the approved FRM-standard hangers already in the garments. In some cases the hangers are in the shipping carton with the garments, but not inserted into the garments. In these cases, Store Associates must insert an approved FRM-standard hanger before the garment is moved to the sales floor.

About 30 percent of garments, however, are received at Macy's West with no hanger, or with a non-standard hanger. In these cases, Store Associates must either insert an approved FRM-standard hanger, or remove a non-standard hanger and insert an FRM-standard hanger. Received garments that do not conform to FRM-standard guidelines are tracked with regard to each of the elements not in compliance such as price tags, hangers and packaging. Macy's West Southland Mall store personnel track suppliers who ship garments out of compliance, and communicate this information to FDS corporate offices. Once on a VICS FRM hanger, garments are distributed to appropriate departments for display and sales.

Prior to implementing the VICS FRM hanger program, Sales Associates were encouraged to give non-standard vendor hangers to customers with their purchased garment to get the hangers out of the store. Now that the hangers are reusable, the FDS policy is to give away hangers only to customers who request them. If the customer does not request the hanger, a Sales Associate removes it. This has been part of the re-education and culture change for store Sales Associates.

Hanger Storage Box

Hanger Caddie

Hangers removed from individual departments are stored in small mobile hanger caddies located at each cash register. Every morning prior to store opening, a Store Associate collects hangers from each of the hanger caddies. The hangers are brought back to the shipping area where they are sorted by size and style. Some are reused for new merchandise that arrives without a FRM hanger, and the remainder are stored in wardrobe-style cardboard hanger storage boxes. Under the VICS FRM hanger program, store management has begun to use the number of hangers returned to the DC as an informal barometer of sales during a given time period.

Each hanger box is equipped with seven hanger bars and holds 600 to 700 hangers. When full the boxes are returned to the Hayward DC. Macy's West Southland Mall store returns between three to five full boxes of hangers each week to the Hayward DC. The Hayward DC returns boxes of hangers to A&E Products, FDS' hanger vendor. The hanger vendor inspects and sorts returned hangers and then sells them to garment vendors at a reduced price (see Figure 1. Hanger Reuse Loop).

A&E Products sells hangers to garment manufacturers. The average price for a new hanger is about $0.25. The cost for the hanger is passed on to the retailer in the cost for the garment delivered to the store. The retailer in turn passes this cost on to the consumer in the sale price of the garment. FDS is rebated two to three cents for each hanger returned to the hanger supplier (A&E Products). In theory, this rebate is included as a reduction in the cost to the customer for the garment. In reality, these each of these costs may not be directly passed on to the next person in line, but may be reflected in the company's bottom line profits.

A similar situation occurs in the labor cost for applying hangers to the garments in the first place. In implementing the overall FRM standards, some of the labor and costs for unnecessary packaging has been eliminated. In implementing the FRM hanger standards, stores with higher labor costs have shifted the cost for this activity to their suppliers who may have lower labor costs.

An interesting side feature of the FRM program is that vendors are required to ship all garments on the approved hangers, even though some merchandise is displayed on shelves without the hangers. This is true even if the store knows before the order was placed that the garment would be displayed without the hanger, because it avoids confusion. For this merchandise, store personnel must remove the hangers before the garment can be displayed.

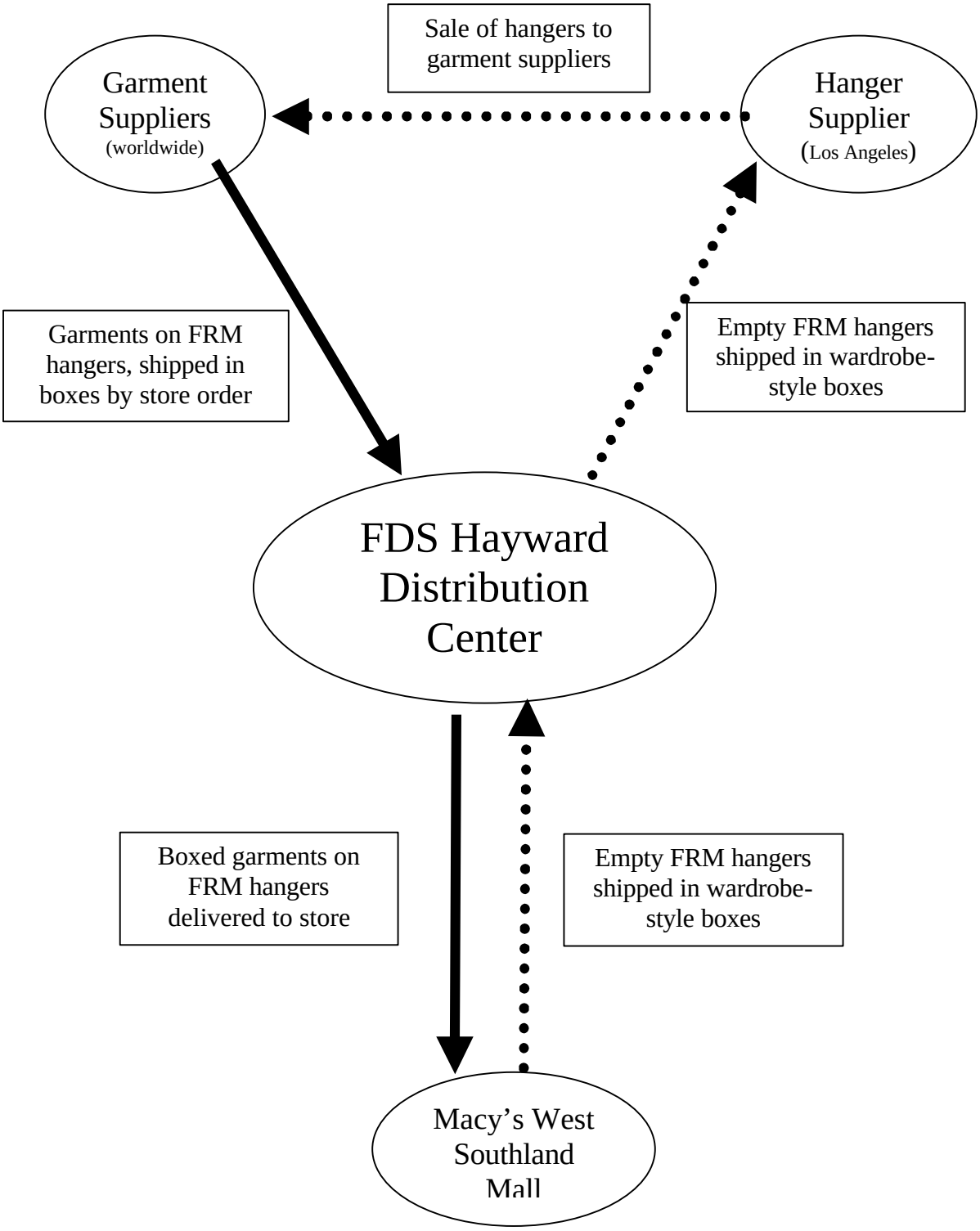

Figure 1. HANGER REUSE LOOP

Foam “Peanut” Extractor

Reuse of Transportation Packaging

If merchandise is received with expanded polystyrene packing “peanuts”, the peanuts are removed into a large storage container suspended overhead, using a specialized vacuum extractor. The foam peanut extractor was developed by one of the FDS employees that saw the need and developed the concept in coordination with an equipment supplier who produces the machines for Federated. The suspended container does not require any floor space and is not in the way of other operations. This collection system allows easy storage and reuse of the packing peanuts.

As needed, the packing materials are released into bags through a tube in the bottom of the suspended container. Excess packing peanuts and protective “bubble wrap” are sent to the store’s Gift Wrap Department for reuse in packaging fragile gifts. About 75% of the packing materials are reused by the store. The excess packing materials are shipped (via the DC) to the Sacramento Catalog Sales Division for reuse. The Catalog Sales Division must buy additional packing materials to meet their needs, but this program reduces the overall cost of packing materials, and disposal by individual stores is reduced.

Before 1994 the plastic peanuts were discarded. Before the vacuum system was designed, Macy’s staff tried separating the packing peanuts by tipping merchandise boxes out over a wire mesh screen. The screen caught the merchandise, while the packing peanuts fell through the mesh into a collection container. Peanuts that fell onto the floor had to be swept up, and were then trashed because they might be contaminated with dirt. The tipping and sweeping process was considerably more labor intensive.

ANALYSIS

The VICS FRM guidelines are designed to get merchandise onto the sales floor more quickly by increasing transportation efficiencies, establishing consistent expectations and by reducing merchandise-handling requirements. Only merchandise on the sales floor (not stuck somewhere in the pipeline) can generate revenue for the store. Getting the purchased merchandise to the floor quickly and efficiently means that the revenues are generated sooner, and costs are lower. The benefits of FDS's application of the FRM guidelines throughout the supply chain is shown in Figure 2, and described below.

FDS Corporate. FDS corporate derive benefits from implementation of the FRM guidelines since the company now relies on a standard across all divisions. This makes management considerably less complicated, more efficient, and more timely. The need for storage space in the DC is significantly reduced, so existing warehouse buildings can serve an expanded market area.

Distribution Center. Through implementation of the FRM guidelines, the DC saves significant labor and handling costs. Staff are no longer required to unpack, inventory and repack merchandise. Additionally the costs of errors are reduced since merchandise boxes are loaded with specific merchandise for a specific store, and are pre-labeled and automatically routed through the DC.

The significant shift in merchandise handling from DCs to the stores caused a shift in labor needs. The labor needs at the distribution centers were greatly reduced. The Hayward DC employed over 40 people to prepare and maintain the garment inventory. Much of what these staff members had done was now no longer necessary (for example, pins did not need to be removed since they were not inserted in the first place), or was being done by the suppliers (such as putting sales tags on garments, or sorting garments by store order). Since the DC had a reduction in labor requirements, FDS was able to move staff to the individual stores to work in the receiving departments. No one was laid off as a result of these program changes.

Retail Stores. Benefits to the retail store are derived whenever costs can be reduced to maximize profits. Such costs include merchandise handling costs, inventory costs, disposal costs, costs of delay in getting merchandise to the sales floor, and labor costs. For example, implementation of the FRM guidelines have resulted in the following cost savings for the local retail store:

- merchandise arrives according to a specific store order – reduces time delay and inventory costs
- hanging merchandise arrives at the store on the appropriate hangers – reduces labor and handling costs
- merchandise arrives from the supplier with without excess packaging, like pins and clips, that would need to be removed before the garment was set out for sale – reduces labor and handling costs
- a store can directly order only the number of items of the sizes they think they can sell – reduces excess inventory costs
- minimal transportation packaging – reduces handling costs and waste disposal costs

The additional receiving department staff at the stores are able to coordinate handling of the FRM hangers. In addition to placing hangers in garments which were not received according to the floor-ready standards and sorting and boxing hangers for return to the DC, the staff is also responsible for flattening and baling the discarded merchandise boxes. These responsibilities do not require full time staff, so these individuals are also able to assist in other store activities.

Customers. Benefits to the customer are derived whenever their most-wanted merchandise is brought to the sales floor quickly and safely, and displayed in an appealing way. As such, this encourages customer satisfaction and sales, which returns revenues. When fashionable merchandise quickly moves from supplier to the sales floor, when garments hang uniformly, when tags with price and size are clear and visible, when pins and clips don't pinch – these are the elements that contribute to satisfied customers. These elements are results of implementation of the FRM Guidelines.

Waste Reduced. Several types of waste were avoided by the implementation of the floor ready merchandise programs. Specific to this study were the hangers which did not meet FDS or Macy's display standards – any hanger that did not meet this standard was discarded at the DC. Now only a small number of the non-approved hangers arrive at the stores. All hangers used for display in the stores are reused, either in the same store, or are shipped for reuse by the garment suppliers.

The changes in packaging requirements reduced the use of small plastic bags for individual garments, tissue or paperboard packing, garment clips, straight pins, and sales tags that were not display quality. Virtually all of these materials were disposed of at the DC.

In addition to the Hanger reuse program, programs are in place to recycle paper, cardboard, film plastics, foam plastics, and pallets from the stores. While cardboard had been recycled at the DCs and store sites before, these waste prevention techniques have led to increased recycling of cardboard boxes. Before these program changes, there was so much plastic film and plastic packing peanuts in the boxes that handling them was overwhelming, and the boxes full of plastic residue were frequently discarded. Now with more manageable quantities of packing materials, more of the boxes are recovered.

Waste discarded from the store is loaded into a 30-cubic yard compactor. Primarily, the wastes are miscellaneous plastics and wastes from the restrooms and breakrooms. Store Associates do not monitor what is discarded. The compactors are emptied on average once every 10-15 days. According to Waste Management of Alameda County, FDS pays $843 per pull for their 40-yd compactor.

Vendor Comments. Many garment manufacturers have benefited from their retail customers who have implemented the FRM guidelines, since the FRM standards have generally reduced vendors' costs in the procurement and application of excess packaging, pins, clips, unwanted hangers, plastic bags and tissue paper to their merchandise. This has reduced the suppliers' costs for purchase of these items, and for transporting this excess packaging. However, some garment manufacturers also report increases in the administrative burden of tracking which orders are

from stores that are not participating in the FRM standards, and package their garments to match differing standards.

Prior to the implementation of the FRM hanger specifications, one of Macy's clothing vendors shipped garments to Macy's in boxes and Macy's staff put the garments on the vendor's wooden hangers. As garments were sold, Macy's staff saved the wooden hangers for reuse with the next shipment from that vendor. Now garments are displayed on generic industry standard plastic hangers. The FRM program has transferred the direct cost for hanger purchase and the cost for labor from Macy's to the garment supplier. Further, the vendor can be charged, if a garment arrives with a broken hanger or any other non-standard arrangement. This may result in increased costs to the vendor in the form of "charge backs" for not conforming to the VICS FRM standard.

In the case of one underwear manufacturer the VICS FRM hanger application has created more waste than the prior process. These small garments ship more efficiently in flat packs, and can be hung at the store, if desired. Because of the difficulties in tracking shipments with different requirements to different retailers, this vendor now ships all of their garments on VICS FRM standard hangers, even if a store does no require it. The vendor has also incurred an increase in costs for applying FRM hangers to customers who do not require them.

Prior to the VICS FRM hanger standard, this manufacturer folded garments in small plastic bags and shipped them to the retailer. Since adhering to the VICS FRM standard, their factories have significantly increased administrative tasks and costs through increased costs of hangers, plastic bags, cardboard cartons, and shipping expenses. Labor costs (although labor is less expensive in the developing countries where the garments are manufactured, than in the United States) have also increased because the handling requirements have shifted from the retailer to the vendor.

1) The hangers must be purchased at a cost of about $0.25 per hanger (formerly, garments were shipped folded and without a hanger). This is a significant cost on garments that are often sold to retailers for under $5 (hanger costs might be less of an impact on garment suppliers that have higher-margin garments).
2) Packaging is more expensive because larger plastic bags must be purchased to accommodate the garment with its hanger.
3) More shipping cartons must be purchased to accommodate bagged garments with their hangers. Formerly nearly 150 pieces of folded, bagged garments were shipped per carton. Now, only about 50 garments (with hangers) fit in the same sized carton.
4) Shipping is more expensive because the larger boxes require more shipping room for the same quantity of shippable garments, which is more expensive.
5) Administrative costs have increased from "charge backs", including when a garment's bar-code cannot be scanned properly, when a pre-packaged set of garments from the factory does not identically match the stores' order, or when a hanger is broken in transit.

SUMMARY

In implementing the VICS Association FRM hanger application guidelines, and other FRM guidelines, Federated Department Stores and Macy's West have been able to increase the efficiency and productivity in conducting their business. The FRM program has reduced space needs at the DC by about 87,000 square feet. The direct shipment of product to the stores has reduced the delivery time for merchandise. Additionally, with reuse of hangers, fewer hangers must be purchased, resulting in lower operating costs. Other types of packing materials have been reduced also. The reduced handling requirements have allowed the existing staff to generate higher revenues. Furthermore, the reduction in the amount of time required preparing merchandise for the sales floor has resulted in significant labor cost savings. Overall, this program has allowed them to reduce wastes and lower costs.

FIGURE 2. BENEFITS OF VICS FLOOR READY MERCHANDISE GUIDELINES

	CUSTOMER	RETAIL STORE	DISTRIBUTION CENTER	MERCHANDISE SUPPLIER
All hanging merchandise must be shipped on a VCS FRM hanger in labeled cartons			• Reduced handling time • Reduced distribution errors	
Hangers must be generic - may not indicate size, logo, or vendor name.		• Permits multiple reuse of hangers		• Permits multiple reuse of hangers • Reduced hanger purchase cost
Supplier cartons arrive at the DC to fill a specific purchase order for a specific store		• Reduced time to receive merchandise	• Reduced handling time	• Reduced distribution errors
Retailers receive merchandise directly from suppliers as necessary		• Reduced loss from discounting outdated merchandise	• Reduced inventory storage • Reduced merchandise handling	
Suppliers prohibited from using excess packaging		• Reduced handling time • Reduced disposal costs		• Reduced costs for supplies and labor
Retail price tickets must be clearly and visibly placed	• Efficient and easy to read price tags			• Increased handling
Garments must be laid in the box front side facing up with all buttons, zipper, and hooks closed.	• Freshest appeal • Minimized wrinkling for freshest appeal	• Reduced handling time • Minimized wrinkling of garments		• Increased handling
No safety or straight pins allowed.	• Reduced injuries	• Reduced handling time	• Reduced injuries	• Reduced costs for supplies • Reduced labor costs for handling

FIGURE 3. FEDERATED DEPARTMENT STORES LETTER TO VENDORS

Federated Department Stores, Inc.

August 2000

Dear Federated Department Stores, Inc. Vendor,

After careful consideration, as well as feedback from many of you in the vendor community, our stores, and merchants, we have decided to **eliminate** the use of ***all vendor hangers***.

During a six month review of our stores, we found the following:

1) where vendors supply special hangers, we usually **do not have a sufficient supply**
2) the hangers in the vendor shops **do not remain pure** as other hangers tend to get mixed in to the vendor shops
3) vendor special hangers tend to **find their way to other** (clear VICS hanger) **departments**

The bottom line is that, while well intended, the execution of **vendor hanger programs** is not practical in our store operating environment.

Our plan is to move to 100% clear VICS hangers for all Men's, Women's, and Children's (over 5T) apparel displayed hanging in our stores, by February 1st , 2001. However, you may begin shipping on clear VICS hangers immediately.

This move to 100% clear VICS hangers will **simplify our store operations** and make for a **cleaner looking presentation of your product**. Where needed, "Henry" (face-out) hangers may be used for display purposes.

For additional information about our VICS Floor Ready Hanger Program, please visit our website at ***www.fdsnet.com*** and refer to our 2000 Vendor Standards Manual, Appendix H, or call us at 212-704-1508.

Best Regards,

Lisa Lichtenberg
SVP Retail Technology
Federated Merchandising Group

Peter Longo
President
Federated Logistics & Operations

FIGURE 4. FEDERATED DEPARTMENT STORES WARNING NOTICE TO VENDORS

WARNING - WARNING – WARNING

Attention All Garment Manufacturers,

Federated Department Stores has just been informed that a company in the garment district in NY is selling counterfeit VICS hangers!!! These hangers **DO NOT MEET VICS** standards.

The hangers we have discovered are the 17 inch dress hangers. They are made of highly breakable polystyrene, they have no vendor markings, no logo and no style number, and the hook is the wrong shape.

DO NOT BUY THESE HANGERS. For Federated garment shipments, only buy hangers from one of our **approved hanger sources** (see our year 2000 Vendor Standards Manual at www.fdsnet.com for a complete listing). If we receive shipments from you with these counterfeit hangers, an expense offset will be assessed

APPENDIX A: VICS BACKGROUND INFORMATION

VICS
VOLUNTARY INTERINDUSTRY COMMERCE STANDARDS

VICS Mission

The mission of the VICS Association is to take a global leadership role in the ongoing improvement of the flow of product and information about the product throughout the entire supply chain in the retail industry.

VICS Objective

Revised June 1995

The Association's overall global objective is to improve product availability to the consumer by providing leadership and encouragement in the identification, development and implementation of volunteer standards, protocols, guidelines, and other mechanisms, when properly utilized, are expected to lead to better anticipation of, and reaction to, changes in consumer demand for these products with the subsequent optimization of production and carrying costs.

VICS SHOWS THE WAY TO INTELLIGENT BUSINESS STRATEGIES.

Since 1986, VICS, the Voluntary Interindustry Commerce Standards Association, has worked to improve the efficiency of the entire supply chain. VICS establishes cross-industry standards that simplify the flow of product and information in the general merchandise retail industry for retailers and suppliers alike.

VICS is made up of senior executives who've proven that a timely and accurate flow of product and information between our companies significantly improves our competitive position. We've proven that cross-industry commerce standards facilitate better customer service. And with the hundreds of small and large companies we've worked with, we've proven that VICS implementation achieves excellent returns, returns even far beyond expectations.

JOIN US, BECAUSE MEMBERSHIP HAS ITS PRIVILEGES.

Membership in VICS offers you unique resources and the important advantages your company needs to stay competitive in a rapidly changing environment. Implementing VICS technologies and quick response (QR) partnerships is most successful when you have a commitment and a desire to make changes that will improve the bottom line. We'll provide the contacts and the ideas to make this happen. You'll receive a newsletter on current issues. And, most importantly, you'll have a one-stop source of invaluable information.

Please don't confuse our organization with the Uniform Code Council's VICS EDI, another worthy group to which you may already belong. Our organization addresses high-level, strategic standards requirements. VICS EDI handles the maintenance and fine tuning of VICS standard, and is a separate organization administered by the Uniform Code Council.

SUPPORT THE VICS CAUSE WITH OTHER VISIONARY COMPANIES.

The list of current VICS members, represents many of the leading companies in our nation. These prestigious firms have pioneered the VICS concept and made it succeed. Your company's name on our membership list places you in the forefront of a movement that promises to revolutionize the way we do business. Your participation in VICS assures your company of a strong future in a time of increasing technological advances.

GREATER PARTICIPATION MEANS FASTER RESULTS.

In our faster-cheaper-better world, results count, and results are easier to come by when we all work together. Your input will help us to create solutions that will improve processes throughout the supply chain. The more companies support the effort, the faster we can all enjoy the benefits of more efficient business strategies.

VICS BENEFITS PROVIDE BOTTOM-LINE VALUE FOR YOUR COMPANY.

With the amount of "churn" in business today, it's difficult to keep up. Companies that aren't moving forward, or who don't know how to adapt to technological change, are moving backward. VICS provides a unique opportunity for companies to share best practices, work together to eliminate unnecessary costs, and improve the position of their own companies and the industry. Our membership list is a virtual Who's Who, and membership is growing by several companies a month. Find out why these companies have made the commitment to intelligent business strategies, and why they believe in VICS.

With your membership you'll receive copies of the quarterly VICS newsletter for interested members of your staff; you'll be able to fully participate in VICS committees which are developing standards in a number of areas; and you'll have access to decision-makers at visionary companies who are working on these issues.

CAST YOUR VOTE.

Your VICS membership not only allows you to benefit from the work of the VICS committees, but to also speak out on the industry issues affecting your company. VICS members are allowed to be heard and to cast a vote at the committee meetings in which they participate.

THE PAST PRESAGES THE FUTURE.

VICS' past achievements speak for themselves. The Floor Ready Merchandise standard. Thirty-eight different transaction sets for more efficient commerce. Our past successes hint at the promise that the future brings.

JOIN VICS IN ONE OF THREE WAYS:YOUR SUPPORT COUNTS.

Membership in VICS entails a one-time membership fee described below and annual dues of $1,000 per calendar year. This level of funding allows us to continue our work in a cost-effective manner, by using industry experts in retailing, manufacturing and logistics who volunteer their time to make progress on these important issues. (New members of VICS do not pay dues in the quarter in which they join or any quarter which might come before.)

SPONSORING MEMBER

If your organization is a general merchandise retailer or supplier, you can be eligible to become a Sponsoring Member of VICS. Your membership fee is a one-time payment of $5,000, plus annual dues. As a continuing Sponsoring Member, your company name will appear on VICS membership lists which are widely distributed, you'll be eligible to become a member of VICS Committees, you'll be able to attend periodic update meetings, and you'll receive a kit containing all recently published VICS materials. As a continuing Sponsoring Member you'll also be eligible to fill a vacancy on the VICS Board.

ASSOCIATE MEMBER

If your company is a vendor of retail automation products or services (e.g., manufacturers of point-of-sale and other in-store equipment, consulting groups, software package developers etc.), you may become an Associate Member. Your membership fee is a one-time payment of $10,000, plus annual dues. As a continuing Associate Member, your company name will appear on VICS membership lists which are widely distributed, you'll be eligible to become a member of VICS Committees, you'll be able to attend periodic update meetings, and you'll receive a kit containing all recently published VICS materials.

TRADE ASSOCIATION MEMBER

Trade associations (generally 501(c)(3) or 501(c)(6) corporations) may support VICS by becoming a Trade Association Member at $1,000, plus annual dues. As a continuing Trade Association Member, your company name will appear on VICS membership lists which are widely distributed, you'll be eligible to become a member of VICS Committees, you'll be able to attend periodic update meetings, and you'll receive a kit containing all recently published VICS materials.

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Holt, Renfrew & Co.

Keith Sartin
Levi Strauss & Co.

Bill Holder
Dillard's Inc.

James McLaughlin
The Gillette Company

Jesse Johnston
Milliken & Company

Charles Williams
Georgia-Pacific Corp.

Ken Harris
The Gap

Tom Sample
Treasurer
Carhartt, Inc.

Ralph Drayer
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Paul G. Benchener
Robert F. Protzman
Schneider National Carriers, Inc.

Jerry Miller
Sears

Greg Miles
Bulldog Hardware Co.

Robert Obee
Roadway Express

Mike Peterson
Dayton's Marshall Field's Hudson's

Marilyn Sell
Kohl's Department Stores

Arthur Smith
Electronic Commerce Council of Canada

David Specht
Haggar Clothing Co.

Andrew Cowan
JC Penney Co.

Pat Sinnott
Canadian Tire Corp.

John Thompson
Liz Claiborne

APPENDIX B: VICS FLOOR READY MERCHANDISE GUIDELINES

The VICS Floor-Ready Merchandise Voluntary Guidelines Summary is presented here. The full 80-page report is available online at www.vics.org.

Background

In 1986, supplier, manufacturer, and distributor executives in the General Merchandise and Apparel retail industry shared the belief that a more timely and accurate flow of product information could significantly improve customer service and enhance overall competitive positions. To facilitate this flow, these executives established the Voluntary Interindustry Communications Standards (VICS) committee.

The VICS committee's objective is to provide continued leadership and encouragement in the use of standards and protocols, as well as, support for other mechanisms that will enhance customer service.

To date, the VICS committee has helped secure industry endorsement of:

- a voluntary standard for product identification (U.P.C.-A) used with point-of-sale scanning devices,
- a communications format and set of protocols (VICS EDI) allowing for efficient electronic data interchange, and
- a bar code symbology (UCC/EAN-128) for shipping containers and raw material identification.

Significant reductions in total lead time have occurred for those retailers and suppliers adopting these standards.

Floor-Ready Merchandise

In June, 1992, a study was commissioned by five retailers and four apparel suppliers to research additional lead time reductions for the men's and boy's bottoms category. Specific topics included pre-ticketing of merchandise, hanger application, shipment accuracy, container labeling, and pipeline benefits. After establishing some preliminary guidelines and benefits, the group released a document in December, 1992 entitled Floor-Ready Merchandise. Key conclusions included:

- Merchandise should be floor-ready when received at retail sales locations.
- Standardized, voluntary guidelines are necessary in order to develop efficient mechanisms for shipping and/or receiving floor-ready merchandise.
- Pipeline benefits can be substantial depending on individual trading partner circumstances.

Realizing the potential benefits to the retail industry, the VICS committee was asked, and agreed, to support the development of guidelines for the General Merchandise and Apparel industries, and established the VICS Floor-Ready Task Force in October, 1993.

After further study, the VICS Floor-Ready task force recognized there are many aspects to the floor-ready process. To support guideline development, the VICS task force adopted a mission and definitions:

> ***Mission****: Establish industry-wide guidelines to reduce the time to move general merchandise and apparel to the retail sales floor and to provide the best overall value for the consumer. These guidelines will be established and implemented through a cooperative effort between retailers and their suppliers. Generally, the best economics will be obtained when there is consistency of a given service.*
>
> ***Floor-Ready Merchandise****: Merchandise that is ready for sale when received at a retail sales location. When applicable, activities such as pricing, hanger application, and packing, occur at the most logical stage in the pipeline. The responsibility for these activities is negotiated between the retailer and the supplier. Floor-Ready Merchandise activities relate to the preparation of merchandise for presentation to the consumer.*
>
> ***Shipment Packaging****: Shipment packaging is the unit load or transport package and incorporates the consumer packaging only when the shipping unit is also the selling unit. Successful implementation of effective shipment packaging requires dialogue between trading partners to identify mutually beneficial opportunities. Environmental considerations are consistent with the long term objectives of shipment packaging: reduction of material waste, increased reuse of packaging and ease of handling.*
>
> ***Receipt-Ready Shipments****: Scannable shipments, supported by appropriate EDI documents, received at a retail location which meet agreed-upon requirements for labeling, routing, containerizing, and delivery. This will reduce delays in processing and moving merchandise to the sales floor. RRS requirements relate to the shipment of merchandise for receipt by a retailer.*

Mutual implementation of these precepts may result in these pipeline improvements:

- Reduced lead time,
- Increased consumer availability,
- Increased environmental awareness, and
- Decreased costs.

To obtain these improvements, retailers and suppliers will discuss voluntary arrangements concerning product preparation, shipment, and presentation. While these areas are the subject of this document, they are not, however, all there is to floor-ready merchandise. Over time, this document will be expanded and enhanced to accommodate additional aspects of floor-ready merchandise.

Overview

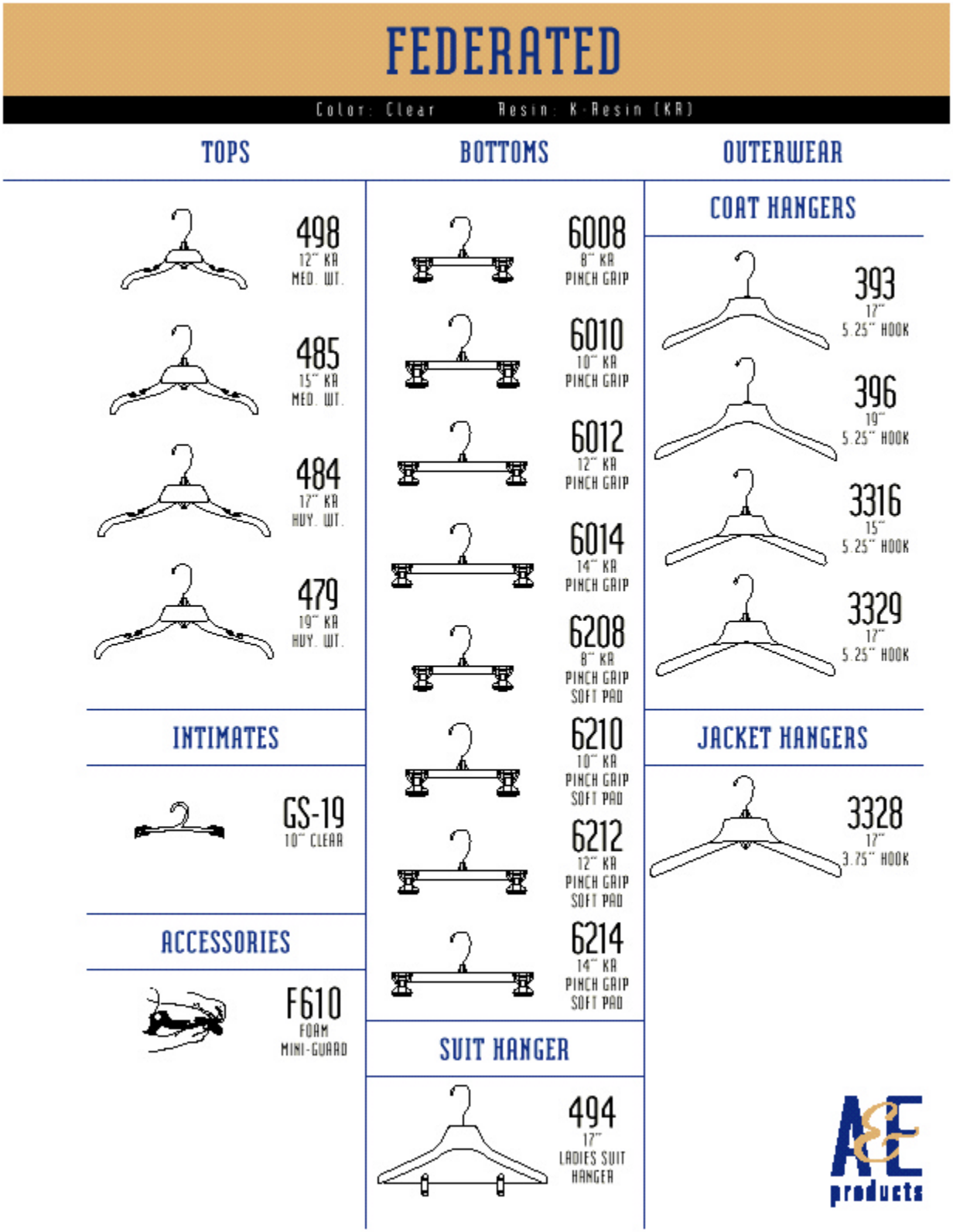
The purpose of these Floor-Ready Merchandise guidelines is to provide suppliers and retailers with uniform guidelines for the efficient preparation of products for presentation to the consumer.

The VICS Floor-Ready Merchandise task force was established in October, 1993, to study the logistics of delivering floor-ready merchandise. A variety of activities, ranging from hanger application to security tagging, have been examined by the task force. These guidelines currently address retail price marking and hanger application. It is anticipated these guidelines will be expanded to cover a broader range of subjects related to the preparation of floor-ready merchandise.

In developing these guidelines, emphasis has been placed on the importance of partnership between retailer and supplier. The intention is to maximize the efficiency of applying retail price information, hangers application, and other activities to consumer products when applicable. It is the responsibility of the retailer and supplier to decide where in the product pipeline these procedures can take place most effectively.

Industry standardization should eliminate time and inefficiencies from the product pipeline. Adherence to these guidelines should enable suppliers and retailers to improve the value of products delivered to the consumer, with the potential of increasing profits.

FIGURE 5. FEDERATED DEPARTMENT STORES SPECIFIED HANGERS



APPENDIX C: SUPPLY CHAIN MANAGEMENT TECHNOLOGIES

UPC Bar Code

From **How UPC Bar Codes Work**
by Marshall Brain (and other sources)

Just about every package you see has a **UPC bar code** printed on it. In fact, nearly every item that you purchase from a grocery store, department store, mass merchandiser (like Wal-mart), etc. has a UPC bar code on it somewhere. "UPC" stands for the **Universal Product Code**. UPC bar codes were originally created to help grocery stores speed up the check out process and keep better track of inventory, but the system quickly spread to all other retail products because it was so successful.

UPCs originate with a company called the Uniform Code Council (UCC). A manufacturer applies to the UCC for permission to enter the UPC system. The manufacturer pays an annual fee for the privilege. In return, the UCC issues the manufacturer a 6-digit **manufacturer identification number** and provides guidelines on how to use it.

The UPC symbol printed on a package has two parts: 1) the machine-readable bar code, and 2) the human readable 12-digit UPC number. The first 6 digits are the manufacturer identification number, the next 5 digits are the **item number**. In general, every item the manufacturer sells, as well as every size package and every repackaging of the item, needs a different item code.

The bar code usually doesn't contain descriptive data, (just like your social security number or car's license plate number doesn't have anything about your name or where you live). The data in a bar code is just a reference number which the computer uses to look up associated computer disk record(s) which contain descriptive data and other pertinent information. When the scanner at the check out line scans a product, the cash register sends the UPC number to the store's central POS (Point of Sale) computer to look up the UPC number. The central computer sends back the actual price of the item at that moment. This approach allows the store to change the price whenever it wants, for example to reflect sale prices. If the price were encoded in the bar code, prices could never change.

When read by a bar code reader and transmitted to the computer, the computer finds the ‘disk file’ item record(s) associated with that item number. In the disk file is the price, vendor name, quantity on-hand, description, etc. The computer does a "price lookup" by reading the bar code, and then it creates a register of the items and adds the price to the subtotal of the groceries purchased. The computer also maintains inventory control by subtracting the quantity from the "on-hand" total.

Electronic Data Interchange

Electronic Data Interchange (EDI) is a standardized method of sending business documents between companies *electronically* instead of using *paper*.

The most common business documents being exchanged these days are *Purchase Orders* and *Invoices*. There are many other documents that can be exchanged, however. The exchange of documents over the Internet is continuing to gain in popularity throughout the business community. Companies *love* EDI because with EDI, they don't have to print things out, stuff things into envelopes, open envelopes, unstuff envelopes, type things into a computer, etc.

Although the business computer enabled companies to store and process data electronically, companies still needed an expedient method to communicate the data to another company. This method was realized by the widespread use of computer telecommunications. These electronic interchanges improved response time, reduced paperwork, and eliminated the potential for transcription errors. Computer telecommunications, however, only solved part of the problem.

Early electronic interchanges were based on proprietary formats agreed between two trading partners. Due to different document formats, it was difficult for a company to exchange data electronically with many trading partners. What was needed was a *standard* format for the data being exchanged. In the 1960's a cooperative effort between industry groups produced a first attempt at these common data formats. The formats, however, were only for purchasing, transportation, and finance data, and were used primarily for intra-industry transactions. It was not until the late 1970's that work began for national EDI standards.

Quick Response Manufacturing

Quick Response Manufacturing (QRM) is the overall strategy used by companies to reduce the lead time required in manufacturing. The process allows firms to reduce the amount of time required to design and begin production on a new product. This in turn means that businesses in a rapidly changing area can better compete.

It is especially important for businesses in the retail clothing market to get products to display rapidly, since so much of the business is seasonal, and since fashions change so quickly. Having merchandise ‘in the pipeline’ for too long greatly reduces the likelihood that it will sell to a consumer.

There are many other supply change management technologies (i.e., just-in-time delivery), but these three were the primary activities used by Federated.

SECTION 2. WASTE REDUCTION IN TRANSPORTATION PACKAGING SYSTEMS

INTRODUCTION

Transportation packaging refers to the cartons, crates, pallets, skids, wraps, ties and totes that manufacturers use to ship products to the marketplace, directly to their customers, or between operating facilities.

Primary packaging contains the actual product. Transportation packaging is strong and functional, but generally is not as colorful, clever or meant to attract purchasers.

The manufacture and disposal of transportation packaging has become environmentally significant. There is increasing concern over the amount of wood required to manufacture crates and pallets, and wood pulp used to manufacture packaging paper, paperboard, and cardboard. There is also the issue of landfill space required to bury used packaging materials. And the environment isn't the only entity paying a price in transportation packaging use. The purchase, use and disposal of transportation packaging impact the cost of doing business also. These days, companies seeking ways to gain competitive advantages must closely evaluate how to reduce costs and wastes in the storage and shipment of their products, particularly related to transportation packaging.

This case study profiles transportation packaging systems. It describes how costs and wastes from purchase, use and disposal of pallets and corrugated cardboard shipping containers, can be reduced. The purpose of the study is to present one company's waste reduction efforts in transportation packaging systems so that other companies might employ the same or similar systems to also cut costs and reduce wastes. The study introduces the transportation packaging system of snack food manufacturer Granny Goose Foods, Inc. (GGF) at their headquarters facility in Oakland, California[1], and focuses on pallets and corrugated cardboard shipping containers. Two alternative programs for pallet savings were evaluated for specific cost and waste reductions.

TRANSPORTATION PACKAGING

PALLETS

Pallets are one of the major elements of transportation packaging systems. Pallets are platforms on which products can be conveniently stored and moved. Pallets were created to save companies time and money by allowing 'unitized loads' of products (e.g., a stack of boxes held together with plastic wrap) to be quickly and easily moved by forklift truck or pallet jack within a warehouse or onto a truck trailer for shipment. A company has many alternative pallets and pallet systems to choose from – some are more cost effective than others and some generate more waste

[1] After this Case Study was prepared, Granny Goose Foods decided to close their Oakland facility. However, this decision does not change the savings that would have been achieved if this project had gone forward, so this work is provided as a study of Transportation Packaging issues.

than others. The cost effectiveness and waste generated by a pallet is directly related to the number of trips a pallet makes in its lifetime. The more trips a pallet makes, the more cost effective it is because fewer pallets need to be purchased and fewer pallets are disposed of. Calculating a pallet's overall cost per trip includes evaluating purchase price, repair costs, repair frequency, handling costs, disposal costs. Although they can be a significant cost, workers' compensation costs from to pallet-related injuries are rarely tracked. A more complete analysis of pallet use and selection issues is provided in Attachment A.

There are three basic pallet distribution systems in operation.

Open-Ended Pallet System. In an "open-ended" pallet system, a pallet loaded with products is shipped to its destination, the products are unloaded from the pallet, and the pallet is not returned to the shipper after it is unloaded. This system is also referred to as a one-way, or single-use system because pallets are considered disposable and lost to the shipper after a single use. In an open-ended pallet system, the cost of pallet purchase becomes a part of the cost of shipping the product because the full purchase cost must be included in each shipment. In an open-ended pallet system, a pallet's durability and reparability are not serious concerns because the shipper does not expect to use a pallet more than once. Thus, buying a cheap pallet reduces a shipper's costs, and also minimizes a receiver's product shipment costs. Additionally, there are no costs for pallet tracking systems. On the other hand, the significant costs of pallet purchases in this system may reduce a shipper's product price competitiveness. Abandoned pallets tend to pile up around the receiver's loading docks, reducing working space, blocking access and inviting injuries. Disposing of accumulated pallets becomes a direct cost of business to the receiver.

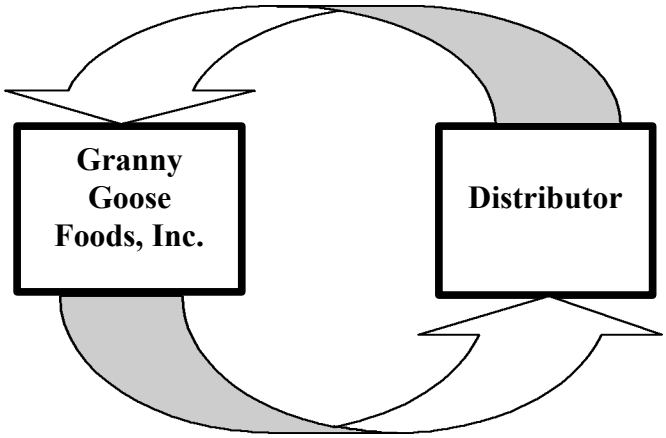
Figure 1. Open-ended Pallet System

- Significant costs for new pallet purchase
- No pallet tracking system required
- No pallet repair costs
- No pallet storage costs to sender
- No pallet disposal costs to sender

Closed-Loop Pallet Recovery System. An alternative to an open-ended system is that a pallet can be part of a "closed-loop" pallet recovery system. In the ultimate "closed-loop" system, pallets are circulated from shipper to receiver and back to shipper again. Pallets are reused in this

cycle for the lifetime of the pallet. In this system, a relatively small portion of a shipper's pallets are lost in each trip and a relatively high level of pallet quality and maintenance is retained. As pallets will be used for many trips, a more durable and repairable pallet is of value to a shipper, even if the initial purchase price is higher. Overall costs per pallet use are likely to be lower than in an open-ended system since pallet purchase price can be amortized over multiple trips. Additionally, a pallet tracking system is required in a closed-loop system to preserve a shipper's investment in a higher cost and quality of pallet. The biggest problem in a closed-loop system is that a returned pallet may not be the same pallet originally shipped, but some other pallet may be substituted in its place. That is, the pallet returned may not be of the same quality, condition or size as the original pallet.

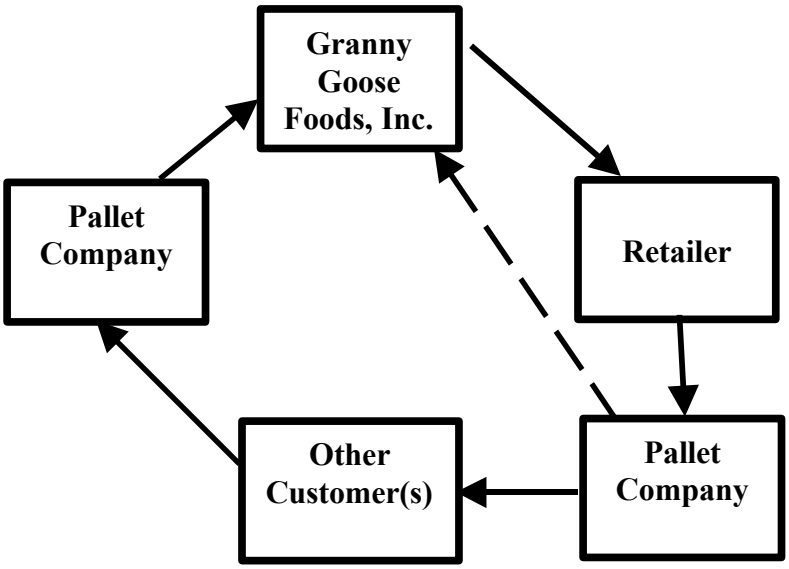
Figure 2. Closed-Loop Pallet Recovery System



- Reduced costs for new pallet purchase
- Pallet tracking system required
- Pallet repair costs
- Pallet disposal costs
- Pallet storage costs

Third Party Pallet Management System. An alternative closed-loop system is the "third party pallet management system." In a third party pallet management system, pallets are rented from a supplier (no pallet purchase is required by the shipper). The shipper ships products on the pallets to a receiver (generally a retailer or distributor). When the pallets are unloaded, the receiver contacts the pallet management company who retrieves the pallets directly from their location, without any involvement of the product shipper. The management company retrieves and repairs the pallets, and sends them off to any one of the management company's customers, rather than back to the original shipper. The pallet management company then provides the original shipper with additional pallets which have been retrieved from another retailer near that shipper. In this system, pallets need not be shipped back to the original shipment location, but can be used by a company near the company that had received a shipment on them. This increases the efficiency of the pallet use system.

Figure 3. Third Party Pallet Management System



- No pallet purchase costs
- Pallet rental costs
- No pallet tracking system required
- No pallet repair costs
- No pallet disposal costs
- No pallet storage costs

CORRUGATED CONTAINERS

Corrugated Cardboard Shipping Containers

Another element of a transportation packaging system is the shipping container. A shipping container holds one or more products safely and securely during transportation. Corrugated cardboard is the most commonly used material for shipping containers as it provides good product protection, is lightweight, readily available, reasonably priced and recyclable.

Like pallets, cardboard shipping containers most commonly follow an open-ended system wherein the cardboard containers are abandoned at the destination. In this system the receiver must manage disposal of the cardboard and the shipper must purchase replacement cardboard containers for each shipment. Alternately, shipping containers may follow a closed-loop recovery system wherein the container is returned to the shipper for reuse. In an open-ended system, repeated purchases of new containers is factored into the cost of product shipments. In a closed-loop recovery system, a shipper can avoid some of the container purchase costs by reusing the returned containers for additional trips. Despite traveling in a closed-loop recovery system, however, corrugated containers still have a relatively short life cycle and are less durable than some other container materials. A greater number of trips may be achieved by using shipping containers made of more durable materials.

GRANNY GOOSE FOODS, INC. – CORPORATE PROFILE

Granny Goose Foods, Inc. (GGF) is a manufacturer of snack foods including potato chips and tortilla chips, puffed cheese snacks and popcorn. GGF describes itself as the largest independent snack food producer in the West. Brand names include Granny Goose, Clover and Padrinos.

GGF snacks are manufactured at and distributed from corporate headquarters in Oakland, California where GGF has been operating since its founding in 1945. About three-quarters of the company's manufacturing and distribution originates at this corporate headquarters site and one-quarter of the company's manufacturing and distribution originates at the company's facility located in Kaysville, Utah. GGF snack foods are distributed to stores throughout the 13 Rocky Mountain and western states including Hawaii. The company employs approximately 400 people, and reported sales of $105 million in 1998.

TRANSPORTATION PACKAGING AT GRANNY GOOSE FOODS

General

GGF ships 70 percent of their products to their own distributors who directly place the product onto store shelves. The remainder of GGF product is shipped to direct sale retailers (e.g., grocery stores) where the retailers' staff place the products on the store shelves. Distributors and direct sale retailers are GGF "customers."

GGF employs 14 Shipping and Receiving staff working in three shifts over a 24-hour day. Shipping and Receiving staff are responsible for receiving products and materials shipped to GGF for use in preparing their products, and for preparing GGF outgoing product for shipment to customers. Shift work increases or decreases depending upon product demand, primarily by season. GGF production is seasonal – highest during the summer months and throughout the holiday and sports season (May through January), and decreasing in the cool winter and early spring months (February through April).

Production

In a typical production cycle, GGF customers submit their product orders to corporate headquarters at the beginning of a week. GGF establishes their production level according to customer orders received. Actual production and primary packaging (bagging) of the snack foods begins by mid-week and each order is filled within a week.

In filling a customer's order, GGF production staff assemble corrugated cardboard boxes ("cases") by "fan folding" them into shape. Fan folding involves folding the case end flaps under one another. No glue or bindings are used on the cases. While a fan-folded cardboard case is somewhat more fragile than a taped or glued box, fan-folding makes box assembly faster, less tedious and less expensive, and the cases are much more easily reused. GGF is able to effectively use fan-folded corrugated cases because their products (chips and snack foods) are lightweight and exert little pressure on the case seams. Staff place the bagged product into the assembled cardboard cases by hand, with the number of bags based on the size of the case. GGF purchases specific cardboard cases according to finished product bag size to minimize extra space within the case. Product cases are stacked in layers on pallets in the production area. Stacks of product cases are bound with twine ("unitized") at the middle row and top row to stabilize the stack.

Shipping

After pallets are loaded with product cases, they are moved by pallet-jack from the production area to a staging area at the shipping dock. When the correct assortment of palletized products have been assembled to fill a customer order the loaded pallets are moved by forklift truck from the staging area into waiting truck trailers. Pallets are stacked in two layers before being loaded into the trailer. The last two pallets loaded into the trailer are unitized with stretch wrap to provide additional stability (like bookends) to the entire trailer load. The entire product order, including pallets and cardboard cases shipped are recorded in a tracking system. A trailer can hold thirty pallets of product. When a truck trailer is full it departs for its customer destination. Product shipment concludes the production-shipment cycle within two weeks from when the order is received.

In order to maximize efficiencies, GGF only transports only full truck trailer loads. In instances when a customer requires a partial trailer load, GGF assembles "virtual" truckloads, by stacking product cases in metal racks to simulate the size of a truck trailer. Product cases from separate orders are combined until enough cases are ready to be loaded into an actual truck trailer for shipment.

Receiving
Every day, truck trailers return empty product cases (cardboard boxes) and pallets to the warehouse from customer sites. Stacks of empty pallets are removed from the truck trailer by forklift truck. Empty pallets are inspected and those with obvious damage, or those not meeting GGF specifications, are removed from the stacks. The remaining pallets are moved to a storage area to await reuse. When needed, an empty pallet is moved to the production area for loading of product cases for the next customer order.

Receiving Department staff use the tracking system to record the quantity of empty pallets received and the location from which pallets were sent. If a customer does not return the same number of pallets as was shipped, or returns unusable pallets, then that customer is assessed the purchase cost for replacement of the equivalent number of pallets. Most pallets shipped to the distributors are returned to GGF and are reused, creating a closed-loop pallet recovery system. Pallets shipped to direct sales retailers, however, are not as likely to be returned, thus creating an open-loop pallet system, or pallets other than those shipped to the retailer may be substituted.

Receiving staff also accept deliveries of products and supplies necessary for their own production activities. GGF works with vendors to have products shipped on pallets that meet GGF specification for product shipments. For example, they specify that their supplier of new cardboard boxes ship those boxes on pallets that GGF can use in their product distribution system. About half of incoming vendor pallets meet GGF specifications and are reused. The remainder of vendor pallets are stored for some other future use, or are disposed of.

In addition to managing pallets, GGF Receiving staff receive flattened corrugated cardboard product cases returned from customers. The cardboard cases are returned to the warehouse for reuse in additional product shipments. Returned cardboard cases that have reached the end of their reusable life, or are not usable since they are not GGF boxes are loaded into an on-site baler. Cardboard bales are then sold to a paper processor who pays GGF for the baled corrugated cardboard.

Management of returned pallets and cardboard cases requires about five hours each day of staff time.

PALLETS

Pallet Circulation
GGF has approximately 5,500 pallets in circulation at a given time. Pallets are distributed among the corporate warehouse, in transit to a customer, at a customer's location, in transit back to the GGF warehouse, or temporarily out of circulation being repaired. The majority of pallets are returned to the corporate warehouse to be reused in a closed-loop recovery system in the following way:

Time	Activity

0 – 1 days	An empty pallet at the corporate warehouse is stacked with cardboard cases and loaded into a truck trailer.
1 day	Pallets and cardboard cases are on the road in a truck trailer. *
0 – 7 days	Pallets and cardboard cases arrive at a customer site. Pallets are unloaded and stored. Products are removed from cardboard cases. Cases are unfolded and stored. Stacked empty pallets and flattened cardboard cases are loaded onto the next truck trailer returning to the corporate warehouse.
1 day	Empty pallets and flattened cardboard cases are on the road in a truck trailer.
0 – 7 days	Empty pallets and flattened cardboard cases arrive at the corporate warehouse, are unloaded, inspected and stored until reuse.

* unless shipped by boat to Hawaii.

When a truck arrives at its destination it is unloaded. The 30 pallets of product are taken off, and under ideal conditions 30 pallets are loaded back onto the trailer while it waits. When the product is delivered to a distributor, the pallets that are reloaded into the trailer are likely to be the same pallets that were off-loaded with the prior shipment. This means that the distributor must have space to keep the GGF pallets separate from any other pallets they receive. The direct sales retailers are less likely to maintain separate stacks of pallets to return to selected vendors. They do not take the time as the pallets are unloaded to stack them by distributor, because there is no incentive for them to do so. This means that GGF gets fewer of its own pallets back from the retailers than it does from their distributors.

Lost Pallets. A portion of GGF pallets is lost from the closed-loop recovery system in the following ways:

- Not returned from direct sales retail customers
- Not returned from Hawaiian destinations from where it is too costly to return pallets
- Not returned from GGF Kaysville location (although they are not actually lost to GGF)
- Damaged and sent for repair
- Damaged beyond repair and disposed of (ground for biomass by Waste Management)
- Returned pallets are not GGF size or specifications, and disposed of

Vendor Pallets. Pallets received from vendors are sorted as they are unloaded. Those used vendor pallets that meet GGF specifications are introduced into the stockpile of pallets for product shipment, and GGF credits that vendor for the cost of a new pallet purchase. Used vendor pallets that do not meet GGF specifications are returned to the vendor, stored for unspecified uses, sold, or disposed of.

New Pallets. To make up the difference between pallets lost from circulation and vendor pallets introduced into circulation, GGF purchases new pallets each month. New pallets are purchased whenever staff notices that stacks of available empty pallets are “getting smaller”. GGF purchases new wooden 4-way pallets based on size (pallets must conform to the Grocery Manufacturers of America (GMA) size specifications) and low cost. The pallet vendor was chosen based on their ability to supply pallets that satisfied GGF criteria, as well as having pallets that are readily

available locally and easy to order. GGF submits an order to their vendor based upon the previous order so very little time is required to process each new pallet purchase order.

Repairable Pallets. GGF temporarily loses a portion of pallets from circulation due to repairable damage. Damaged pallets are sent for repair when staff notices that the stacks of damaged pallets are "getting larger". GGF pays their pallet vendor to repair their pallets.

Irreparable Pallets. A portion of GGF pallets is permanently lost from circulation when they are returned with irreparable damage (or damaged at the facility). GGF collects irreparable pallets in a designated wood bin from where they are hauled to the Davis Street Transfer Station in San Leandro to be ground for biomass.

Injuries

Pallet related injuries are not uncommon. Injuries related to the use of pallets add to a company's overall costs in the form of worker's compensation payments. Pallets may have protruding nails, or split, weak, or missing boards that could directly injure a worker. A worker might incur a back or shoulder injury when attempting to move or lift one or more pallets by hand. A worker might step on a pallet surface and have a leg injury related to board spacing. Any time a worker is injured on the job it is a cost to the company.

GGF has instituted several policies related to minimizing pallet-related injuries. For example, GGF policies prohibit staff from stepping on pallet surfaces. Additionally, when loading product cases onto pallets, the cases must be stacked one layer at a time instead of stacking cases into unstable tall columns. By minimizing injuries, GGF not only protects the well being of their staff, but also minimizes costs related to worker's compensation payments.

CARDBOARD PRODUCT CASES

Cardboard Product Case Circulation

GGF has tens of thousands of cardboard product cases in circulation at a given time. Nearly 10,000 cases are shipped each day. The boxes hold an average of 8 bags each, depending on the size of the bag. Cardboard cases follow a similar circulation between GGF and its customers, as GGF pallets do. Unlike wood pallets, however, cardboard product cases are not repairable. The majority of cardboard cases are able to make four or five round trips before they reach the end of their reusable life and are removed from the system for recycling. At any one time, approximately 80 percent of cardboard product cases in circulation are used. GGF purchases new cardboard product cases at a cost of about $0.40 per case, or about $0.05 per bag of product shipped, if the box is used only once. However, GGF is able to amortize the cost of the cardboard product case over the number of trips it can make. Therefore, GGF keeps costs down when they keep product cases in circulation for the maximum number of trips.

Cardboard Product Case Rebate Program. To encourage their customers to return cardboard cases so that they can be reused, GGF has established a rebate program. The rebate program operates in this way: GGF initially purchases cardboard cases for $0.40 per case. GGF charges

customers $0.30 per product case as part of the cost of product shipment. Customers unfold and stack cardboard cases on empty pallets for return to GGF. GGF rebates the customer $0.40 for each returned cardboard case returned, netting the customer $0.10 per case for their efforts. In turn, GGF has a continual stream of corrugated product cases at a cost of only $0.10 per case for the lifetime of the case. As a result, GGF saves $0.30 from each case reused. Before the cardboard rebate was inaugurated, approximately half of corrugated cardboard cases in circulation were returned. Since the rebate program, nearly 80 percent of cardboard cases are circulated back into the system.

ANALYSIS

Current Pallet System Costs

On average twelve truck loads of product are shipped per day with thirty pallets in each load. If they shipped only on new pallets and did not get any back, GGF would alleviate some handling costs, repair costs, and disposal costs, but would spend $6.00 per pallet on purchases of 360 new pallet pallets shipped every day, for a total cost of $2,160 per day.

Table 1 summarizes GGF current costs for pallet use in product shipments to distributors and to direct sales retailers. There is a significant difference in the cost of shipping pallets to distributors and of shipping pallets to retailers.

Overall, GGF spends an average of $1.18 for each pallet shipped in the current system – $0.62 for each of 252 pallets shipped daily to distributors in a largely closed-loop pallet recovery system, and $2.49 for each of 108 pallets shipped daily to retailers in a largely open-ended pallet system. This is considerably less than a cost of $6.00 for each pallet shipped if GGF had to purchase a new pallet for each product shipment as required in a completely open-ended pallet system.

Distributor Circulation. GGF receives about 96 percent of their pallets back from their distributors. Of these returned pallets, the majority are ready to be immediately reused in further product shipments. About four percent of returned pallets, however, are unusable in the condition in which they are returned – either damaged but repairable (three percent), or otherwise unusable (one percent). Pallets that are damaged but repairable are sent for repair to the same company from which GGF buys pallets. Pallets that are damaged beyond repair or do not meet GGF specifications are disposed of -- collected in a wood bin, hauled by Waste Management Inc., and ground for biomass. About four percent of pallets shipped to distributors are not returned at all.

In this closed-loop pallet recovery system, GGF must pay pallet handling costs, repair costs, disposal costs, and purchase costs. Overall costs for the 252 pallets shipped to distributors each day equates to $0.62 per pallet shipped, daily, a significant improvement over the $6.00 per pallet daily cost if GGF shipped only on new pallets and did not get any back. Overall, this closed-loop

pallet recovery system saves GGF about 90 percent of the cost of purchasing entirely new pallets for shipments to distributors.

Direct Sales Retailer Circulation. GGF receives about 75 percent of their pallets back from their direct sales retailers. Of these returned pallets, slightly more than half (56 percent) can be immediately reused in further product shipments. However, 19 percent of returned pallets are unusable in the condition in which they are returned – either damaged but repairable (11 percent), or otherwise unusable (eight percent). Directly unusable pallets are either sent for repair or dumped into the wood bin, as appropriate. About 25 percent of pallets shipped to distributors are not returned at all.

In their direct sales to retailers loop GGF replaces an average of 34 pallets per day. At an average weight of 40 pounds per pallet, 1360 pounds of wood are consumed each day in new pallets, and over the course of the year about 200 tons of wood are discarded to landfill or recycled to fuel just from this 30% of the GGF product distribution system. With a return rate equal to that of the closed loop system, GGF would only need to replace about 8 pallets per day.

In the "semi-closed-loop" pallet recovery system, GGF must pay pallet handling costs, repair costs, disposal costs, and purchase costs. Overall costs for the 108 pallets shipped to retailers each day equates to $2.49 per pallet shipped, daily. While this is a significant improvement over the $6.00 per pallet daily cost if GGF shipped only on new pallets and did not get any back, it is about four times the cost of the $0.62 per pallet shipped in the distributor pallet loop. The cost in the retailer part of the pallet system is higher because of the greater loss of pallets (33 percent either permanently unusable or not returned). Overall, the retailer pallet system saves GGF about 60 percent of the cost of purchasing entirely new pallets for shipments to retailers.

Vendor Pallets. GGF receives much of their production supplies on pallets. Where they can, GGF uses the incoming pallets to replace some of the non-returned and non-repairable pallets. On average, 35 pallets are received each day. GGF encourages vendors to provide their supplies on pallets they can utilize in their system, but not all comply. For example, while this report was being prepared, the supplier of the cardboard product cases changed ownership. Even though the purchase agreement required the vendor to ship boxes on four-way GMA pallets, the supplier switched to two-way pallets (which are less expensive) to save money, since the supplier was not expecting to get the pallets back. GGF then had a stack of almost new pallets that they could not utilize in their system. They were evaluating the alternatives of shipping the pallets back to the box supplier, or trying to sell the pallets on the local market.

Table 1. PALLET USE COSTS				
Shipping			30	Pallets per trailer
# trailers departing warehouse (daily)	12		360	Total pallets shipped, daily
% pallets shipped to distributors	70%		252	Pallets shipped to distributors
% pallets shipped to direct sales retailers	30%		108	Pallets shipped to direct sales retailers
Cost per new pallet	$ 6.00		**$2,160.00**	**Costs of new pallets, daily**
			$ 6.00	**Cost per pallet shipped, daily**
Distributor System - Receiving			252	Pallets shipped, daily
% of shipped pallets returned reusable	92%		232	Empty pallets returned and reusable, daily
Costs of handling a returned pallet	$ 0.25		**$ 60.48**	**Costs of handling returned pallets**
% of shipped pallets returned damaged	3%		7.3	Pallets returned damaged (for repair)
Cost to repair pallet, per pallet	$ 2.50		**$ 18.14**	**Cost of pallet repair**
% of shipped pallets returned unusable	1%		2.4	Pallets returned unusable
Cost of disposal, per unusable pallet	$ 1.00		**$ 2.42**	**Cost of pallet disposal**
% of shipped pallets not returned	4%		10.1	Shipped pallets not returned
			12.5	New pallets needed daily
Cost of new pallet, per pallet	$ 6.00		**$ 75.00**	**Cost of replacement pallet purchases**
			$ 156.04	**Costs of pallets, daily**
			$ 0.62	**Cost per pallet shipped, daily**
Retailer System - Receiving			108	Pallets shipped, daily
% of shipped pallets returned reusable	56%		61	Empty pallets returned and reusable, daily
Costs of handling a returned pallet	$ 0.25		**$ 20.25**	**Costs of handling returned pallets**
% of shipped pallets returned damaged	11%		12.2	pallets returned damaged (for repair)
Cost to repair pallet, per pallet	$ 2.50		**$ 30.38**	**Cost of pallet repair**
% of shipped pallets returned unusable	8%		8.1	Pallets returned unusable
Cost of disposal, per unusable pallet	$ 1.00		**$ 8.10**	**Cost of pallet disposal**
% of shipped pallets not returned	25%		27.0	shipped pallets not returned
			35.1	Total # of new pallets needed daily
Cost of new pallet, per pallet	$ 6.00		**$ 210.60**	**Cost of replacement pallet purchases**
			$ 269.33	**Costs of pallets, daily**
			$ 2.49	**Cost per pallet shipped, daily**

Current Cardboard Product Case System Costs

Table 2 summarizes GGF current costs for cardboard product cases used in product shipments to distributors and to direct sales retailers.

GGF current cardboard product case system costs an average of $0.18 for each cardboard case shipped, which includes costs for purchase, handling, rebate program and revenue from recycled cardboard. This is a 55 percent cost savings over the $0.40 for each cardboard case shipped if each case was purchased new. GGF low cost per cardboard case is largely due to the cost savings from their customer rebate program, and through revenue generated by recycling cardboard boxes that have reached the end of their useful life.

GGF ships an average of 9,720 cardboard product cases daily. Overall, about 90 percent of all cardboard cases shipped to customers are returned to GGF. Of these, about ten percent are returned unusable and must be recycled. The remaining 80 percent returned through GGF rebate program in reusable condition. About ten percent of cardboard cases shipped are not returned.

GGF pays $0.40 for each new cardboard case to replace the cases returned unusable and the cases never returned. GGF needs to replace 1,944 cases every day (20 percent of the 9,720 cases shipped daily) for a daily cost of $777.60 for new cardboard case purchases.

GGF handles each of the 8,748 cardboard cases returned every day (90 percent of the 9,720 cases shipped daily), both those that are immediately reusable and those that are to be recycled. At a cost of about $0.05 for handling each case, the daily cost of handling of returned cardboard cases is $437.40.

GGF has established a rebate program to encourage customers to return cardboard cases so that they can be reused. GGF charges customers $0.30 per cardboard case shipped, and rebates customers $0.40 for each cardboard case returned. The customer "realizes a net revenue" of $0.10 for each case returned. In this way, GGF pays only $0.10 per cardboard case as often as it can be reused. For the 7,776 cases returned in the rebate program every day (80 percent of the 9,720 cases shipped daily) the net daily cost is $583.20 for their rebate program.

GGF recycles all cardboard cases that have reached the end of their usable life. GGF generates between 11 and 12 bales of cardboard each week and in 1998 was paid approximately $50 per ton for baled cardboard by their paper recycler. An average of 972 cardboard cases (10 percent of the 9,720 cases shipped daily) are recycled every day. This generates daily revenue to GGF of $67.55 for the baled cardboard.

Table 2. CARDBOARD PRODUCT CASE USE COSTS				
Distribution System – Shipping				
# pallets per trailer	30		27	product cases per pallet
# trailers departing warehouse (daily)	12		810	Product cases per trailer
			9,720	Cardboard product cases shipped daily
average # trips per box	5			
purchase cost for new case, each	$ 0.40		**$ 3,888**	**Purchase cost for new cases, daily**
			$ 0.40	**Costs per case shipped, daily**
Distribution System – Receiving				
% cases shipped to distributors	70%		6,804	Cases shipped to distributors
% cases shipped to direct sales retailers	30%		2,916	Cases shipped to direct sales retailers
% of cases returned and reusable	**80%**		**7,776**	**Of cases returned and reusable (daily)**
% of cases - not returned	**10%**		**972**	**Of cases lost to system (replace) (daily)**
% of cases returned but not reusable	**10%**		**972**	**Of cases unusable (daily)**
			1,944	**Total # of cases to be replaced, daily**
purchase cost for new case, each	$ 0.40		**$ 777.60**	**Purchase cost for new cases, daily**
Cardboard Recycling Program				
# bales of cardboard/week	11.5		0.59	Tons/bale of OCC
# tons cardboard generated per week	6.75		$ 337.50	Per week revenue from baled cardboard
$ per ton for baled cardboard	$ 50		$ 0.07	Revenue per case, baled
cases recycled per week	4856.1			
cases recycled daily	971.22		**10%**	**Cases recycled, daily**
wt. per case (lb.)	2.78		**$ 67.55**	**Daily revenue from baled cases**
Rebate System – Receiving			9,720	Cases shipped, daily
% of shipped cases returned	90%		8,748	Empty cases returned, daily
Costs of handling a returned case	$ 0.05		**$ 437.40**	**Costs of handling returned cases**
% of shipped cases returned reusable	80%		7,776	Empty cases returned and reusable, daily
Deposit charged per case	$ 0.30		$ 2,916.00	Deposit revenue
Refund paid per case	$ 0.40		$ 3,499.20	Refund costs
			$ 583.20	**Net cost of refunds (deposits – refunds)**
% of shipped cases returned unusable	10%		972	shipped cases returned unusable
Value of recycled material ($/ton)	$ 50		**(67.55)**	**Revenue from OCC recycling, daily**
% of shipped cases not returned	10%		972	shipped cases not returned
			1,944	Total # of new cases needed daily
Cost of new case, per case	$ 0.40		**$ 777.60**	**Cost of replacement case purchases**
			$1,730.65	**Costs of product cases, daily**
			$ 0.18	**Costs per case shipped, daily**

SUMMARY

GGF has taken a series of steps to reduce costs and wastes generated through the distribution of their product. These steps save GGF over $3.50 per pallet shipped, and over $0.20 per cardboard case shipped. However, GGF has not implemented programs to maximize the benefits of these program elements. GGF has not established the same rebate and direct incentive payment program to encourage retailers to return pallets, as they have with cardboard product cases.

GGF has a rebate and incentive program that encourage the return of the cardboard product cases, but they still use cardboard boxes that have an average life of five trips before they have to be replaced. Use of a more durable shipping container has the potential for further reducing costs and waste generation.

Two alternative scenarios are presented that would further reduce GGF pallet and product case system costs and waste generation rates.

The first scenario is an analysis of alternative pallet systems for shipments to direct sales retailers. The three systems to be analyzed are a Pallet "Rebate" Program, a 3rd Party Pallet Management System, and Pallet Replacement Penalty System. Each system would be evaluated to determine the effectiveness of the alternative in reducing waste and for its overall cost to GGF.

The second scenario would be to test three container types as alternatives to corrugated cardboard boxes for shipping products to retailers and distributors. Each of these systems would be evaluated to determine the effectiveness of the alternative in reducing waste and for its overall cost to GGF.

SCENARIO A: ALTERNATIVE PALLET SYSTEMS FOR SHIPMENTS TO DIRECT SALES RETAILERS

Objectives

- To evaluate alternative pallet systems for shipments to direct sales retailers.
- To identify the pallet system that provides the lowest operating cost for new pallet purchase, used pallet repair, and used pallet disposal.

Strategy

1. Test, evaluate and compare three alternative pallet systems selected options:

   A. Pallet "Rebate" Program
   In a pallet rebate program, GGF would purchase and clearly label a set of new pallets. For each pallet load shipped to the direct sales retailer, a deposit fee of $2.00 per pallet would be added to the cost of the order. In turn, the direct sales retailer would keep the pallets separate, and receive a rebate of $3.00 (the deposit fee, plus an incentive amount) per pallet, for each of GGF pallets returned to GGF. In this way, the direct sales retailer would be motivated to return pallets, and GGF would reduce the cost per trip for each pallet by increasing the number of trips per pallet.

   B. 3rd Party Pallet Management System
   In a 3rd party pallet management system, GGF would rent the number of pallets required to ship products to two retailers. GGF would ship products on the 3rd party company pallets (no pallet purchase required). The management company would retrieve (and repair as necessary) the shipped pallets directly from the direct sales retailer location without further GGF involvement. The management company would continue to provide GGF with additional pallets to ship product.

   C. Pallet Replacement Penalty System
   In GGF current distribution system, GGF ships new pallets to direct sales retailers. For the pallets that the retailers do not return, a financial penalty equivalent to the replacement cost of a new pallet is assessed. To avoid the penalty replacement cost, retailers return a pallet. However, it is not always GGF pallet, or even a pallet of similar size or quality or condition. In these cases, GGF must still replace the pallet with a new one meeting GGF specifications. For those pallets which are not usable by GGF, GGF would impose the same financial penalty as they do for non-return of pallets.

2. Operation: Data would be gathered on:
   - ✓ impact on cost competitiveness of product sales*
   - ✓ time, materials and cost to establish program
   - ✓ time, materials and cost or savings to operate program
   - ✓ purchase or rental costs for new pallets
   - ✓ pallet return statistics
   - ✓ frequency of replacement pallets
   - ✓ number of trips per pallet
   - ✓ usability and handling of pallets
   - ✓ number and nature of pallet-related injuries
   - ✓ damage and repair cost statistics
   - ✓ time and ease of interactions with pallet companies
   - ✓ pallet disposal costs

3. Evaluation & Analysis: System alternatives would be evaluated to determine:
   - ✓ overall time required to purchase/rent, use, and dispose of pallets in each system
   - ✓ overall cost of purchase/rental, use, and disposal of pallet in each system
   - ✓ overall advantages and disadvantages of each system

4. Recommendation: The most efficient and lowest cost pallet system for shipment of product to direct sales retailers would be identified and recommended to GGF.

* It is believed that since there is a deposit system on the cardboard cases that has not had a negative impact on sales, that a similar rebate of ‘more than the deposit’ system for pallets would not create an unwillingness by the retailers to purchase the product.

PALLET REBATE PROGRAM SCENARIO DETAIL

Pallet Rebate System for Direct Sales Retailers

It has been shown that costs increase with an increase in the number of pallets lost from circulation. Since most of GGF pallet loss is through the direct sales retailer pallet system, the following proposed pallet rebate system, based upon GGF own cardboard product case rebate program, may increase pallet return from retailers and thus, lower GGF overall costs. The rebate program model has been successful for GGF in getting product cases returned from these same retailers.

The pallet rebate system would operate as follows: GGF charges retailers $2.00 per pallet as part of the cost of product shipment. Retailers return empty pallets to GGF for a rebate of $3.00 for each returned pallet, netting retailers $1.00 per pallet for their efforts. In turn, GGF has a continual stream of pallets at a reduced cost for the lifetime of the pallet. After costs for the rebate, pallet repair, disposal, and new pallet purchase, overall per pallet costs are still lower by using the rebate program than by using the current "semi-closed-loop" pallet system. If the rebate system nets a 60 percent pallet return (only slightly greater than the current 56 percent return), per pallet costs are $2.15, or a 14 percent cost reduction over current per pallet costs. If the rebate system nets a 90 percent pallet return, per pallet costs drop to $1.42, or a 43 percent cost reduction. Greater than 90 percent return rate is not considered achievable since some of the pallets are damaged and some are shipped beyond returnable range (e.g., to Hawaii). The analysis shows that increasing pallet return rate decreases per pallet shipping costs.

Table A-1 summarizes the projected costs for the pallet rebate system. Three scenarios are presented to demonstrate the sensitivity of the rate of return of reusable pallets. This analysis shows that the higher the return-rate, the lower the cost of providing pallets in the system. The actual costs of the system would be determined by the return rate achieved.

Table A-1. PALLET REBATE SYSTEM COSTS				
Retailer Rebate System – 60% Return			108	pallets shipped, daily
% of shipped pallets returned reusable	60%		65	empty pallets returned and reusable, daily
Costs of handling a returned pallet	$ 0.25		**$ 21.60**	**Costs of handling returned pallets**
Deposit charged per pallet	$ 2.00		$ 216.00	Deposit revenue
Refund paid per pallet	$ 3.00		**$ (21.60)**	**Cost of refunds (deposits – refunds)**
% of shipped pallets returned damaged	10%		10.8	pallets returned damaged (for repair)
Cost to repair pallet, per pallet	$ 2.50		**$ 27.00**	**Cost of pallet repair**
% of shipped pallets returned unusable	10%		10.8	pallets returned unusable
Cost of disposal, per pallet	$ 1.00		**$ 10.80**	**Cost of pallet disposal**
% of shipped pallets not returned	20%		21.6	shipped pallets not returned
			32.4	Total # of new pallets needed daily
Cost of new pallet, per pallet	$ 6.00		**$ 194.40**	**Cost of replacement pallet purchases**
			$ 232.20	**Costs of pallets, daily**
			$ 2.15	**Cost per pallet shipped, daily**
Retailer Rebate System – 75% Return			108	pallets shipped, daily
% of shipped pallets returned reusable	75%		81	empty pallets returned and reusable, daily
Costs of handling a returned pallet	$ 0.25		**$ 24.30**	**Costs of handling returned pallets**
Deposit charged per pallet	$ 2.00		$ 216.00	Deposit revenue
Refund paid per pallet	$ 3.00		**$27.00**	**Cost of refunds (deposits – refunds)**
% of shipped pallets returned damaged	10%		10.8	pallets returned damaged (for repair)
Cost to repair pallet, per pallet	$ 2.50		**$ 27.00**	**Cost of pallet repair**
% of shipped pallets returned unusable	5%		5.4	Pallets returned unusable
Cost of disposal, per pallet	$ 1.00		**$ 5.40**	**Cost of pallet disposal**
% of shipped pallets not returned	10%		10.8	shipped pallets not returned
			16.2	Total # of new pallets needed daily
Cost of new pallet, per pallet	$ 6.00		**$ 97.20**	**Cost of replacement pallet purchases**
			$ 180.90	**Costs of pallets, daily**
			$ 1.68	**Cost per pallet shipped, daily**
Retailer Rebate System – 90% Return			108	pallets shipped, daily
% of shipped pallets returned reusable	90%		97	empty pallets returned and reusable, daily
Costs of handling a returned pallet	$ 0.25		**$ 25.92**	**Costs of handling returned pallets**
Deposit charged per pallet	$ 2.00		$ 216.00	Deposit revenue
Refund paid per pallet	$ 3.00		**$ 75.60**	**Cost of refunds (deposits – refunds)**
% of shipped pallets returned damaged	4%		4.3	pallets returned damaged (for repair)
Cost to repair pallet, per pallet	$ 2.50		**$ 10.80**	**Cost of pallet repair**
% of shipped pallets returned unusable	2%		2.2	pallets returned unusable
Cost of disposal, per pallet	$ 1.00		**$ 2.16**	**Cost of pallet disposal**
% of shipped pallets not returned	4%		4.3	shipped pallets not returned
			6.5	Total # of new pallets needed daily
Cost of new pallet, per pallet	$ 6.00		**$ 38.88**	**Cost of replacement pallet purchases**
			$ 153.36	**Costs of pallets, daily**
			$ 1.42	**Cost per pallet shipped, daily**

SCENARIO B: ALTERNATIVE PRODUCT SHIPPING CONTAINERS

Objectives

- To evaluate alternative shipping cases for shipments to distributors.
- To identify the shipping case that provides the least cost and most shipments.

Strategy

1. Identify three alternative containers to corrugated cardboard boxes for product shipments. Select and purchase the containers necessary. Test and evaluate the

Operation: Data would be gathered on:

✓ time, materials and cost to establish program
✓ time, materials and cost to operate program
✓ container return statistics
✓ frequency of replacement containers
✓ number of trips per container
✓ usability and handling of containers
✓ damage statistics
✓ repair frequencies/costs
✓ container disposal costs

2. Evaluation and Analysis: System alternatives would be evaluated to determine:
   ✓ overall time related to purchase, use, and disposal of each shipping container
   ✓ overall cost of purchase, use, and disposal of each shipping container
   ✓ overall advantages and disadvantages of each type of container

3. Recommendation: The most efficient and lowest cost shipping container system for shipment of product to direct sales retailers would be identified and recommended.

ATTACHMENT A: THE ROLE OF PALLETS IN TRANSPORTATION

This analysis is provided to assess the role of pallets in warehousing and transporting products. The following research is based on information derived from the pallet industry, selected businesses, governmental agencies, and educational institutions. A listing of pallet alternatives is presented in Table A-1: "Pallet Comparison Matrix."

Pallets were designed to save companies time and money by allowing products to be quickly and easily loaded for shipment with a forklift or pallet jack. The shipper has many alternative shipping platforms to choose from. Some options are more cost effective than others. Some alternatives generate a significant amount of waste, and some contribute to waste prevention.

1. PALLET USE PATTERNS

Pallets are used primarily to move products within production facilities, from one location to another, and from the manufacturer to the buyer. To evaluate a pallet a user must determine the cost per trip. There are three basic patterns to pallet use.

1. <u>One-Way, Single Use</u>

Pallets shipped with merchandise from a manufacture are commonly abandoned at the destination. In this case, the cost of the pallet becomes a part of the cost of shipping the product. Therefore, buying a cheap pallet reduces operating costs. The durability and repairability of the pallet are not serious concerns, because the buyer does not expect to use the pallet more than once.

Abandoned pallets are a significant concern for retailers. Pallets tend to pile up around the loading docks, and may even block access. Employees or truck drivers may be injured trying to move stacks of pallets out of the way. Disposing of the pallets is a direct cost to the retailer, which normally comes directly from profits.

<u>2. Closed-Loop Systems</u>

In cases where the pallets are part of a closed-loop distribution system, the pallets are shipped with merchandise from one location to another, but are then returned to the manufacturer or distribution center, and are reused. In this case, durability and repairability are important considerations.

The cost per trip evaluation includes repair costs, damaged goods costs, workers' compensation costs relating to injuries caused in moving pallets, and handling and housekeeping costs, but not sorting since typically only one type of pallet would be used.

The biggest problem in closed-loop systems is that the pallet returned may not be the same one, or of the same size and quality, as the one shipped.

3. <u>Multiple-Use, Leasing Systems</u>

In multiple-use leasing systems, individual product manufacturers do not have the expense of buying and maintaining an inventory of pallets. Instead, vendors ship products to retailers on the leasing company's pallets. When the retailer unloads the pallets, they are not abandoned, but the leasing company collects, sorts, and repairs the pallets as necessary. The leasing company then ships the pallets off to another local manufacturer, rather than shipping them back to the point of origin.

Companies using the leasing services must pay a deposit fee and a rental fee for a truckload of pallets. Some companies (e.g., CHEP) charge a per day use fee. The rental company charges the deposit fee to the primary user of the pallet (manufacturer). The manufacturer charges the fee to their customer (the retailer) when they ship the products. The retailer recovers the fee when the pallets are returned to the rental company. The returned pallets are sorted, repaired as necessary, and shipped to another user.

Large retailers may encourage their vendors to supply products on these pallets to reduce their handling costs. In Canada 70% of pallets in use are owned by members of the Canadian Pallet Council (CPC), an industry controlled, member serviced, voluntary pallet exchange program. Most of the remaining pallets are owned by leasing companies. This is increasingly common in the USA as the industry share of discount retail stores expands. CHEP Pallets is one of several companies that lease pallets to users in the United States [they lease worldwide].

The pallet rental companies (such as CHEP) provide an infrastructure to move pallets between pallet users and pallet accumulators (shippers and receivers), and alleviating the need for companies to buy and dispose of pallets.

For the most part pallet rental companies only supply 48" x 40" pallets. Diversified economies demand more sizes of shipping platforms. There have been numerous attempts at standardizing pallet size in the U.S. (The GMA pallet was one such attempt by the Grocery Manufacturers of America to standardize pallets in the grocery industry.) Some industries use different size pallets. Industries with special needs are not likely to ever use a pallet rental fleet since that would entail changing all of their automated materials handling equipment.

Disposal of scrap pallets has become a more important environmental concern as tipping fees have increased. These issues have started a trend toward more companies controlling their pallets themselves or in a pallet rental system. More and more companies are beginning to take serious looks at how they can control their pallets through a round-trip cycle. This will change companies' views of pallets from expenses to assets. On their balance sheets and income statements more companies will capitalize their pallets and fewer will treat them as shipping expenses.

However, as the price of wood has continued to rise, making the cost of pallets higher, the value of recovered pallets, and hence their demand, has also increased. The prices continue to fluctuate, so no specific pallet reuse patterns have developed.

2. PALLET USE ISSUES

The primary considerations in selecting a shipping pallet are related to costs. This includes the initial purchase price and the cost per trip. The size of the platform, weight of the pallet, load bearing capacity, conditions of use and recovery, durability, repairability, special features (e.g., sterility), and ease of use are other important features. Each of the pallets available has some benefits and drawbacks when compared with other alternatives.

The purchase price of an individual pallet is directly related to a number of factors including the number of units manufactured, the type of materials used, and the quality of construction. The investment in a more expensive and more durable pallet is only worthwhile if it will be used more than once. The cost per trip is primarily a response to whether the pallet will be used more than one time by the buyer. When a pallet is reused, its price should be divided by the number of trips it is designed to make before replacement to determine the cost per trip.

The most common pallet size is the 48” x 40” GMA pallet, manufactured to be easily loaded onto a flat bed trailer or into an enclosed trailer. Other pallet sizes are used to ship specific sized products. Using a standard sized pallet is an important consideration in determining if other firms can use the pallet after its initial use. Wood and plastic lumber pallets can be easily manufactured in many sizes. Injection molded plastic pallets are much more expensive to make in a non-standard size.

The weight of the pallet affects the amount of product that can be shipped in a load. When shipping heavy or bulky products, the cost of shipping the weight and space of the pallet must also be taken into consideration. Shipments of heavy materials are limited by the legal weight that the truck can carry. In these cases, having a lighter weight pallet could allow the shipment of more product in a load. Sometimes, the size of the inside of a trailer is the limiting factor in shipment of boxed products. In these cases, having a lower profile pallet (or slip sheet) might allow the shipper to get more product in a load. When shipping light weight products, the space taken by the pallet reduces the amount of product which can be shipped in a load.

The “load bearing capacity” of the pallet determines how much product can be loaded on an individual pallet, and how many pallets will be needed to ship a given weight of product. The crush strength of the cartons loaded on the pallet also contributes to how high the product can be stacked on a single pallet, and how many “unitized” pallet loads can be stacked.

The “conditions of use” relate to whether the pallet is used only in a warehouse or within a plant and is shipped within a closed-loop system where the pallet is returned to the primary user, or if the pallet is used to ship products one way to product buyers and not returned. Since pallets are commonly used only once, it may not be possible to recover the cost of a durable pallet. However if it is to be recovered and reused, the quality of the pallet becomes more important.

Pallet “durability” describes how well the pallet withstands degradation in normal use, while “repairability’ describes how easy it is to repair damage which does occur to the pallet. The durability of various pallet types is ranked against each other on the attached Pallet Comparison Matrix. Durability is considered to be low if the pallet is easily damaged in normal use and would

not be expected to survive more than a few trips. Durability is considered to be high if the pallet is designed to withstand normal wear and tear for an extended period of use. Durability is considered to be medium if it is ranked between high and low. Repairability is considered to be low if the pallet is difficult or impossible to repair when damaged. Repairability is considered to be high if the pallet is easily fixed when damaged. Repairability is considered to be medium if ease of repairing the pallet is between low and high.

The life-cycle cost of pallets is related to the number of trips which it makes, which in turn is influenced by the damage suffered in normal use, the repairability of the pallet, and the cost of labor to do the repairs. Other factors which are not normally included in this analysis but which may be significant in certain circumstances include the cost of storage space, sorting many different sizes and types of pallets, damaged goods costs, worker injuries, workers' compensation costs, disposal costs, and housekeeping costs – delays in loading and unloading shipments caused by unloaded pallets being left in the wrong place.

3. PALLET ALTERNATIVES

Traditionally, pallets have been constructed from wood. Recently, pallets have become available in a large variety of other material types. The selection of the optimum pallet requires balancing the features described above with the benefits of each material type.

Wood Pallets. The standard wood pallet, also known as the GMA (Grocery Manufacturers Association) Pallet, is 48" x 40" so that they can fit into an enclosed shipping trailer. Most commonly pallets are moved about from the wider side, but to load an enclosed container, they must be moved from the narrow end also. This means that they need to be designed so that they can be picked up either from the wider side or the narrow end. These are called four-way pallets. Most pallets are constructed of cheap softwoods, so that the pallets are inexpensive. As wood has gotten more expensive, the quality of wood used for pallets has gone down. Pallets that are not well constructed can cause the product to be damaged.

To increase durability, pallets may be constructed of hardwood, use larger spacers (e.g., 4”x 4” instead of 2”x 4”s), and have less space between slats, to be more durable, but they are heavier.

Wood pallets contribute to many injuries because they are heavy, and have sharp edges when broken. Some pallets are designed to be lighter weight or more durable, but are likely to cost more to purchase. The purchase price must be balanced with the durability to provide a life-cycle cost.

Wood pallets are the industry standard, and are used for almost all applications. As alternative shipping platforms are more available, wood pallet use is now declining where sterile conditions are important, where the load is very heavy, or where pallets are being replaced by slip sheets to reduce the impacts of discarded pallets.

Armored Pallets. An Alameda County based company, Marathon Pallets, increases durability of their pallets by using plastic lumber on the leading edges, blocks and stringers to provide better protection against damage by the forks of the lift. This protection reduces the need for repair and

replacement, and the added durability improves the life-cycle cost. In another design to increase durability, the boards on the leading edges are covered with sheet metal to provide protection. However, the metal may peel up and damage merchandise or injure workers.

Armored pallets are more expensive to construct because of the additional materials handling during manufacture. However their increased durability offsets the higher cost to potentially provide a lower life-cycle cost.

Plastic Pallets. Two types of standard plastic pallets are manufactured. In plastic lumber pallets, plastic lumber is substituted for wood, and individual boards are nailed together. Injection molded pallets, made from one or two large sections (a top surface with spacers, or a top and bottom surface) are more commonly used than plastic lumber pallets. Plastic pallets are uniform in dimension and are easily cleaned and sterilized. However, they are heavier and are more expensive than wood pallets. They also have slick surfaces, and flex if not fully supported from below (e.g., when placed on storage racks in big box discount stores). Since they are injection molded, they are made almost entirely from primary (non-recycled) materials.

Plastic pallets are used primarily in closed-loop systems where the expense of the pallet can be amortized over multiple trips. They are heavily used in food service applications so the pallets can be sterilized, and in the automotive industry so that spilled petroleum products can be removed.

Nestable pallets can be made by forming indentations in the upper surface so that the spacers from one pallet fit into the spacers of another pallet. These Single-surface molded plastic pallets can be stacked in about 60% less space than standard pallets, so they require less warehouse storage capacity and occupy less of the trailer capacity if they are shipped back to the supplier. They are primarily used when the pallet can be returned for reuse to the same company that shipped product on it.

Pressed Wood. Pressed wood pallets have a solid (sheet) surface made from lower-grade recycled wood (e.g., oriented strand board), instead of dimensional lumber. These pallets may have an increased load bearing capacity. Pressed Wood pallets are made with inexpensive materials, are quickly assembled, and are ideal for shipping many small items. These single surface pallets may be lighter, since they generally have spacers but no bottom boards, but this may mean that they can't be stacked. This type of pallet is used primarily by the building materials industry.

Fiber Pallets. Fiber-formed pallets are made from molded paper. They are light weight and single surface pallets can be manufactured to be nesting, so that up to 100 fiber pallets will fit in the same space as about 13 wooden pallets. These pallets have limited load bearing capacity, and will not hold up if they get wet. They can easily be recycled with mixed paper.

Corrugated fiberboard pallets are made from multi-layered corrugated paperboard. They are relatively lightweight and have high load bearing capacity, but they are not very durable. They are best for single use shipments where the pallet is not easily returned to the user, since they can be recycled in with cardboard boxes. Their use may be problematic in wet weather conditions, although they can be made from polycoated OCC.

Fiber pallets are used primarily in one-way shipping (especially for export) by the paper industry, for shipping lightweight products (e.g., insulation and ceiling tiles), and for shipping industrial parts. These pallets are also used in the grocery and automotive industries.

Metal Pallets. Wire-mesh and metal rack pallets are strong and durable, but are heavy and expensive. When damaged they are recyclable with scrap metal. Metal pallets are used primarily in closed-loop systems, for moving heavy equipment, by the military and in the aerospace industry.

Solutions to Specific Needs. Some types of pallets present solutions to specific problems. For example, plastic and metal pallets can be sterilized, which is a benefit to the food handling industry. There have been cases where wood pallets infested with bugs have caused damage to food in shipment, or pallets infested with termites have caused damage to warehouses.

4. PALLETS ALTERNATIVE

Slip Sheets. The primary alternative to the use of pallets is slip sheets. Slip sheets are thin layers of fiber or plastic. Fiber slip sheets may be made from chipboard or corrugated cardboard. Plastic slip sheets are made primarily from acrylic plastic. Stacks of product to be shipped are loaded on the slip sheets and "unitized" (wrapped, banded or strapped to hold them together). The sheet allows loads to be slipped onto or off of the lift forks using a special "push-pull" attachment which is needed at both the shipping and receiving ends to load and unload products. The attachment may cost up to $8,000 per unit.

Slip sheets require much less truck and warehouse space. They are less expensive than pallets, and are safer to handle. Since they do not weigh much, they are easily returned to the user. The fiber slip sheets are not very durable, and may be used only once before being recycled. However, they are easily recycled with other materials.

Loading and unloading with slip sheets takes more time because of the operation of the "push-pull" attachment mechanism. Also, the forklift operator must be adequately trained to reduce the potential for damage to the product (instead of the pallet) if the forklift is not properly operated.

5. UNITIZING LOADS

Pallet loads of products are frequently wrapped with plastic film to keep the stack together during shipment. Banding and strapping are also used to secure loads. Alternatives to the single use materials are being developed as a way to reduce packaging waste. For example, large reusable rubber bands can be used to hold boxes in place.

An alternative to wrapping loads on pallets is to place them into a shipping container that includes a pallet-like base. This type of packaging includes [among other alternatives]: a) a 4'x4' cardboard box referred to as a Gaylord; b) a wooden fruit bin; and c) a collapsible plastic tote. The Gaylord is used to ship large durable produce (such as pumpkins and watermelon) and other irregular bulky, items that do not stack well on pallets from vendors to retailers. Fruit bins are used to move produce from the fields and orchards to the packing houses. Plastic totes have been

used extensively to ship retail merchandise from distribution centers to stores, and return merchandise to the distribution centers.

6. INDUSTRY SELECTION OF PALLET TYPES

Pallet type selection is primarily a function of the distribution network of a product. Materials that are moved within a closed-loop distribution network are shipped on durable pallets where the savings in avoided replacement costs are quickly realized. For shipping product out of a closed-loop system, a more durable pallet is only an unnecessary expense.

Pallet Design Features

Pallet design includes many features. There are two primary designs, are block and stringer. The following diagrams show the features of the pallet. The diagrams were downloaded from the Complete Packaging, Inc. website at www.completepkg.com/pallets.htm. A full glossary of terminology relating to pallet design can be found of the General Pallet website at www.generalpallet.com/pallet.html.

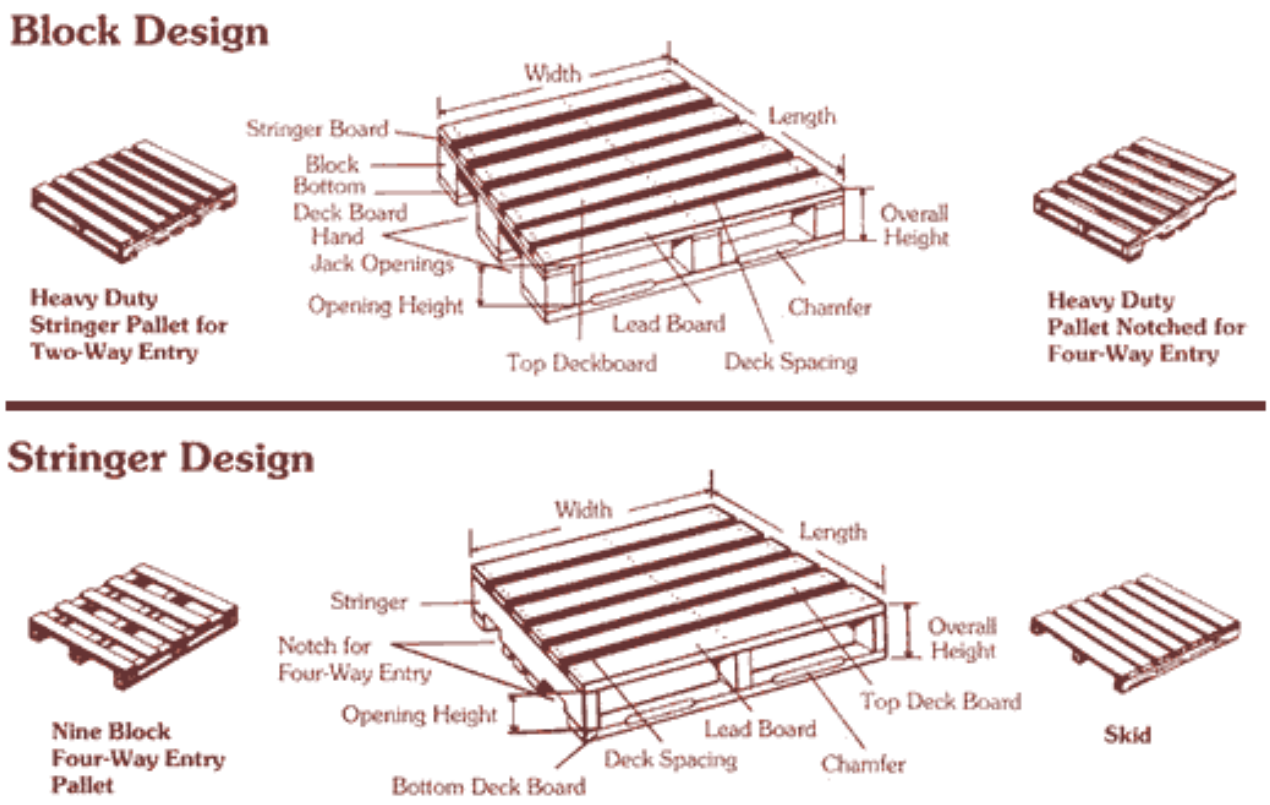


Table A-1. Pallet Comparison Matrix

Material	*Cost*	*Weight (pounds)*	*Durability*	*Repair-ability*	*Strengths*	*Weaknesses*	*Comments / Primary Users*
Softwood	$7.00-$8.00	40-80	Low	High	industry standard; cheap	Not very durable	The most common pallet in use; 40” x 48” is the grocery
Hardwood	$8.00-$12.00	80-110	Medium	High	more durable than softwood pallets	Cost more & is heavier than softwood	About 1/3 of all wood pallets
Pressed Wood	$7.00-$9.00	30-45	Medium	Low	Solid surface		Made from low grade or waste materials;
Pressed Fiber	$3.00-$8.00	10-12	Low	Low	Very light weight	Low durability	Recycled with mixed paper
Corrugated Fiber	$3.00-$8.00	8-12	Low	Low	Very light weight; easily recycled		Recycled with corrugated boxes
Plastic Lumber	$30.00-$80.00	30-80	High	High	Durability	Heavy	Used for food service – can be sterilized
Wood & Plastic lumber	$40.00-$60.00	45-80	High	High	Combines good features of both wood and plastic		“armored” edges where damage occurs. Plastic is 100% recycled HDPE
Wood / Plastic Composite	$50.00-$80.00	60-90	Medium	High	Alternate to plastic lumber	More expensive	Uses recycled materials
Metal	$40.00-$100.00	20-100	High	Medium	Durability	Heavy	Recyclable
Metal Edged Wood	$60.00-$80.00	45-85	High	Medium	Reduces damage to wood pallet	Metal edges a worker safety problem	“armored” edges where most of damage occurs.
*** Fiber Slip Sheets**	$2.00-$6.00	2-5	Low	Low	Light weight and cheap for single use	* requires special equipment at both ends of shipment.	Waste preventing & Recyclable
*** Plastic Slip Sheets**	$4.00-$8.00	2-5	High	Low	Light weight; reusable	* requires special equipment at both ends of shipment.	Maximum waste prevention

SECTION 3. REDUCING PAPER USE THROUGH TECHNOLOGY

INTRODUCTION

Several years ago, the concept of a paperless office was believed to be just around the corner. The reality thus far has been quite different – we are using more paper than ever before. There are technologies available – hardware and software – that could move us closer to a paperless office by reducing the need for forms, creating electronic files, and producing and routing memos, manuals, and reports electronically. While these technologies are making inroads in our paper consumption in some areas, we are fighting an uphill battle to reduce paper use. The objective of this report is to provide a tool that can help in the battle.

This report provides an overview of trends in paper-reducing technology and a series of case studies of the application of these technologies in both the public and private sector. In several of the case studies, we seek to quantify the costs and benefits of the new systems, focusing on the productivity gains as well as the reduction in paper. The report summarizes implementation issues, and strategies for businesses or agencies that are considering paperless technologies. Most of the companies and agencies did not implement these technologies solely to reduce paper use, and in most cases, paper reduction was only one of the benefits. The potential benefits from improved efficiency, better customer service, reduced storage space, reduced errors, and reduced distribution costs far exceed the waste reduction benefits of decreasing paper consumption.

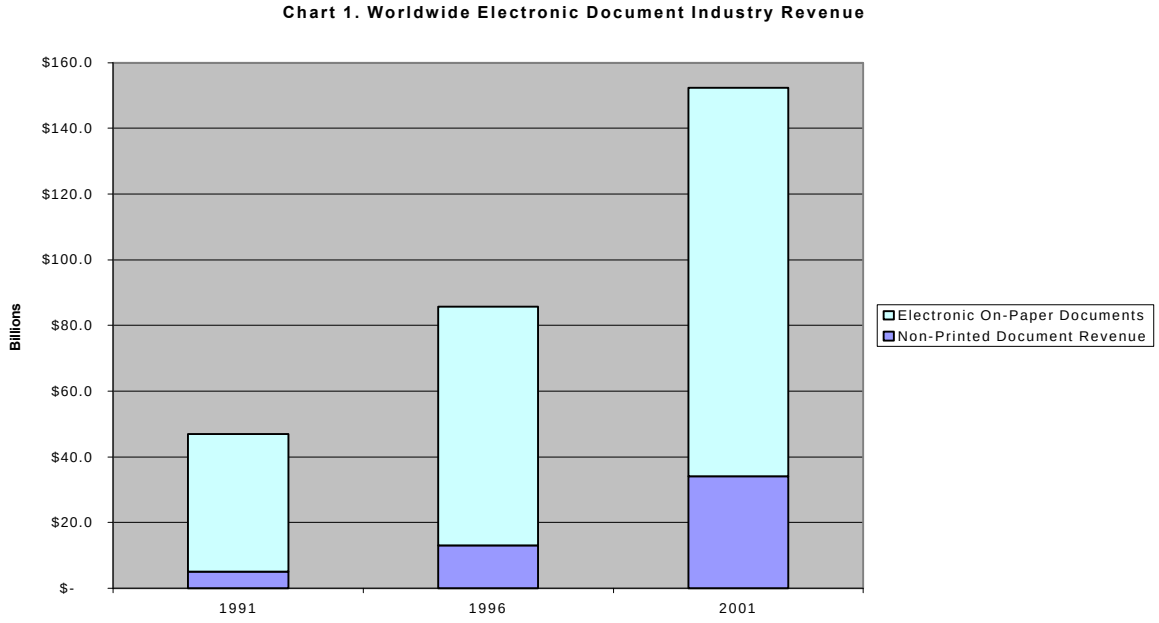
The scope of this report has shifted slightly from the original intent. When we outlined the project in early 1998, we intended to build on the work of the 1997 report, *Profiting from Source Reduction,* by working with companies and agencies to implement, test, and measure the impacts of source reduction programs. One aspect of this work was to examine the implementation of paper reducing technologies at the Alameda County Social Services Agency (SSA) and at a private business in Alameda County. We had originally planned on providing hands-on, technical assistance to these entities as they implemented a new paper-reducing technology, and on documenting the process and its costs and benefits. We ran into two difficulties. First, as is detailed in the SSA case study on page 30, the SSA technology we were going to follow has not yet been implemented. Second, we were not able to identify a business in Alameda County to work with us through the process of implementing a new technology. We did conduct several interviews with officials from Union Bank of California – headquartered in San Francisco and with four branches in Alameda County – about their already-implemented technologies. The Union Bank case study is presented on page 20.

Because we were not able to provide the detailed case studies that we originally intended, we have opted instead to provide this overview of paperless technologies. It includes dozens of case studies – a few based on interviews, and many based on existing write-ups. We believe this approach is valuable because it provides a broad overview of the types of issues that companies and agencies face in implementing these technologies, which can be used by others as they seek to reduce their reliance on paper. There are many businesses, technology companies, and organizations discussed in this report. Their mention here is not an endorsement of any kind by the author or by the Alameda County Source Reduction and Recycling Board.

TRENDS IN PAPER USE

There are many reasons for the increase in paper consumption, and the less-than-rapid diffusion of paperless technologies in the workplace. A recent Electronic Document Systems Foundation (EDSF) report reminds us that "the single most significant factor to bear in mind about the ongoing transformations of information societies – and thus about changes in reading and using paper-based documents – is that the process is really more evolutionary than revolutionary."[1] They point out the difference between the rate of invention or innovation, which has been extremely rapid, and the rate of diffusion, which is significantly slower. According to EDSF, we may have been a bit hasty in our predictions of a paperless office. Still, industry experts predict that electronic media will increasingly replace paper-printed media. In 1995, paper-based documents account for 90% of document production, and in 2005 they are expected to account for only 30% of production. This is illustrated in Chart 1, where non-printed document revenue doubles, but on-paper documents continue to grow also.[2]

However, digital technologies are dramatically increasing the total number of documents used, and the result will be an overall increase in the number of printed documents – an estimated doubling between 1995 and 2005.[3] This last fact seems to be critical to understanding paper and digital communications. It is not an issue of replacing one technology with another – it is an expansion of the types of technology we use. For instance, the Electronic Messaging Association



[1] Electronic Document Systems Foundation, *Network, Screen and Page: The Future of Reading in a Digital Age*. EDSF, Torrance, CA. 1997, p.5
[2] From, *Defining the Document Industry, Economic Impact and Future Growth Trends.* EDSF, Torrance, CA, 1997, p.6
[3] EDSF, p.9

predicts that by 2000, 108 million people in the US will be using email, sending 6.9 trillion messages, an average of 64,000 per person per year, or 1,200 per week.[4] At the same time, the Postal service delivers 199.9 billion pieces of mail to 130 million customers, an average of 29 per week. We are just receiving more information. Similarly, the National Academy Press found that after placing more than 1,000 books on the Web, sales did not decrease, they rose 17%. Customers were accessing entire books on the Web, downloading portions, and then ordering the hard copy of the book.[5]

Paper consumption has been rising steadily, and does not show signs of a significant drop off. The American Forest & Paper Association (AFPA) predicts that paper consumption will grow at an annual rate of 3.2% between 1995 and 2010 – with growth in developing countries at a rapid 5.3% and growth in the US and other developed countries at a lower 2.5%.[6] The rate in the developed world has been about the same for the last ten years. Between 1990 and 1998, annual paper consumption in the US rose from 86.8 million tons to 99 million tons.[7] The AFPA study notes that between the growth in the developing world and "the positive attributes of paper," paper's future should be assured "well into the next century."[8] Still, AFPA recognizes that digital documents may be replacing many paper uses in the next 10 of 15 years. In response to the real and perceived trend away from paper-based communications, a new group, PaperCom Alliance, has been created to support and promote the benefits of all types of paper communications.[9]

Paper consumption of all types has increased. Consumption of printing and writing papers has grown faster than all other grades of paper. Since 1980, global paper consumption increased by 74% while printing and writing paper increased by 110%.[10] In US offices, the number of pages of paper consumed is growing at a rate of 20% a year, and in 1996, US office workers copied more than 800 billion sheets of paper and printed about the same number.[11] The Envelope Manufacturers Association reported the largest volume of envelope sales on record in 1997 – apparently email did not change this. Overall mail volume rose from 166.4 billion pieces in 1992 to 199.9 billion pieces in 1998. A large share of the increase was due to advertising mail volume, which rose from 62.5 billion in 1992 to 82.9 billion in 1998.[12] Email has made a dent in first class mail volume. In the first quarter of 1998, first class mail was up only 1.2% from that period a year earlier, while third class mail was up 3.1%. First class mail represented less than half of the mail stream for the first time in US Postal Service history.[13]

Given the trends in increased use of paper, and in increased use of digital information, it seems that one of the key benefits of electronic technologies is to enhance our ability to capture and

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[4] "The Email Paradox, Questions to Consider." PaperCom Alliance, www.papercom.org/zeft.htm
[5] "Paper Consumption Soars with Online Growth." PaperCom Alliance www.papercom.org/speech5.htm
[6] 1996 AFPA report cited in Electronic Document Systems Foundation, *Network, Screen and Page: The Future of Reading in a Digital Age*. EDSF, Torrance, CA. 1997, p.51.
[7] AFPA, cited in "Paper Consumption Soars with Online Growth." PaperCom Alliance www.papercom.org/speech5.htm
[8] EDSF, p.51.
[9] PaperCom Alliance, www.papercom.org
[10] Abramovitz, Janet N. and Ashley T. Mattoon. *Paper Cuts: Recovering the Paper Landscape*. Worldwatch Institute, Washington DC, December 1999.
[11] Abramovitz, p.14.
[12] "Paper Consumption Soars with Online Growth"
[13] "The Email Paradox, Questions to Consider." PaperCom Alliance, www.papercom.org/zeft.htm

process information. Given our attachment to paper, experts no longer predict that we will rid our offices and homes entirely of paper. There are many forms of paper that probably cannot be replaced – for instance reading a book in bed or the Sunday paper over a cup of coffee.[14] However, there are many forms of information including sales reports, invoices, purchase orders, forms and financial reports that are more easily produced, accessed, and stored electronically. While it may seem like an uphill battle, we can shift away from our heavy reliance on paper by raising awareness about just how much paper we do use, the costs of using paper, and the ways in which we can reduce that use. Reducing waste and saving trees are just two of the benefits. Improving efficiency and reducing costs are more likely to motivate the change.

WHAT IS ELECTRONIC DOCUMENT MANAGEMENT?

There are numerous acronyms and technical names in the field of Electronic Document Management that can be intimidating to someone that is not in the information technology field. In this section we try to explain the industry in layperson terms. Document management involves many types of documents:

- Documents arriving to the business as paper that need to be scanned and indexed,
- Documents arriving in electronic form or that are created electronically within the business,
- Faxes originating as paper or stored in electronic format,
- E-mail, and
- HTML documents for delivery via the Internet or Intranet.

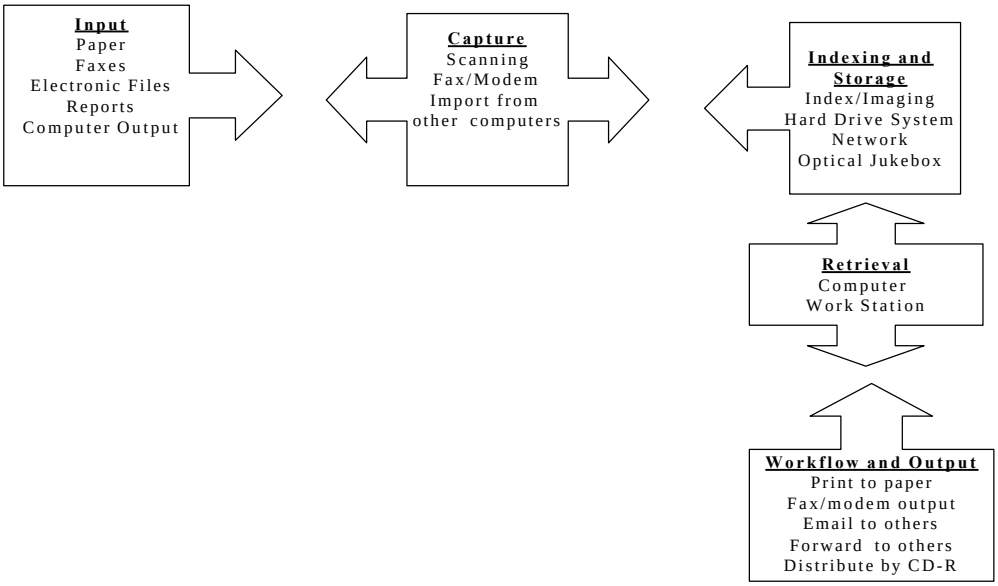
The types of documents identified above are then processed in one or more of the six primary phases of document and data management:

1. Capture – creating electronic images of paper documents (i.e. scanning) or inputting documents directly into the computer
2. Indexing – organizing and storing massive amounts of documents and reports requires an indexing method using index fields or full-text files
3. Storage – once the information is captured electronically and indexed, it must be put somewhere. Options include magnetic tape, removable disks (CD ROMs), and laser disks.
4. Retrieval – in order to use the documents, they must be retrieved from the storage system using the index method
5. Workflow and output – designing the flow of the captured documents and data through a distribution system

[14] This is not to say there are not efforts to replace these. There are a growing number of electronic books in development that try to duplicate the look and feel of a hard copy book with the benefits of electronic technology.

6. Revision control and repository-oriented (storage) services – there must be controls on the documents and mechanisms to re-file the electronic documents located throughout an organization

Chart 2: Electronic Document Management



One of the primary goals of document management systems is to make workers more efficient by reducing the amount of time they spend looking for information and providing more time to make decisions.[15] Businesses are increasingly focused on delivering improved customer care and service. Workflow, a common term in the industry, is essentially an office automation tool that links document-based information with processes and maps their path across departments and workers. According to one firm, workflow is "the process implementation of the electronic distribution of work."[16] Workflow should reflect the business practices (the who, what, when, where, and how of the organization) and use the information to control the flow and distribution of work. Many businesses are looking at implementing workflow systems because of their ability to boost productivity.

Other major areas of growth in the industry are the Internet and the Intranet. Increasingly, the Web is being used as a mechanism for both internal and external participation in business processes. Matrix Information and Directory Services predicts that by January 2000, there will by 827 million people using the Internet, up from 71 million in 1997.[17] The Intranet refers to the use of Internet technologies within a corporation. By 1997, an estimated 70% of all US Corporations had Intranet systems.[18] Intranets have several benefits, including ease of establishment, the ability to publish in one place only, ease of access, and low cost. One of the issues is linking existing business processes to new web-based systems. Using web-based

[15] Glenn W. Magnell, "Workflow and Document Imaging – An Evolving Partnership" inform magazine, AIIM Web Page: www.aiim.org/inform/april99/april99p54.html
[16] Universal Systems Incorporated Web Page: www.usiva.com/whatis_workflow.html
[17] EDSF, p. 63.
[18] EDSF, p. 74.

systems can simplify training and use of information management processes, and in addition can serve as a universal interface for a variety of applications. Reports, sales, and accounting data can be placed on web-based systems to allow for quick viewing and analysis – saving on the cost of production and distribution.

Scanning is the most commonly understood function within document management – the transfer of information from paper form to electronic form. Scanning can be quite expensive, ranging from $.11 to $.25 per page for scanning alone, to $.15 to $.30 for preparation, scanning, and indexing.[19] While a business may first think of scanning all their paper files when implementing a new document management system, it may be more beneficial to begin by automating current processes and scanning incoming materials, and scanning old files later.

Storage is another key component of electronic document management. The cost of electronic storage is dropping, and this trend is expected to continue. In the early 1990s, a 200-Megabyte (MB) hard drive disk cost $200, about $1 per MB. By 1997, a 2 gigabyte (GB) hard drive cost under $300, about 15 cents per MB. The cost to performance ratio has been improving at a rate of about 60% per year.[20] To put this in perspective, one four drawer file cabinet holds 10,000 pages of paper, equivalent to 500 MB or 1 CD-ROM.[21] There are a variety of storage mechanisms for electronic information. The most common are CD-ROMs (read only), CD-Rs (optical disks that are recordable), magnetic tape, and DVDs (digital video disks).

Reflecting expansion and the improvements in technology, the document technologies industry is expected to grow considerably in the next several years. An industry study predicts that total revenues will rise from $13.2 billion in 1998 to $41.6 billion in 2003.[22] Most of the technologies have an expected growth rate of between 21 and 42 percent, with a few, such as document component management and integrated systems, with growth rates of over 60%. Imaging technologies are expected to have lower growth rates. Vendor revenue is currently distributed between services (40%), software, (30%), hardware (23%), and maintenance (7%). This distribution is expected to stay about the same through 2003. The industries generating the largest revenues for vendors are financial services, health care and pharmaceuticals, insurance, banking, government, and manufacturing. Transportation and utilities are also significant markets. The three technologies most commonly purchased in the US in 1998 were COLD, workflow, and imaging.

In most of the examples of electronic document management in this report, the business or agency uses a combination of electronic forms and documents, scanning of incoming materials such as letters or claim forms, and electronic distribution. Significant efficiency benefits are achieved when an entire file related to a particular service or client is available electronically. Typically in these systems, all correspondence to and from, forms and applications, financial statements, and other records are located in one, easily accessible file. Another major benefit relates to the increased ease in finding old records and files. The typical professional worker spends between 1/2 and 2 hours a day searching for documents – this time can be almost eliminated when files are available electronically and can be easily retrieved.

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[19] RC InfoBites, AIIM Web Page: www.aiim.org/industry/resources/infobites.html
[20] EDSF, p. 127
[21] RC InfoBites, AIIM Web Page, www.aiim.org/industry/resources/ingobites.html
[22] "State of the Document Technologies Industry: 1997-2003, Executive Summary", AIIM, www.aiimlorg/publications/infoshop1/industry.html

According to one vendor, there are seven challenges for the electronic business industry:[23]

1. Integrating multiple products in a complete solution
2. Exploiting the power of the web for access and process
3. Including access to documents, data, images and records
4. Coordinating work between organizations and departments via the web
5. Supporting rapid application deployment
6. Supporting corporate and industry standards
7. Addressing the challenges of enterprise scalability.

Many of these challenges appear in the case studies below. For example, integration of multiple products was a challenge for GM and Caterpillar. Scalability is an issue, as often an information system is developed first within one department, for example accounting, and then is later scaled up to the entire enterprise. To be most effective, the system should be able to grow as its use is expanded.

TRADE ASSOCIATIONS AND ORGANIZATIONS

There are a number of trade and resource groups within the electronic document industry. As would be expected in this field, information is readily available through web pages. Three of the leaders in this area are:

Association of Information and Image Management (AIIM) International:[24] AIIM merged with the International Information Management Congress (IMC) earlier this year to create one international organization "dedicated to bringing industry vendors and users together " and "helping business and public sector organizations to understand document technologies and solutions and apply them to improve critical business processes." The organization conducts conferences, including a large annual event, and produces a variety of publications and an extensive web page. AIIM is a good resource for information on paperless document management and the primary trade group in this area.

Xplor International:[25] is another trade group providing knowledge, education, and networking to members in the document industry. Xplor hosts an annual conference/exhibition, the Global Electronic Document Systems Conference and Exhibit, and conducts surveys, produces reports on the status of the industry, and is a resource for information on document technologies. The organization has a nonprofit foundation, the Electronic Document Systems Foundation, which produces reports including: *Defining the Document Industry – Economic Impact and Future Growth Trends* and *Network, Screen and Page: The Future of Reading in a Digital Age*.

[23] Universal Systems Incorporated Web Page: www.usiva.com/business_req.html
[24] AIIM Web Page: www.aiim.org
[25] Xplor International Web Page: www.xplor.com

Document Management Alliance: [26] DMA is both an organization and a standard that enables document management systems from different vendors to interoperate. The standard has been developed through technical committees of electronic industry and user representatives over the last two years. The need for standardization has become apparent as the use of electronic document management systems has expanded. There is concern that without interoperability between vendors, organizations will be creating islands of information and won't have the flexibility to choose the best system or systems for their needs.

Private Companies Providing Services, Hardware, and Software for Paperless Technologies

This section identifies and describes several companies that provide services related to paper-reducing technologies. They are summarized here to illustrate the types of organizations and services that are available. Their inclusion in this report is not an endorsement of their services or products. There are many more companies that provide similar services, and we recommend that an organization that is planning on implementing a paperless technology program look at a variety of vendors and service providers.

Advanced Paperless Technology Associates:[27] is a group of consultants based in Dallas, Texas that specialize in finding and developing imaging and information management systems for businesses. Their goal is to help their clients "do things better and faster, while having a positive environmental impact." They are anti-paper, and focused on helping companies reduce the amount they are using. " The only paper being created by your enterprise should be that paper that is going "out of house" or those documents that are absolutely essential to personnel in non-network accessible locations." APTA assists the client in all stages of developing a paperless technology system. Their services include:

- Meeting with staff to gain full understanding of the workflow needs and involve staff in the design team
- Conduct a detailed analysis including a review of budget constraints and a cost analysis
- Write a Request for Proposal (RFP) for the hardware and assist in vendor negotiations
- Supervise integration and development of the new system
- Provide or obtain training for employees to use the new system, and
- System support and consultation on expansions or upgrades.

Digi-File:[28] is another "full service" company providing imaging and knowledge management solutions, primarily in the Houston, Texas area. They specialize in imaging systems to capture documents as digital images and develop an internal document management repository or image management capability. They provide services as well as sell hardware and software. They cite the primary benefits as improving productivity and efficiency while eliminating the need for paper storage.

[26] DMA Web Page: www.aiim.org/dma/index.html
[27] APTA Web page: www.paperlesstechnology.com
[28] Digi-File Web page: www.digi-file.com

Universal Systems Inc.:[29] Is one of the larger software and services providers for work process automation. Their primary product is the Documetrix™ line of document management, imaging, and legacy systems. Their vision promotes the effective application of the best technology to improve the way [clients] work. The company focuses in three major areas: information on demand, work management, and on-line commerce. They have developed specific electronic-based applications for claims processing, invoice management, case report files, clinical supplies tracking, human resources and personnel, procurement, and customer ordering and service. Their services include: research, development, documentation and training, collaterals, quality assurance, tools, standards, support, and packaged business applications.

A pharmaceutical company uses a Documetrix system to collect, store, and analyze the vast amount of information gathered in the drug-testing process. This allows for faster processing of Case Report Forms and a more complete and accurate picture of the status of the drug trial. A chemical plant uses a Documetrix system to create, store, and manage engineering drawings of the plant processes. Because every engineering drawing may have ten to twenty updated versions, the ability to keep the files in electronic form saves a significant amount of paper and assures that only the most recent drawing is used. Florida Power & Light was seeking a work management solution to minimize paper processes and increase enterprise-wide connectivity and productivity. The system put in place on 9,000 computers allows employees access to customer invoices, regulatory procedures, employee files, engineering drawings, and nuclear operating procedures. Since the system was deployed, over 2 million documents have been loaded on-line in various departments, which has resulted in a "vast reduction in paper flow throughout the organization", allowed multiple users access to files simultaneously, and opened up floor space previously used for paper files.

Report.Web:[30] is a product developed by Network Software Associates (NSA), a Virginia-based software company. Report.Web is an Intranet/extranet reporting and viewing system. It allows internal or external reports to be loaded and viewed, with the ability to extract material and publish from Intranet sites. It is scalable, i.e. easily adjusted to a variety of system and report sizes, and allows for a multi-host report publishing and distribution. The system does not require extensive hardware configurations. The product was launched in 1997, first for government use, and then for commercial use in 1998. The basic software costs just under $20,000.

NSA cites several features of Report.Web. Often, with large paper-based reports, employees will need to compare numbers within the report. This requires re-keying the data into a spreadsheet in order to do the analysis. With Report.Web, staff can click on the spreadsheet they want to use, and it is displayed in Excel. This feature saves hours of data entry, and reduces the chance for errors in re-keying. Another large savings results from reduced shipping and handling of reports. For budget reports and other time-dependent data, companies must use expensive overnight shipping, and this often isn't fast enough. With Report.Web, reports can be viewed from disparate locations simultaneously.

Storage space is another issue when reports are archived in warehouses or storerooms in either paper or microfiche form, the space is more costly and the reports are harder to access. Benefits also extend into printing production – where staff must spend time lining up papers, maintaining

[29] Universal Systems Web Page: www.usiva.com
[30] Network Software Associates web page: www.nsainc.com, Interview with Sarah Patnode of NSA on 9/16: 703-875-0444 ext. 142, patnodes@nsainc.com:

computers, re-doing manually when there are mistakes or someone looses a report. In addition, it is much easier to find information in an on-line report – staff can search by name or other keyword and find the section of a massive report instantly, rather than searching through a stack of paper. This benefit carries over to customer service, where staff can pull up information immediately.

The Return on Investment (ROI) for Report.Web is typically six months, only counting the hard benefits of paper reductions and reduced shipping. Training for this system is minimal – the system is very intuitive – click and go approach. Some clients have minimal training for end-users, and some haven't even done any training. Still, some clients are making a relatively gradual transition to the new system. Now that many companies have the infrastructure in place, the product is becoming increasingly popular. A few years ago, the company would talk to people and they would say "great idea, call when I have an Intranet" – now, they do.

Some examples of successful applications are: Revlon began using Report.Web to distribute their daily sales and marketing reports to the sales teams, allowing for rapid and efficient distribution of information as compared to the hard copies that were printed and shipped previously. Another company, Vanstar, was using data lines to ship mainframe reports to five remote distribution centers. They began using Report.Web to generate and distribute the reports. They save $24,000 a month by not leasing the data lines, and realize additional savings by eliminating the high-maintenance line printers at the distribution centers. The US Army replaced their use of paper and microfiche for reports to a Report.Web system, saving both paper and other costs. The technology division of Rhone-Poulenc in Europe instituted a Report.Web system to "webify" access to mid-range reports for their many international facilities. While current reports are put on the web, older reports are being archived using a Computer Output to Laser Disk (COLD) system.

UniFirst, Inc. began using Report.Web to distribute their daily sales and inventory reports to their 120 remote offices, allowing for rapid and efficient distribution of information as compared to the hard copies that were printed and shipped previously. Another organization, the Department of State Central Finance Management System, was using an antiquated WANG system to maintain reports. They began using Report.Web to generate and distribute the reports. They save $8,000 a month on paper costs, and realize additional savings by eliminating the high-maintenance line printers at the distribution centers, and no longer servicing their old system. The Employers Insurance Company of Nevada retrained their print operations personnel who were no longer needed for manual print, parsing and distribution to configure and maintain their Report.Web system. In the end they were able to decrease the overall administrative overhead of report distribution.

The Cintas Corporation, which distributes uniforms, has150 remote offices that share accounting and financial reports. Employees can now access and download reports and retrieve data without using paper or re-keying information. The system has increased the efficiency of the data flow and reporting processes. The Naval Federal Credit Union was wasting a large amount of paper and time in the administrative work associated with modeling and distributing financial reports. Now, with Report.Web, employees receive their reports in less time, and without paper, cutting down on printing and maintenance costs.

Romax Development:[31] provides bridge services to companies during the implementation of paperless technologies. Their vision is "preservation and conservation of our natural resources through paperless technology implementation", and their mission is to become leaders in the field of implementation and configuration of paperless technology. They provide clients with services, hardware, and software, and emphasize implementation of new systems. One of their services is "PRESS: Paper Reduction Evaluation and System Study", where they analyze a company's paper use and paper flows to determine savings and competitive advantage from implementing an electronic system. In PRESS, Romax clearly defines the key data, who needs the information, and how it must be routed.

One client was National Semiconductor in Sunnyvale. Their credit and collections department had collection problems, and were using literally tons of paper invoices. Now, all invoices are stored in a COLD system (Onbase), they have gone from 14 to 7 staffpeople, and increased volume. No invoices are printed because they use Winfax to a server to fax invoices directly to clients. There were significant savings in time and people. National Semiconductor spent $10,000 on hardware and $40,000 total on software, hardware and consulting. The company saved 3 to 4 people per year, significantly more than they spent.

Another example is Hewlett-Packard. Four to six years ago HP had a Unix-based computer system. Their Santa Clara and Roseville facilities switched to COLD systems, with poor results initially. Training was an issue; people didn't know how to use the system. In Roseville, HP spent $100,000 on hardware and software for the new system, but nothing happened. Then they spent $25,000 for Romax consulting services for three months of training and time to get the system running. Once the system was up and running, HP saved $400,000 on paper alone in six months. Overall in HP's 30-40 sites with COLD systems, they save $30 million in raw paper a year.

CRE8 Incorporated Independent Consultants:[32] specialize in process redesign and analysis, education, developing application requirements, evaluating vendors, system conceptualization and design, and implementation oversight. They help companies identify needs, develop programs, design, make changes, and conduct training.

Onbase:[33] is a software system developed by Hyland Software. The system provides access to information within a company through COLD, electronic document imaging, and workflow. The Onbase system allows for integration, and can be configured and scaled to fit the needs of clients. It is compatible with a variety of software and hardware programs, allowing for easy integration into a company's existing system.

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[31] Romax Web Page: http://www.romaxdev.com/romaxdev/ and interview with Ron Reimert, President, April 12, 1999

[32] CRE8 Incorporated Web Page: www.cre8inc.com

[33] Hyland Corporation Web Page: www.onbase.com and OnBase Corporate brochures

PRIVATE SECTOR CASE STUDIES

This section includes 14 case studies of private companies that have implemented paperless technologies. Two cases, Union Bank and Southern California Water Company, are based on interviews with company staff and written materials. The remaining case studies are brief summaries of already written descriptions of the systems. The intent of this section is to provide information on the range of companies and applications that are using paperless technologies, as well as some of the benefits and implementation issues. The case studies are divided into four industry groups: utilities, financial institutions, wholesalers, and manufacturers.

Summary Table 1 – Private Sector Case Studies

Company	Technology	Purpose	Key Benefits	Implementation Issues
Atomic Ski USA	Report.Web for in the field sales reports, available via palm pilots	Quick and up-to-date access to sales information for field representatives	Reduced burden on customer service staff, better sales information in the field	Security issues with cellular system
BellSouth Telecommunica-tions	Electronic filing system	Report production and viewing	In two years, saved about 16 million sheets of paper and $3.5 million	Getting users to change mindset was a challenge, need to get used to idea that don't need paper, and that reports are safe and accessible
Caterpillar, Inc.	DigiPath/WEB system "portal" to link various systems and improve access	Link the six data "warehouses" within the company	Improved productivity, improved records management, reduced costs	Huge company with many systems to link, multiple languages
Earle M. Jorgensen Company	Image-X storage and scanning system	Handle orders, testing results, billing, delivery receipts, administrative tasks	$100,000 per year savings in data entry, improved customer service, reduced paperwork	Was able to maintain their pre-existing database application
EVEREN Capital Corporation	Computron COLD system for records retention	Knowledge transfer and storage within 140 offices	Improved customer service, elimination of microfiche, reduced paper, positive return on investment	Validity of data, security, desktop presentation, system backup, down time
General Motors Corporation	Common system for all documents	Improve communication between systems and departments	Better communication and fewer systems in place	Compatibility of various systems and changing to new systems

Company	Technology	Purpose	Key Benefits	Implementation Issues
Haworth's Furniture Company	CD-ROM catalog	Easy updating of catalog	Saves $1 million annually by avoiding catalog reprints, improved marketing has paid for system	High system costs: $500,000 plus $2-3 million in training, laptops for sales staff
Niagara Mohawk Power Corporation	Networked digital document capture, storage, and retrieval system	Quick distribution of maps to field crews, editing and revision of maps	Ten-fold increase in productivity, improved customer service, reduced paperwork	Was able to maintain their pre-existing database application
Phillips Petroleum Company	Electronic system for billing and invoices	Improve efficiency	Cost savings due to reduced staff time to process checks	
St. John's Bank	COLD system, network database, scanning module	Improved service for archiving and retrieving reports, checks, customer statements, operational improvements, reduced paper	Improved customer service, reduced printing and shredding, printing reduced from 100,000 to 10,000 pages per month	System required little or no end-user training, total investment of $55,000 (St. John's is a small bank)
Silicon Graphics	Electronic system for orders and invoices	Improve efficiency	Expected savings of $2.1 million in year two, reduction of forms, reducing 500,000 sheets of paper, increased efficiency in purchasing	System cost $1 million to research, design, develop, need to research entire process, listen to staff concerns and suggestions when developing
Southern California Water Company	Report.Web system for Intranet report viewing	Distribution of accounting and other internal reports	Quick access, easy to download and use data, $80,000 reduction in distribution costs	Very little training required; 3 hours for basic, 6 hours for in-depth
The Southern Company	Electronic system for purchases and payments	Reduce costs	Calculate savings of $6 per electronic transfer, $120,000 a year, reduced 60,000 sheets of paper	

Company	Technology	Purpose	Key Benefits	Implementation Issues
Union Bank of California	Lotus Notes for on-line manuals, records management system	Improved efficiency, cost savings, overall bank shift to electronics	Improved distribution, ease of access to files, improved customer service, reduced costs, reduced paper, $100,000 saving in reduced printing of manual updates, eliminated need for 200,000 foot storage building, reduced staffing from 30 to 4 for filing	Access to computers for all employees, include staff in discussions as new programs developed, use vendors to stay up to date, show employees how they benefit in training

Utilities

The Southern California Water Company:[34] is a Los Angeles based public utility company that provides water to over 240,000 customers. The company was looking for a more efficient way to distribute accounting and other reports to their five district offices and other remote locations. Reports, often generated in one long file that required hand-bursting (separating and sorting) into separate reports, were sorted and sent express to the remote offices. This was costly and slow – often users were waiting for the information, which was already two days old by the time they received it.

Report.Web provided them with a system that allows one long file to be electronically bursted into separate reports with individual security provisions. The reports are then loaded onto the company Intranet system, and immediately available (with security provisions) to users in all locations. Southern Water saved $80,000 a year just on avoided express mailing costs, plus additional savings from reduced paper use and staff efficiency. Paper savings have not been quantified. However, instead of printing and delivering lengthy reports, staff, if they print at all, only print the few pages they are interested in.

The company switched to Report.Web a couple years ago after reviewing a variety of software programs. One of the main reasons they chose Report.Web relates to training requirements. The system is intuitive and very easy to use, according to John Gordon, Southern Water's midrange systems manager – as simple as clicking on buttons. Gordon can teach staff the details of the system in about three hours. Recently he conducted a six-hour class series for regional employees to show them the full capabilities of the system.

The greatest savings is hard to quantify. The company realizes significant savings from avoiding re-keying of data for analysis. Before the new system, staff that needed to analyze data from the reports had to key in entire spreadsheets before they could do the analysis. Now, they simply

[34] Interviews with Sarah Patnode, National Software Associates, Inc., 9/16/99 and John Gordon, Southern Water Company, 10/4/99, and NSA Inc. Web Page: www.nsainc.com

download into an Excel file, and can begin work. This reduces double-entries, errors, and time spent doing tedious data entry.

Another benefit results from the quick availability of reports. When monthly close-out reports are ready, employees that need the data feel a loss of control when they can't access the information for several more days. Often, they called up, frustrated, that it had not been delivered on time. Now, they can access the information within hours, after it is uploaded onto the web system. The system also reduced the load on the Central Processing Unit (CPU), and eliminated the need to buy more computing power.

Niagara Mohawk Power Corporation:[35] instituted an integrated, networked digital document capture, storage, retrieval, output, and distribution system for maps and other large documents. The system allows Niagara to select and distribute maps to field locations, edit and revise maps, scan, and print much more efficiently. The ability to quickly distribute maps to field crews (38,000 in all) was critical during the ice storms in 1998 that left more than 100,000 customers without power. The new system resulted in a ten-fold increase in general productivity, improved customer service, and cost savings because it eliminated the need for field staff to travel to headquarters to view maps, eliminated shipping of documents, and improved the work environment for employees.

The Southern Company:[36] a utility company, uses electronic systems for purchases and payments. Based on a national survey of EDI document costs and savings, the system saves an estimated $6 per every electronic transfer – they calculate for the 20,000 quotes received a year. Each of these is three pages (normally), saving 60,000 sheets of paper a year.

BellSouth Telecommunications:[37] saved about 16 million sheets of printout paper and $3.5 million dollars during 1994 and 1995 by implementing an electronic filing system. The system enables employees to view, download, or print archived reports. Reports can be viewed on-line. "The greatest challenge has been getting users to change their mindset for the need to have a piece of paper in their hand … employees need to be assured that their reports are safe and accessible."

Financial Institutions

EVEREN Capital Corporation:[38] is one of the largest employee-owned companies in the U.S. EVEREN is a full-service brokerage firm and also provides securities execution and clearing services and commodities clearing services. EVEREN has 140 offices in 27 states, and about 2,000 employees. In 1996, EVEREN identified the need for a more efficient knowledge transfer and storage system. Like both GM and Caterpillar, one of their initial problems was that there were already a wide variety of information systems in place throughout the company. These

[35] AIIM Web Page, inform magazine, Nov.98: www.aiim.org/inform/nov98/nov98p40.html

[36] EPA report: WasteWise Update: Going Paperless with Technology, EPA530-N-96-007, Office of Solid Waste and Emergency Response, June 1996

[37] EPA report: WasteWise Update: Going Paperless with Technology, EPA530-N-96-007, Office of Solid Waste and Emergency Response, June 1996

[38] AIIM Web Page, inform magazine, November 1997: www.aiim.org/inform/Nov97/knowl.html

included in-house automated systems, applications, and external services. EVEREN was very interested in return on investment in their new system, and did considerable research to identify a system to put in place. The goals of the new system were:

- Enhance customer service
- Automate processes with end product queries from the COLD application
- Drastically reduce the amount of paper printed
- Eliminate microfilm and microfiche
- Leverage existing technology
- Realize return on investment

EVEREN selected a COLD system, the Computron COOL (computer output on-line) as the "official knowledge repository" for records retention. In the initial year of implementation EVEREN is using the system in six branches with over 275 users. Their goal is to roll out to all their branch offices and 2,000 employees. EVEREN started out with a pilot project in a group that was technically proficient and used a lot of paper – the Corporate Accounting Department. A key element of the test was to identify the organizational impact of the new system. Using a pilot approach, they could determine issues arising with diverse feeder systems, devise a security plan, and ascertain the technical operating plan and indexing requirements.

Testing security and auditing the validity of the data were integral to user acceptance. They spent a lot of time determining that data sent from various sources was valid, complete, and timely. EVEREN put tools into place to measure disk storage usage and server performance. They also used the test phase to validate data normalization and standardized naming conventions for the company-wide deployment. As EVEREN continues to expand implementation, their next concerns will be ease of use and desktop presentation – making desktop presentation more like the previous paper forms. They are also looking at the need to integrate existing disparate desktop equipment and knowledge sharing over an enterprise wide Intranet. Some lessons learned from EVEREN:

- Develop a plan for system redundancy and back-up of system and data – there is low tolerance for down time
- Develop a business continuance plan and test it periodically. Without paper records, the COLD system becomes critical, make sure risk is minimized
- Involve end users as well as management in designing your accessing and indexing schemes – become very familiar with the data in the system and user needs
- Obtain retention requirements for reports before implementing data into your system – batch reports with like retention times, and
- Document the flow and processes regarding corporate knowledge access, develop access permission systems for proprietary data.

Union Bank of California:[39] Union Bank of California is one of the nation's largest banks, with over 247 West Coast branches and $32 Billion in assets. They have four Alameda County branches. The bank formed as a merger between Bank of California and Union Bank in 1996. UBOC has approached source reduction and recycling from a proactive standpoint, but they are coming from an increased efficiency gains/reduced costs viewpoint rather than from an environmental one. The bank's paper-reducing technological innovations have come as a part of "Mission Excel", a company-wide effort to improve efficiency and reduce expenses. Through the programs they have implemented, the bank has successfully reduced waste and increased efficiency in their offices

Paper reduction programs are generally implemented through electronic technology efforts and through recycling programs. Union Bank of California has approached paper reduction on several different levels. Some levels may be obvious to the customer, like on-line banking or faster records retrieval, while others, such as electronic manuals and confidential document destruction programs, are visible only from an internal standpoint. Although the bank has worked with staff at all levels to implement the programs, the effort has essentially been top-down – all branches, and employees, must become a part of the new system.

One of the major efforts of UBOC has been in the field of records management. The bank must keep track of all the transactions of thousands of customers each day. For example, UBOC receive approximately 450,000 demand deposits each day, these used to be printed and delivered to all 247 branches daily. With the paper versions, the staff would have to thumb through these large reports to find the account number they were looking for. Now, the bank makes all demand deposit records available (to those with security access) electronically using COLD technology. All account information is sent to the COLD writer, where it is automatically indexed and archived. The bank has an optical library with 468 GB storage capacity on 180 platters. The data is also shipped electronically to a back-up storage facility. Bank employees can pull up data quickly from their desktops, and print or fax from the computer for customer requests. It takes only 7 to 20 seconds to retrieve a statement, vs. 3 to 5 minutes for microfiche (which then requires a special printer). Just through eliminating the microfiche selection, printing, and re-filing process, the bank saves $75,000 in personnel costs and $25,000 in printing each year.

In developing the system, Union Bank surveyed bank staff and analyzed each report from a requirements point of view. According to the bank, this up-front analysis of how data was used, legal retention requirements, and data sources for printed reports saved time on the back-end. The system has allowed the bank to eliminate paper in addition to microfiche, for an additional $10,000 in savings per month. This translates to hundreds of thousands of sheets of paper a day, plus improves labor productivity and eliminates the need for couriers, who used to have to deliver the reports by 8am the next day. Now, almost every major customer report is on-line.

UBOC is also in the process of putting internal reports on-line. For example, each department gets three general ledger reports a day for their department. This means at least 20 pages of

[39]This case study is based on interviews with four Union Bank employees: Stephen Ward, Vice-President of Bank Operations, Dick Lechnar, Manager of Records Management, Francisco Sison, Bank Operations, and Schuyler Bailey, VP Bank Manager of the Berkeley Branch. The interviews were conducted in November and December, 1999. Also, AIIM Web Page, inform magazine: www.aiim.org/inform/union.htm

paper, per manager, per day. There are 1,000 departments in the bank receiving these daily reports. Now, getting the report on-line, a manager can just look at the few lines that are relevant to them. They haven't evaluated the paper savings, but they are using an outside consulting group, Andersen Consulting, to help quantify the gains from such efforts as part of their strategic planning. This quantification is focusing on distribution and ease of access. The assessment is looking at all 360 UBOC facilities. It is difficult to quantify because the savings are spread. For example, a single branch might save a Full Time Equivalent (FTE) employee, but at that scale it only shows as an efficiency gain. At the central facilities, such as accounts payable and purchasing where there are many employees in those jobs, they are able to more readily demonstrate efficiency gains and FTE savings.

Another major effort of UBOC has been in creating internal documents, such as manuals, in electronic form. They are currently undertaking a project using Lotus Notes to put all 39 of their employee manuals in an electronic format that can be accessible via the Intranet. When the project is completed in June 2000 there will be nine large on-line documents that can easily be accessed and searched by subject. Also, if a change needs to be made, they can be made quickly without reprinting or having to update an entire manual.

The bank began to look at putting the manuals on-line in 1994. At that time, the technology would only allow a large text file. Because this didn't seem to have significant advantages, bank executives put the project on hold for a couple years. By the time the project started up again, they were able to take advantage of emerging technology such as the Intranet to create a searchable, and more easily accessible set of documents. One of the first steps was to hold focus groups with bank employees to discuss the new technology. At these meetings, bank operations staff asked employees, "what is the problem with the paper manual?" Bank operation's primary focus was to make the process of using manuals better for the user by improving factors such as format and content. Effectiveness was an issue – operations wanted to know, if employees don't read the manuals in paper form, will they read them in an on-line environment? They looked at the entire process, the purpose of the manuals, and the content of the manuals. The employee feedback at these sessions allowed operations to better structure the on-line manuals. By switching to an on-line format, the bank was free to modify the structure of the manuals to improve usability. The manuals are now more transaction oriented. Employees can easily search and identify the information they need to complete a certain task such as making a deposit. Background information that is in the paper versions, such as why a particular procedure was developed, is not needed in the on-line version.

Last year, with three of the nine manuals on-line, the bank saved $100,000. These savings were realized through not preparing, printing, and delivering 600 updates for the manuals. Savings are expected to triple once all the manuals are on-line. The extent of potential paper savings in the future is significant. In 1999, bank operations made 10 million copies. Seventy-five percent of these were related to the manuals and updates. Once all the manuals are on-line, the number of copies made will drop drastically, although not to zero.

A change that affects all employees on a daily basis is the internal phone book, which has been put in electronic format. This allows any change in personnel to be instantly updated across the board. Before the directory was on-line, it was updated every few weeks in paper. Employees

often would wait for an updated version, and during the year, a stack of paper much larger than the initial directory was generated with updates. According to branch personnel, the new on-line directory is user friendly. The phone directory also illustrates the reluctance of some staff to trust an on-line system. Some employees are still hanging onto their old paper directories, just in case.

A key issue is computer accessibility. To implement these changes, some computer systems were upgraded or, in areas like warehouses, computer kiosks were installed. New workstations were purchased, and employees with their own workstations accept the new systems more readily, since they have easy access to the manuals. Those without must use the kiosks, or bump someone off of their workstations. Management must be willing to purchase PCs if they are serious about implementing these technologies.

Of course, training is important. Showing people how they benefit and training to enable them to use the system helps overcome the level of resistance. Support from the top, and from intermediate level managers also eases initial concerns. Training for electronic systems has been a gradual process, and is often done on a staff-by-staff basis because of the high staff turnover in the banking industry. For the manuals, the bank offers prerequisite training for all employees, as well as on-the-job training. Because the system is based on a simple point and click approach, they don't really have an issue of someone not being able to get around within the manuals. Employees don't need to be application savvy to use the new system.

Employee response is mostly positive. In follow-up focus groups, employees preferred the on-line system, although they still feel that they are receiving lots of paper-based information. The bank will do another focus group after all the manuals are on-line. Employees like the easy access to information. This is especially helpful for a teller, dealing with a big line. Both they and the customer get frustrated when they have to search for information. There are efficiency gains for the rest of the staff as well – they no longer have to search through nearly as much paper, which can save time and frustration. At the branch level, introduction to email caused some discomfort to staff. Once supervisors worked with staff, they became comfortable with the new system.

A third component of the UBOC program has been in electronic data management. Previously, when someone applied for a loan, several copies of the application were made and shipped to different offices for processing and storage. Now, as soon as an application comes in it is scanned and put into electronic format, then the paper copies are destroyed (all the paper is then recycled). The electronic copy is now the only copy; therefore changes can be made without the possibility of creating different versions of the same document. Also, there has been a tremendous reduction in filing and storage needs. An entire 200,000 square foot building in San Diego is no longer used for document storage. The filing staff has been reduced from 30-40 employees to just four; who now do imaging, rather than filing. UBOC tries to relocate displaced employees to other departments.

The changes at UBOC have occurred gradually over the past four years, and are part of a continuous process. What resulted was a shift to a more electronic culture. Though some employees would like to hold on to their old ways, and old phone books, eventually everyone will have to use the various electronic systems. Forms are starting to go on-line too, from

ordering supplies to putting in time sheets. The support has come from the top, and even the Bank's vice presidents are using the new systems.

In offering advice to others implementing similar programs, bank staff emphasize that it is critical to create a collaborative effort with the systems development team and the users. They emphasized the importance of sitting down with staff and asking what they want to achieve, and creating qualitative and quantitative goals to measure progress. Another important factor in Union Bank's implementation has been the use of vendors. As the bank, like many other organizations becomes "lean and mean", it is necessary to rely on outside help to keep up-to-date on new technologies. This is especially true with information technologies, which are rapidly evolving. The bank used a Request for Proposal (RFP) process to identify and select vendors.

The banking industry is highly regulated, and some technological innovations are limited by the regularly requirements to produce and/or maintain printed copies. The bank has been conservative in their approach to paper reduction, and has still realized significant savings. One area that is still in paper is customer statements. This is because they are required by law to be printed. In addition, consumers are not generally accepting of electronic technologies. Until they are comfortable with totally electronic banking, which is now a consumer's rights issue; there will be no pressure on regulatory agencies to change requirements.

Overall, Union Bank of California is an excellent example of source reduction through implementing electronic technology. They are focusing on transforming everything possible to electronic versions. The benefits have come in cost savings on paper, filing staff, storage space, and printing, as well as efficiency gains for customers and employees, easier distribution and ease of access. The focus of these efforts is to keep increasing performance as a bank; it so happens that paper reduction has been an added benefit for the environment.

St. John's Bank:[40] This small bank based in St. Louis, Missouri wanted to improve customer service and operations related to archiving and retrieving reports, checks and customer statements. The switch from a paper and microfiche based system to a COLD system resulted in significant savings and increased efficiency. Their primary goal was to add operational improvements and improved responsiveness and accuracy in customer service. Additional goals included reducing paper and paper storage costs. The new system allows easy cross-reference of information, so that employees can search for customer data and retrieve deeper layers of information – for example a statement, a check, then a signature card – very quickly and easily.

The system also required little or no end-user training. The total initial investment for software licenses, COLD/ERM module, Network Database utilities, scanning module, and CD-Mastering module was $55,000. The system went from approval to operation in only 4 months. According to the bank, improvements in customer service were dramatic. With the old system, it would take 2-3 days to retrieve an old bank statement for a customer. Now, it takes one to two minutes. Additionally, reports can be viewed on PC, which eliminates printing and the later shredding of sensitive documents. The bank reduced printed pages per month from 100,000 pages to 10,000, netting hard savings of $15,000 per month.

[40] AIIM web page, inform magazine: www.aiim.org/inform/may99/may00p34.html

Wholesalers

Atomic Ski USA:[41] has installed Report.Web for its 25 sales reps to provide them with up-to-date information on inventories. Previously, publishing and distributing weekly sales reports was costly, and the information was quickly out-of-date. Now, the sales reps have access to information without waiting for weekly reports, and without extensive calls to customer service reps, who can spend their time with customers. Atomic Ski is going one step further, and providing sales reps with information through palm pilots rather than laptop computers. Because of the seasonal nature of their business, Atomic's balance-to-sell report has a useful lifespan of only a few hours. When only paper copies were available, sales reps had to call in to customer service to make sure they weren't selling a product that was no longer in stock. Sales reps have easy access to information on-line, and can also download sales data into Excel or Access to create reports.

Haworth's:[42] a furniture company, implemented an electronic (CD-ROM) catalog and information system for salespeople. The system cost $500,000 for software development and an additional $2 to 3 million for laptops and training, but has paid off from a marketing perspective alone. Just in not-reprinting paper catalogs after changes, the company saves $1 million annually.

Manufacturers

General Motors Corporation:[43] has many document management systems. The systems are not integrated and are based on different infrastructures – some are custom built and some are packaged systems. GM systems in place included PC Docs, Documentum, Lotus, Saros, HomeBuilt, and others. This proliferation of systems resulted in management overhead, obstacles for users, and system compatibility issues. It created "islands" of documents with their own "cultures." GM is now moving towards a common repository, using Document Management Alliance standards to create a common systems communication layer in new projects. This will make it easier to communicate between the various information systems and between various departments. Over time, GM will go from 40-plus unique information management structures to less than four.

Caterpillar Inc.:[44] is a $21 billion corporation with 65,800 employees and operations in over 20 countries. Caterpillar's 195 dealers add another 81,800 employees and 1,213 stores. Due to their size, Caterpillar has operations that extend beyond manufacturing and into publishing, financial services, education and training, and telecommunications. To support these functions, the company has a hardcopy library of millions of pages of manuals, printed in 16 languages. Caterpillar's information management needs are extensive, and require the ability to exchange information between a variety of platforms and storage mechanisms. The variety of systems in

[41] National Software Associates Web Page: www.nsai.com and Internet Week Online, Monday November 1, 1999: www. Internetwk.com/lead/lead110199.htm

[42] EPA report: WasteWise Update: Going Paperless with Technology, EPA530-N-96-007, Office of Solid Waste and Emergency Response, June 1996

[43] : Building a Common Repository at General Motors Corporation, Transportation Industry White Paper, Document Management Association web page

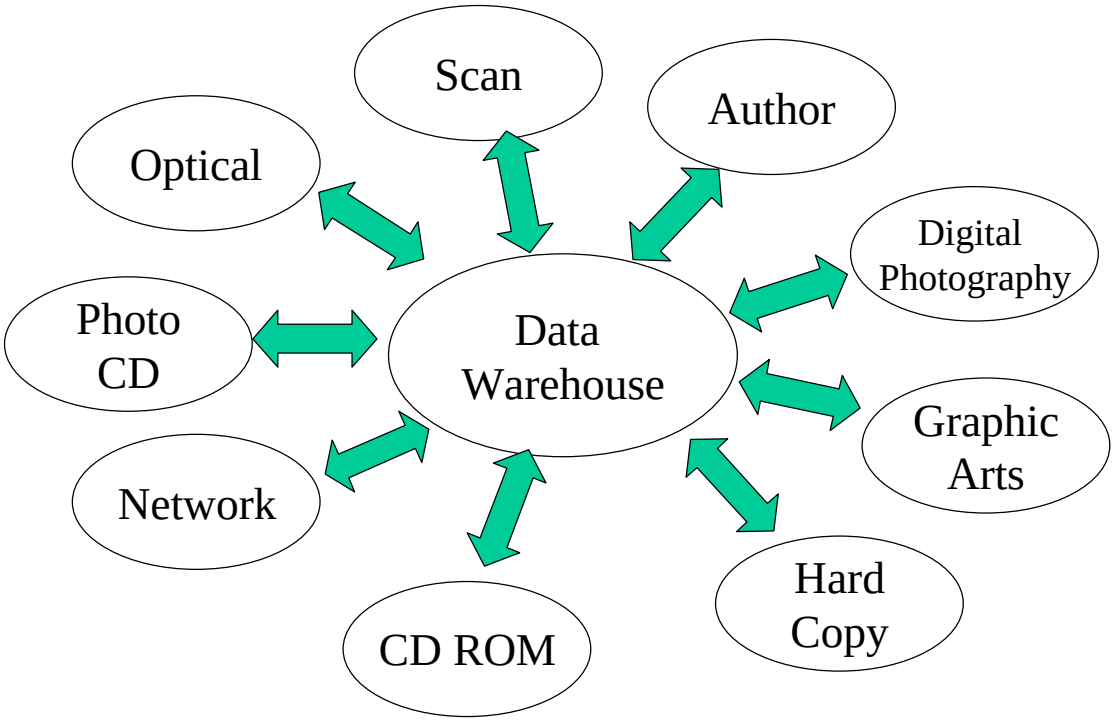
[44] "Building an Information Hub for High Velocity Knowledge Exchange at Caterpillar Inc.", Manufacturing Industry White Paper, Document Management Association web page

place include: image management, COLD, asset management, application-specific management, and home built systems.

There are four main problem areas for companies such as Caterpillar that have vast amounts of knowledge and face difficulties in making it available: no standard format or content structure; islands of information created department-by-department rather than enterprise-wide; limited accessibility; and the total cost of new systems including training and administration. Prior to implementing the new system, Caterpillar had six "islands" of information: 1) electronic documents, 2) photographs, 3) transaction documents in custom systems, 4) office suites and email systems, 5) digital legacy documents, and 6) paper legacy documents. Caterpillar's vision with regard to information management is to: "put knowledge to work by harnessing the silos of information into a virtual data warehouse to support the multiple disciplines across the worldwide enterprise and extended enterprise of suppliers and dealer." A key goal is inter-operability of multiple systems.

Four goals for implementing their new information system are: agreement on system architecture and infrastructure; use common operating environments; make records management an integral requirement; and plan for remote viewing, remote printing, centralized printing, version control, instantaneous updating, and digital interfaces. In the new system, an open standards-based middleware data warehouse connects islands of information and provides a framework to retrieve knowledge and make it accessible (Chart 3).

Chart 3. Caterpillar's New System



Expected improvements resulting from the new systems include: productivity gains in the double digits, an increase in electronic vs. paper documents, automating paper-based transactions and processes, improved records management, increased availability of information within the organization and also with dealers and suppliers, reduced redundancies in processes, reduced

travel costs, decision-making that is based on more current information, and improved customer satisfaction.

Earle M. Jorgensen Company:[45] EMJ (a steel distributor) needed a system to help deal with orders, testing results, billing records, delivery receipts, and other administrative reporting requirements for their steel distribution system. EMJ receives and processes between 3,000 and 10,000 orders per day, with more than 25% requiring customization to client's needs. Previous to implementing an Image-X storage and scanning system, documents were maintained at 34 locations. Customer service was relatively poor, and the company lost an estimated $12,000 per facility per month in sales because mill reports couldn't be provided to customers in a timely manner. The new system allows employees to scan, store, retrieve, and print or fax mill reports and other documents. It eliminates paperwork, manual filing and storing, and makes it possible to retrieve documents almost instantaneously. The company is saving over $100,000 per year in data entry costs, alone. The company has increased revenues and new sales opportunities through improved customer service. One of the major advantages of this system to the company, in addition to the efficiencies, is that the company was still able to maintain their pre-existing database application.

Phillips Petroleum Company:[46] began paying suppliers and receiving payments electronically. The system paid for itself in cost savings, including reducing the amount of time spent to process checks and forms.

Silicon Graphics:[47] developed an electronic system for orders and invoices. The custom system is expected to save $2.1 million in the second year. Initial costs were $1 million, and included research, design, and development. SG conserved about 500,000 sheets of paper per year (much of it unrecyclable carbon paper) by eliminating multi-part electronic forms. The number of steps to purchase an item is down from 15 to 3, and takes only 24 hours, as compared to 3 weeks. The new system is a web-based system. SG offers a few implementation hints: 1) research the current paper-based process from start to finish; 2) look at the entire chain of individuals involved in the process, including customers and suppliers; 3) listen to everyone's concerns and suggestions and incorporate key ideas; and 4) don't be intimidated by initial start-up costs.

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[45] AIIM Web Page, inform magazine, www.aiim.org/inform/oct98p36.html

[46] EPA report: WasteWise Update: Going Paperless with Technology, EPA530-N-96-007, Office of Solid Waste and Emergency Response, June 1996

[47] EPA report: WasteWise Update: Going Paperless with Technology, EPA530-N-96-007, Office of Solid Waste and Emergency Response, June 1996

PUBLIC SECTOR CASE STUDIES

There are significant opportunities for paper reduction and cost savings in the public sector as well as the private sector. This section summarizes nine examples of agencies –local, state, and national – that have implemented paperless technologies. Two case studies, Alameda County Social Services and the Defense Finance Accounting Service, are based on interviews with agency staff and articles and, while the remaining seven cases are summaries of existing write-ups.

Summary Table 2 – Public Sector Case Studies

Agency	Technology	Purpose	Key Benefits	Implementation Issues
Alameda County Social Services Agency	INFOPAC system for storage of Notices of Action	Reduce paper, reduce filing	Potential to eliminate 100,000 sheets per month printed and filed	Not enough staffing to get program going, need to address screen size, viewing of forms and indexing and accessibility, lack of computers, training
California Department of Motor Vehicles	Imaging system for vehicle registration	Speed registration process, eliminate microfiche	Eliminated $600,000 per year microfiche contract, reduction in staff from 99 to 77 and increase in productivity, eliminated backlog, improved processing time, saves over $1.2 million per year	Staff reluctant to change initially, needed training and time to adjust to new systems
Defense Finance Accounting Service	Report.Web system for financial and accounting reports	Reduce paper and improved distribution of reports	Cancelled $680,000 per year microfiche contract, save $100,000 per year in couriers, improved access to information, reduced paper	Inadequate computers and monitors, initially they were slow and had poor viewing on screen – had to upgrade, staff initially not supportive, new computers and training helped, total cost was $540,000 for 5,000 copies of program and implementation

Agency	Technology	Purpose	Key Benefits	Implementation Issues
Maricopa County Recorder's Office	FileNet Workflo and document imaging system, customized Recorder's Document Information System	Improve ability to keep up with growth in area, handle public documents and voter registration	Immediate access to information, reduced paperwork, reduced filing, improved delivery time, customer access improved, improved efficiency	Program supported by $4 per document recording fee
State of Maryland Register of Wills	Imaging, storage, indexing, retrieval, and workflow software	Improve estate administration system	Improved customer service, improved response time, elimination of microfiche	Implemented quickly with only a few weeks of testing
Massachusetts Department of Revenue	Imaging and workflow system	Overall shift from paper to telephone, electronic tax systems, improved performance, eliminate storage facilities	Processing costs reduced by $1.5 million annually, reduction of 50 employees, elimination of 11,000 square feet of storage space	Technical issues related to human errors, scanning settings, education of taxpayers, staff initially intimidated, training helped with acceptability
New York City Office of the Comptroller	Documetrix system for workflow, database management	Improve efficiency, work processes, access to information for claims filing	Reduction in staff from 142 to 93,with 13% increase in claims processed, ease of access to files, reduced delivery costs, uncovering improper claims saved $200,000	Training – staff needed training on the new equipment
University of California, Irvine	Variety of projects part of a University wide effort to streamline: eliminating forms, printing of reports, manuals, financial documents	Reduce paperwork, streamline processes, reduce administrative costs	Elimination of 7.3 million sheets of paper a year, elimination of some printing production, improved processes	Reviewed business processes to look for opportunities to streamline
West Virginia Department of Highways	Electronic imaging and workflow system	Improve efficiency in administering files related to 500-plus highway projects	Reductions in storage space, improved work environment, increased productivity, reduced off-site travel, improved quality control	Implemented system in 3 phases

Alameda County Social Services Agency[48]: The Alameda County Social Services Agency (SSA) administers the public assistance programs set forth in the California Welfare and Institutions Code and related laws. Programs administered by SSA include: protective services, in-home supportive services, foster care and adoption, emergency services, homeless shelters, public assistance, food stamps, Medi-Cal, veteran's services, Welfare to Work, and public guardian services. SSA employs about 2,300 people and has twenty locations throughout the County, with the main office in Oakland. SSA employs about 17 percent of County employees, and purchases over 20 percent of the paper used by the County. Because they are such a large paper user, SSA became a target for the mandated countywide paper reduction of 15 percent (by weight) by 2000. In 1997, Community Environmental Council and Global Futures studied the potential for paper reduction and the costs and benefits of paper use and reduction in SSA. As a follow-up to that work, our goal was to track, measure, and document a paper-reducing technological innovation within SSA. This case study documents that effort.

The targeted technological change was the development of an on-line storage system for Notices of Action (NOAs) and related reports. Each time a change is made or an action taken for a particular client, a form, the NOA, is completed. Currently, one copy is printed and mailed to the client, and one copy is printed and filed at SSA. Approximately 100,000 NOAs are printed and filed each month. The goal of the project is to eliminate the printing and filing of NOAs within SSA – only the client copy would be printed, and the SSA copy would be stored on-line and available for retrieval and revision as needed.

In February 1998, SSA Senior Program Systems Coordinator Marilyn Ghiorso and Manager of Administrative Services Jim Brown met with Beth Eckl of Alameda County General Services Agency to discuss paper reduction options. They identified several possible projects, including the NOA project. SSA received a $7,000 grant from the Alameda County Source Reduction and Recycling Board (ACSRRB) to study the on-line storage of case documents. To conduct the study, SSA contracted with the County Information Technology Department (ITD).

The first meeting with ITD to discuss the project was held in August 1998. SSA and ITD staff met to discuss the feasibility of ITD developing a system to store the NOA on-line. SSA staff discussed the practical difficulties that the new system would have to address: compatibility with programs and reporting in other counties and state agencies; compatibility with the yet-to-be developed statewide computer system for social services (CalWIN) and other programs; labor and union issues; training, and normal resistance to change. From ITD's perspective – any of the Agency's technological needs could be met, if there were adequate resources. At this initial meeting, it appeared that SSA and ITD were talking on different planes – the technology orientation and user orientation were not initially the same. It was, however, agreed to move ahead. Staff figured it would take about 160 hours for ITD to study the feasibility of a new system.

During August and September 1998, Linda Yim of ITD staff studied and developed a report to assess current on-line storage systems at SSA, program needs, possible technologies, costs and

[48] This case study is based on telephone interviews with Marilyn Ghiorso of SSA, Beth Eckl of Alameda County General Services, Linda Yim of Alameda County Information Technology Department, attendance at a meeting between ITD and SSA, the ITD report on the project, and various other emails and discussions between August 1998 and December 1999.

implementation steps, and to submit a proposal. According to Linda Yim, when they started looking at the system, ITD realized that the NOA project could be done with relatively low expense and save a lot of paper. Because the statewide computer networks system, SAWs, is coming out within a couple years, they did not want to develop a system for NOAs that would supercede the statewide program or that would become obsolete once CalWIN was in places. So, they looked at existing technologies and identified the INFOPAC system, which would allow staff to pull up and view NOA reports. One problem, she said, was that "they are not pretty on screen." Still, after scoping out the project, she couldn't see any reason why SSA shouldn't move ahead.

The four-page ITD report was presented to SSA in October 1998. The report outlines the technology, costs, an impact analysis, options, and makes recommendations. As noted above, ITD recommended that the NOAs be stored on-line using the existing INFOPAC product. Through INFOPAC, the NOAs could be indexed, stored, and retrieved through terminals or PC's with terminal emulations. While ITD noted that the system is "not the most sophisticated", they cited several advantages, including low cost for hardware and programming, no new software or workstations, no compatibility problems with future systems, elimination of pre-printed forms, and huge reductions in printing and filing. There were five cost categories: ITD programming; creation of an indexing system within INFOPAC; formatting; developing a system to store records; and purchasing a few mainframe printers for when forms did need to be printed out.

The study recognized several potential problems with the new system. For instance, sometimes forms are returned to the eligibility worker for further notation, copies retrieved from on-line must be adequate in legal terms in case there is an appeal of the case, the system must be acceptable to auditors, on-line viewing is not satisfactory, and a report identification system must be developed and added to the form. While ITD did recognize that there are options that could more easily deal with some of these issues, such as imaging systems and COLD, these systems are much more costly and were not recommended.

The report outlined four steps to move the project ahead: 1) project approval by SSA (requiring a user request to ITD, a determination of whether printed copies of stored on-line documents could be used for audit and in an appeals process, and a review of the new process by appropriate labor representatives; 2) the programming effort by ITD; 3) hardware and software purchasing and installation; and 4) implementation and training. At this point, just over a year from the time of the report, the project has stalled in Step 1.

When the report first came out, Marilyn Ghiorso, in charge of paper reduction programs at SSA, was very positive about the potential of getting the NOAs on-line. After the project received SSA approval, we (Global Futures) would work with them to quantify the costs, benefits, and assess implementation issues of the new program. During the spring of 1999, the project stalled as SSA Information Systems staff were involved in work on mandated projects and were unable to spend time on the on-line storage system. SSA put the development of the use of the Internet and County Intranet (with the goal of paper reduction) into the Agency Strategic Plan, along with plans to hire a staffperson to be dedicated to this effort. However, current staff did not have time to spend on the NOA system, and the project stalled.

In December 1999, the program is still stalled. The primary problem is lack of staff and resources to devote to developing the new system. There are two key issues that must be addressed to make the NOA system effective – viewing documents and indexing. Without these changes, the system will not be user-friendly. Notices and documents stored on-line in the INFOPAC format do not display fully on the current terminals or computer screens, and require staff to use function keys to scan through the document. The Agency needs to develop a system that will allow the whole form to be seen at once. Also, the current system of filing and indexing is not adequate. A NOA is filed by case number and date, but it maybe the date the form was completed, the date it was approved by a supervisor, or the date it was processed. When a staff person pulls up an NOA to review it, they need a quick and standardized system of indexing. SSA needs to create a workgroup to address these issues, but they do not have the staffing.

In addition, SSA needs to develop processes and procedures for the new system, work with the unions to get approval for the new approach, work with the overall computer system vendor to identify printer needs, and work with staff to institute the changes.

SSA has not lost sight of the benefits. Ms. Ghiorso acknowledges that in addition to the paper savings it "will save an enormous amount of staff time." Clerical staff will be able to be diverted away from filing to other tasks. Ms. Ghiorso hopes they can get the momentum going again in 2000, and that the Agency will be able to devote the staff time needed to do so. Now, "State mandates take precedence" – they simply must deal with some projects, and beneficial but lower priority projects such as this one get pushed further down the list.

This case study illustrates a few key lessons. First, it takes people and time to make information technologies happen – and if these aren't both available, the effort is not likely to succeed. This includes not only the staff power to deal with the implementation, but a project champion that can devote time to moving the project ahead. Second, technological issues that make the program user-friendly are critical to its success. For instance, being able to view the full document and being able to easily identify and search for a particular file are critical. While these issues may not sound that important from an IT perspective, when looked at from the user-perspective – someone who may not be enthusiastic about the new technology in the first place – they become all-important. Implementation of new technologies is not always successful in the private sector either – but the low staffing and lack of support may be more common in the public sector. Even though the application has proved financial benefits, the Agency does not have the time to devote to realize them.

California Department of Motor Vehicles:[49] The California DMV processes about 60,000 vehicle registrations a day, in addition to license applications and renewals, releases of liability, and other documents. One division within the DMV has had success with their electronic data system. Before implementing an imaging system, documents were sent from 175 field offices to DMV headquarters where they were photographed for microfiche and then processed, sometimes taking 25-30 days. The new imaging system allows the DMV to process 7,000 images per hour per person, compared to 1,500 per hour per person on average with the microfiche system.

[49] AIIM Web Page, inform magazine: www.aiim.org/inform/lawkodak.htm

The improved productivity allowed the DMV to eliminate the one-year-old work backlog within 3 months, and is saving $1.2 million a year, not counting personnel savings. They have eliminated an on-site technician, saving $225,000 a year, and the staff has been reduced from 99 to 77 by attrition and reassignments – now more work is being done by fewer people. The new micro-imager system can handle documents of different sizes, which allowed the DMV to cancel a $600,000 per year contract with an outside vendor to prepare documents for filming. The system paid for itself in one year. The records are captured and indexed, and can be accessed by DMV staff in different groups. Despite the potential cost savings, DMV was "reluctant to change our process, but once we got past that, the possibilities just started opening up and we saw a lot of room to improve" according to Norm Leonhardt, office services supervisor.

The Defense Finance Accounting Service (DFAS):[50] was one of the first to implement Report.Web for reporting from mainframe applications. DFAS, the largest finance and accounting organization in the world, handles the financial and accounting reports for the Department of Defense (DOD). The San Diego DFAS location generated generated huge amounts of paper reports from a mainframe computer system prior to Report.Web. The reports were distributed to users in remote locations and also stored in microfiche form. Literally tons of paper were generated every month in payroll and financial reports for Navy and DOD employees.

Installation of the new system was mandated in 1997. DFAS received strong support from National Software Associates, the developer of Report.Web, but there were still initial problems. According to Frank Gastelum of DFAS, at first users "wanted to get their paper back". Now, the system enjoys wide popularity. Many of the start-up problems were due to the inadequate computer systems. Staff had old 486 computers with Windows 2.1 and 15 inch monitors. With this equipment, it took a long time to download reports, and they couldn't see the whole page on their small screens. These problems were eliminated when the first year savings were used to purchase 300 computers with Windows NT, boosted memory and 17 inch monitors.

The savings, even in that first difficult year, were significant. The initial cost of the system was about $540,000 to install 5,000 copies and get them running. These costs included overtime, supplies and equipment during the three-month implementation period. The system now costs $52,000 a year for maintenance. The hard savings the first year were $760,000, including cancellation of a $680,000 a year contract with a microfilming company and almost $100,000 in labor costs realized by eliminating the need for couriers to deliver reports.

Users now have immediate access to the reports each morning, while previously they had to wait until paper reports were delivered at 10 am. Segments of the report can be downloaded and pasted into other applications for staff to work on, saving time and reducing data entry error. One report, the 6-foot report, was named due to its size. Employees would fill the report with yellow Post-It notes to mark their place, resulting in a very inefficient and messy process. Now, "users can drill through the report logically on their PCs as often as they want. The research time it has

[50] Interviews with Sarah Patnode, National Software Associates, Inc., 9/16/99 and Frank Gastelum, Defense Finance Accounting Service, 10/7/99, NSA Inc. Web Page: www.nsainc.com, and Doyle, Ed. "Department of Defense Replaces Printers with NT Servers" *ent Online*, November 18, 1998, www.entmag.com/displayarticle.asp?searchresult=1&ID=1199891111PM

saved is considerable." In addition, the 80 to 100 users located across the country have access to the reports, resulting in additional savings on shipping.

One drawback in the system results from its huge size. About 100 new reports, with an average size of 25 MB, are added to the system each day. Reports must be saved for ten years. The database of reports has become enormous, and pulling old reports out of the archives can be slow. Still, the system is more efficient than a paper or microfiche based one. There is an automatic archiving process into CD racks, and thus far they have only filled twenty-seven CDs.

Training was not a big issue once staff computers were upgraded. Since many users were already used to the Internet, many didn't need much training. However, both internal and contract training have been provided, and this has made users more relaxed. NSA provided initial Report.Web training to selected DFAS employees to "train the trainer". These DFAS employees then developed a Report.Web training course for its end users. This two-day course is ongoing and is provided for all end-users. In addition, to set up the new network of NT servers, DFAS headquarters held classes for the administrators who run the Department's local sites. The administrators were given hands-on training in configuring the servers and were walked through the responsibilities of maintaining the server and using the Report.Web software. There are still users that want to print out paper reports, but they can print out page ranges, rather than the entire report, if necessary.

It has "significantly reduced DFAS' reliance on printed reports, nearly eliminating the agency's report production and distribution expenses. Over a two-year period, the agency expects to invest $1.8 million in installing Report.Web in 23 locations, with a resulting savings of $10 million.

Maricopa County Recorder's Office:[51] Maricopa County, Arizona includes the Phoenix area, and has a population of 2.3 million (and counting). The recorder's office is responsible for maintaining and making available public documents, and for voter registration and elections. Maricopa County was one of the first to institute automated systems. The impetus was that the County was unable to keep up with the rapid growth in the area. In 1986, the State legislature passed a $4 per document recording fee that goes directly to automating county recorder offices.

In 1991, Maricopa County installed a FileNet WorkFlo and document imaging system with customized front-end software called the Recorder's Document Information System. In the new system, all documents – 3,000 to 8,000 a day – are indexed, scanned, and returned. Employees have almost immediate and simultaneous access to information, eliminating out-of-file conditions and paperwork. Staff no longer spend excessive time finding and delivering documents. Citizens have access to files on computers at multiple locations in the county, resulting in enormous public benefits. It now takes a customer only seconds to find a file and print it from an optical disk, a process that used to take over 20 minutes.

On-line storage of voter registration signatures has also vastly improved the efficiency of signature verification for elections. The new system provided a return on investment in 18 months, and allowed the county to double its recording transaction volumes over the last five years without increasing staff. Maricopa County has licensed the customized technology and is making it available to other county recorder's offices throughout the country.

[51] AIIM web page, inform magazine: www.aiim.org/inform/cntycase.htm

State of Maryland Register of Wills:[52] In 1997, the Register of Wills instituted an imaging system for the documents related to estate settlement. The executor of an estate files an average of 40 documents to settle an estate, including wills, petitions, legal requirements, and supporting documentation. In the old paper-based system, all forms were kept in their original format until after the estate was closed, and then they were stored on microfiche. Settling estates required County employees to sort through huge volumes of paperwork. In addition, responding to information requests from outside was very slow and difficult. The County installed an imaging system that included client/server imaging, storage, index, retrieval, and workflow software. The system supports collection, scanning, and indexing of a variety of document types and lengths.

In the paper-based system, new information was distributed, put in a bin, reviewed, filed, and recorded. Incoming forms were entered in large docket books by typewriter. Under the new system, incoming mail is immediately scanned and indexed. The new system was implemented quickly, with just a few weeks of testing required. The primary benefit is the enhanced customer service and improved response time. All new wills registered since January 1997 are completely on-line, and the county is transferring older documents into the database. The county is using PCs in their offices to allow citizens to view documents on-line, and will eventually move to a web-based system.

Massachusetts Department of Revenue:[53] the Massachusetts DOR views their primary responsibility as the business of information processing: the use, flow, and management of information. Over a five year period, the agency has been switching from a paper-based system of information management to telephone and electronic systems. Through this time they have downsized staff by 28% while improving all performance indicators. Improvements have occurred in processing, customer service, audits, and enforcement.

For short-form state tax filers, DOR instituted a Telefile system in which taxpayers fill out a worksheet at home, then call in and punch in information over the phone. For the 2 million long-version tax forms filed, DOR needed another solution. One goal was to eliminate the current storage facilities: three locations with a total of two-acres of data stored on paper returns. In addition, it was a lengthy process if any of those forms needed to be retrieved for audits or other inquiries. In the old system, a taxpayer might have to wait days, or even months for their file to be retrieved from storage.

Beginning in 1994, DOR developed an imaging and workflow system. High speed scanners take pictures of returns, and send the images to another computer that reads and extracts data from both handwritten and machine-generated returns. There is an electronic file-folder for each taxpayer that can be easily retrieved. Data entry time has been minimized, and processing costs have declined by $1.5 million annually because of a reduction of 50 full-time employees. Storage of a year's tax returns takes only 25 square feet for a magnetic disk storage box, as compared to 11,000 square feet for paper copies.

The biggest barriers in the imaging system are technical "kinks", mostly due to human error, such as not changing scanner settings properly, and educating taxpayers not to use staples. Staff initially was intimidated by the new technology, and training was another challenge. Once

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[52] AIIM web page, inform magazine: www.aiim.org/inform/june/0698p32.html

[53] AIIM Web Page, inform magazine: www.aiim.org/inform/masscase.htm

workers were trained, they were happier with the new system. Under the old system, data entry operators averaged 351 tax returns a day, now they average 618.

New York City Office of the Comptroller:[54] The New York City Office of the Comptroller processes over 30,000 claims annually. Prior to automation, paper files for claims were processed in seven locations throughout the city, and only one person could work on a file at a time. Many resources were devoted to moving paper files from one office to another. The city installed a Documetrix system that could support a variety of different database programs in use by the city. It allows the city to streamline tasks, provide simultaneous access to files, and access information quickly and easily.

Training was a key issue for the city, as most employees were trained in older equipment. Now, staff can automate printing of acknowledgment letters, route documents to multiple users simultaneously, remove disallowed claims to unclutter work flow, and bring in additional documents. The system optimizes about 36,000 images a day. The changes allowed the agency to immediately relocate 10 employees, saving $300,000 per year. Over time, the office has gone from 142 employees to 93, while new claims have risen 13%. The system also allows the office to uncover patterns of fraud more easily than under the paper-based system. They have uncovered over $200,000 in claims that did not need to be paid, and expect a savings of over $20 million by the year 2000.

West Virginia Department of Highways:[55] The Department of Highways instituted a document imaging system for storing all the records and files related to the 500-plus highway projects that are undertaken each year. Prior to the new system, the division had to maintain a large, off-site storage facility for old records, and extensive file cabinets for current records. The department routinely destroyed 250-300 boxes annually, but kept many more on-site. The result was a "closed, paper-driven, cluttered environment" that was unproductive and costly. File management had become monumental and inefficient, especially if files were lost and when staff had to travel off-site to retrieve files.

The Department instituted an electronic imaging and workflow system in three phases, beginning in 1992. The system allows for easy access and retrieval and varying storage time for records depending on legal requirements. For quality control, one staffperson oversees document scanning and indexing. With the new system, access to documents is immediate, there is minimal floor space for hard copy files, and no need for off-site storage. According to the department, one of the greatest benefits is the creation of an open office environment, with improved staff interaction as well as file access. "We've increased staff productivity, improved quality control, and made work more satisfying and rewarding." Big benefits result because staff don't have to travel off-site to look for files, or deal with the aggravation of missing files.

University of California, Irvine:[56] UCI initiated a cost-cutting, efficiency improvement program in their administrative services in 1991. The program included a massive effort to reduce paperwork and streamline processes and administrative costs. Since 1991 the university has implemented hundreds of productivity and process improvements and now delegates tasks to the

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[54] AIIM Web Page, inform magazine: www.aiim.org/inform/nycase.htm

[55] AIIM Web Page, inform magazine: www.aiim.org/inform/wvacase.htm

[56] University of California Irvine Web Page: http://www.abs.uci.edu/depts/vcabs

lowest appropriate level to allow employees to exercise greater initiative. The program has won awards from the National Association of College and University Business Officers.

The objectives of the UCI program are to simplify administrative processes, decrease organizational complexity and layering, improve productivity, reduce reliance on paper, and tap employee ideas to "de-bureaucratize" essential administrative functions while eliminating tasks that contribute limited value. Several administrative areas, such as procurement, hiring, facility renovation, travel, accounting, and student parking now function, on average, 70% simpler and faster. Two-thirds of delegations of authority have been pushed down the line for faster, better-informed, more accountable decision-making. Annually, over 7 million pieces of paper that could have been produced have been eliminated. The program recognizes that "changing the patterns of bureaucracy requires altering the dynamic of values, expectations, rewards, disincentives, and belief systems that define the "administrative culture" of the University. The goals of the "Paper-Sparse" Plan initiative include:

- Review business processes for streamlining opportunities
- Identify ways to simplify business processes
- Create opportunities to delegate and clarify responsibilities
- Reduce excessive approvals, complex prior-authorizations procedures, and lengthy, bureaucratic information paths, and
- Reduce reliance on paper for business processes.

The original goal was to reduce the volume of paper utilized by 5 million pieces per year on a permanent, ongoing basis. Over three years, the university exceeded their goal and reduced 7.3 million pieces of paper per year through substantial administrative process improvements. Focusing on paper-use, which is equivalent to concentrating on the process output, has provided an effective process improvement tool for managers. The 7.3 million in paper reduction was from the elimination of process-based paper such as forms, reports, manuals, instructions, training, reference materials, financial documents, and announcements. The University measured the results by counting pieces of paper saved in many departments.

Benefits also extend into printing production – where staff spent time lining up papers, maintaining computers, and reprinting manually when there were mistakes or someone lost a report. In addition, it is much easier now to find information; in an on-line report staff can search by name or other keyword and find the section of a massive report instantly, rather than searching through a stack of paper. This benefit carries over to customer service, where staff can pull up information immediately.

IMPLEMENTATION ISSUES

There are many factors that slow the implementation of electronic document systems. One of the key factors is overcoming resistance to change. In addition, there are issues related to access to computers and appropriate equipment, training, time, security issues, data reliability and trust, regulatory requirements, and system compatibility. "The primary constraints on technological change are neither technical or economic; they are "sociotechnical". Change is limited by the reluctance of most people to alter routine ways of using technologies in everyday lives."[57] According to some experts, people don't fear the new technology, they fear the change. The fear of change is reinforced by the fact that many benefits of information management changes are "soft", such as increased employee morale and increased customer service – while the costs are not. Initial costs can be significant for a new system, and to make matters more difficult, require individuals from different departments to work together.

According to Ron Reimert, President of Romax Development, one of the biggest stumbling blocks in implementing paperless technologies is that companies get backlogged on a project. They spend a lot of time analyzing what type of system they want, then don't have adequate resources to get the system up and running once it is purchased. As one firm notes, "the mere presence of a sophisticated technology in an organization does not guarantee improved business"[58] (or even that it will be used).

Training is another issue for some systems. The new technology tends to scare people, and it is time consuming to get people to take the first step. While training needs vary significantly depending on the system implemented, they seem to be accepted as part of the implementation process. The better an employee understands how to use the system, and especially how it benefits them, the better it will be accepted. Some companies have the vendor or an outside consultant provide training, others provide in-house training. Training often consists of a few-hour class, followed by on-the-job training.

Companies must ensure that they are purchasing the proper equipment and systems. Sometimes, the technology companies want to sell businesses the most expensive technology, for instance imaging. Most can't afford to image all old documents – converting paper documents is expensive, about 15 cents per page. While imaging may be a long-term solution to document management, it is more cost effective to start with a paperless system for new reports and invoices. In a second phase, the money saved in the initial phase can be used to image old documents or further enhance the program.

Compatibility of multiple programs and systems is another implementation issue. Companies that want to layer a new technology onto existing systems may be limited in the programs and systems they can put in place because of compatibility issues. The Document Management Alliance has developed standards to help alleviate this problem. Companies such as GM and Caterpillar are slowly building systems that phase out some old systems and incorporate others.

Data reliability is another issue that can make new systems harder to implement. EVEREN Capital Corporation spent a significant amount of time testing the new system and ensuring that

[57] EDSF, p.22
[58] Universal Systems Incorporated Web Page: www.usiva.com/consulting_services.html

the data sent through the system was valid and complete. This up-front time to validate the data is essential if users are to trust the data and accept the system. Security is another issue – passwords and limited access to data are necessary for many systems. Security is an even greater issue with cellular systems such as those being tested by Atomic Ski.

Lack of adequate equipment can hinder implementation. The Defense Finance Accounting Service's new Intranet-based reporting system was slow to be accepted initially because employee's computers and monitors were inadequate for the new system. Once their equipment was upgraded, the system was widely accepted. Even more significant, the Alameda County Social Services Agency is developing on-line systems, but about 40 percent of employees do not have their own personal computers.

Sometimes issues arise between Information Technology groups in a company and end-users. There is often a lack of communication between them, and training is essential. It is important to keep in mind that the end-user, not the IT department, is the customer. In training, one issue is highlighting ways to make electronic solutions better than paper solutions and making the end-user's life better.[59] Union Bank of California's experience reinforced the importance of systems development staff working closely with the future system users in the development phase.

Federal regulatory agencies are increasingly requiring electronic filing of documents, eliminating one of the arguments against such technologies, that they didn't comply with federal record retention or reporting requirements. Both the IRS and SEC issued regulations in 1997 for paperless record systems. The SEC requirements are for electronic storage systems for business or personal record keeping. The FDA regulations focused on electronic signatures in reference to records required to be submitted electronically to the agency. IRS is pushing the electronic filing system. Also, businesses will not be required to store paper copies of documents. Texas state law allows for electronic retention of a reproduction of business records. While trends are moving towards increased acceptance of electronic documents for legal purposes, experts recommended checking with your legal staff and regulators before implementing such a system. Organizations such as AIIM have resources available to assist with these issues.

A thorough assessment of the employee needs, data, processes, security, and regulatory issues before the system is developed will help ease implementation. Several companies and providers outlined similar steps to promote the smooth implementation of new document management systems:

- Analyze worker processes with respect to specific reports
- Obtain complete report requirements
- Determine regulatory retention requirements for each report
- Survey existing desktop equipment
- Assess magnetic and optical storage requirements
- Determine security risks

[59] Interview with Ron Reimert, President, Romax Development, April 12, 1999

Bob Puccinelli offers several pointers in helping overcome resistance to change:[60]

- Corporate executives must embrace the initiative and participate in its mission.
- Employees must be motivated and a well understood method for measurement and feedback of the progress of change instituted.
- First, identify the need for change, align the new cultural values with the organization, and determine the proper individuals to include on the change team. Surveys can be helpful in this phase. Questions in this phase include: What do we want to do? How are we going to do it? Who is involved in doing it?
- Motivate employees to accept change. The key tool is communication. Goal setting is also critical, and the concept of sharing. "Sharing does not come naturally in an organization".
- Next, measurement and adjustment. Surveys to determine the willingness to accept new ideas and alternative solutions are one tool. Increased acceptance of the new system can be gained through clarity of communicated vision and proper measurement and feedback on progress towards goals.
- Change management should be constantly examined and refined. Change cannot be forced.

COSTS OF ELECTRONIC DOCUMENT MANAGEMENT SYSTEMS

The dollar costs of electronic document management systems vary widely, depending on the size and scope of the system. In a smaller organization, a complete implementation of a new system may cost $10,000 to $20,000, while a large business or agency may spend several million on full implementation of a new system. What may be more important for a particular organization is the return on investment. Studies by International Data Corporation show that companies have averaged a 3-year return on investment from 87% to more than 1,200%. Many of these companies show a return of 75% or greater the first year.

Another cost of new systems is training. While training needs vary tremendously, there is always some lead-time involved in getting a system up and running and getting the users up to speed. Like the costs of the system itself, training costs will vary. Some systems need only a two to three hour training class to get employees up to speed. Others may require more in-depth training. If new equipment is required, staff may need to be trained on that as well as on the new software system. Those systems based on the "point and click" approach typically require very little training. Staff required to conduct certain tasks, such as scanning and indexing, typically need more in-depth training.

[60] Bob Puccinelli, "Overcoming Resistance to Change", inform magazine, AIIM web page: www.aiim.org/inform/sep98/0998p40.html

BENEFITS OF ELECTRONIC DOCUMENT MANAGEMENT SYSTEMS

The benefits of paper-reducing technologies extend far beyond those related to reducing the purchase and disposal of paper. Often the environmental benefits of paper reduction are not even considered when deciding on a new system. Improvements in efficiency, timeliness of data and report availability, reduced storage requirements, improved distribution, and customer service are the most widely recognized benefits. Some of the benefits are easily quantifiable, and attributable to the new systems – others are more difficult to measure, but equally important. There are many examples of the benefits of electronic document management systems:

Increased Productivity: The production of statistical reports, records management tasks, and access to and retrieval of digital documents is typically improved with paper-reducing technologies. Caterpillar, Inc. expects productivity gains in the double digits with their new information system. Electronic systems eliminate paperwork, manual filing, and manual retrieval. At Silicon Graphics, they reduced the number of steps required to purchase a material from 15 to 3, and the time involved from 3 weeks to 24 hours. Searching for information in reports is significantly faster – the Defense Finance Accounting Service used to have large reports which they marked with Post-It notes at important pages. Now, they can search on-line and find the pages they need almost instantly. Improvements in productivity were cited in other case studies – increasing the number of documents handled at the Maricopa County recorders office from 3,000 to 8,000 a day, and the number of images from vehicle registration forms processed by the California DMV from 1,500 per hour to 7,000 per hour per person. At the University of California Irvine, several administrative functions now operate 70 percent simpler and faster after implementing a paper-reducing program.

Reducing Employees: Closely related to the improvement in productivity is a reduction in the number of employees needed to do a particular job. This can be a particularly difficult issue in public agencies, or with unions. For example, the Contra Costa County Hospital and Health Care program prints 1,000 to 5,000 bills a day. The County is considering switching to an electronic workflow system that will allow them to triple or quadruple productivity, and only print at the last minute. They expect to cut their workforce of 40 to 50 in half. Because labor concerns are an issue, instead of laying staff off, they may need to reduce through attrition, or moving the current staff to other jobs.[61] Savings from reducing staff can be high. The Massachusetts Department of Revenue saved $1.5 million annually when they were able to eliminate 50 full-time employees in data entry and processing. The New York Office of the Comptroller was able to relocate 10 employees, saving $300,000 a year. They went from 142 employees to 93, while processing 13 percent more claims.

Improved Customer Service: One of the most commonly cited benefits of information management systems is improved customer service. Because staff can instantly pull up information, rather than physically searching through paper or microfiche files, service levels increase, costs decrease, and customers are happier. Since the Union Bank implemented their COLD system, staff can retrieve old bank statements in response to customer requests in just 7 to 20 seconds, while it used to take several minutes with microfiche records. St. John's Bank

[61] Interview with Ron Reimert, President, Romax Development, April 12, 1999

realized even greater improvements – they went from 2 to 3 days to retrieve an old bank statement to one to two minutes.

Improved Access to Information: Data is also more readily available to employees under an electronic system. At the Southern California Water Company, employees are much less frustrated because they have almost immediate access to financial reports. Atomic Ski USA's web-based report system allows sales representatives to have accurate, instant, and up-to-date information on inventories, so they don't sell customers products that aren't in stock. In the legal profession, access to information can be difficult. For example, a group of trained paralegals were given 10,000 documents in banker's boxes and asked to locate 20 specific documents. After 67 hours, they had found 15 of the 20. Using Optical Character Readers (OCR) and imaging, the same documents were indexed and scanned into a computer system. With the automated database, all 20 documents were located in 4.5 seconds. One law firm implementing such as system achieved annual savings of over $3 million.

Reduced Storage Costs: There are significant economic savings resulting from reductions in storage space. One CD ROM stores the equivalent of a four-drawer file cabinet. Space is a big issue in some offices, particularly when storage of documents is off-site. Electronic storage is much easier to access and requires less space to store on a compressed format compared to paper files or microfiche. For the Massachusetts Department of Revenue, storage of a year's tax returns takes only 25 square feet for a magnetic disk storage box, compared to 11,000 square feet for paper copies. The West Virginia Department of Highways had to maintain a large, off-site storage facility for old records and extensive file cabinets in the office for current records. With an electronic system, they were able to expand office space and eliminate on-site storage, improving the office environment. Gradually, they will eliminate the need for the off-site facility. Circus Circus Enterprises invested $300,000 in data entry, workflow, and optical storage project. The result was elimination of $750,000 in annual paper and storage costs and $200,000 savings in microfiche bills.

Document Control and Access: With electronic documents, there is a reduction in human filing mistakes, which can be costly and time-consuming. New documents can be added to the system quickly and accessed immediately, and indexing allows for improved document control. Maps and engineering documents are more readily controlled, and changes incorporated immediately so there are no out-of-date versions in circulation. Another benefit is that multiple staff have access to a file simultaneously – they don't have to wait until a record is returned to the central storage unit and then retrieved again for action by another person.

Reduced Data Entry: Electronic systems typically allow for downloading of data from reports and tables for further analysis, eliminating the need to re-key data. This reduces entry error, tedious work, and the time in data entry. One of the greatest benefits of the Report.Web system cited by the Southern California Water Company is the ability to download Excel tables from the reports for further analysis. The Earle M. Jorgenson Steel Company estimates that they are saving $100,000 a year on data entry costs alone with their electronic system.

Reduced Distribution Costs: Another important and readily quantifiable benefit of electronic technologies is reduced shipping and distribution costs. Accounting reports and other time-dependent information must be overnight delivered or sent by courier when there are off-site locations that require the information. When the files are available electronically, these costs are completely eliminated. The Southern Water Company saved $800,000 a year just by avoiding

express mailing costs. At Niagara Mohawk Power Corporation, field staff no longer have to travel to headquarters to view maps, and they don't need to be shipped to remote locations. Daily reports from the Defense Finance Accounting Service were sent to 80 to 100 users located across the country, in addition to the local headquarters staff – now those reports are available on an internet system.

Improved Quality of Work: Electronic technologies can also enable improvements in work that have broad economic impacts on the company. The Earle M. Jorgenson Company was losing $12,000 a month in sales because of quality issues – implementing their new system allowed for more timely review of quality testing and increased sales opportunities. The electronic system implemented at the New York Comptrollers office has allowed the office to uncover patterns of fraud more easily. In the first year they uncovered $200,000 in false claims, and expect the savings to add up to $20 million by the year 2000.

Reductions in Paper: While reductions in paper are not always the reason that companies or agencies implement document management systems, they are one of the benefits. Union Bank saves $10,000 a month through the elimination of paper. Similarly, St. John's Bank reduced monthly printing from 100,000 pages to 10,000, saving $15,000. Bell Communications estimates that they saved 16 million printed sheets and $3.5 million dollars during 1994 and 1995 through an electronic filing system. Haworth's, a furniture company, saves $1 million a year because they do not have to re-print catalogues. The Southern Company, a utility, estimates that they save $6 for every page of paper that is transferred electronically rather than on paper. (This may be high, other estimates range from $1 to $5 per page). Southern receives 20,000 purchase quotes electronically, eliminating the need for 60,000 sheets of paper. UC Irvine has eliminated 7.3 million sheets of paper a year through a variety of efficiency and electronic improvements. There are also savings that result from elimination of microfiche. The California DMV was able to cancel a $600,000 a year contract with a microfiche provider when they switched to an electronic imaging system. Electronic storage is replacing microfiche and microfilm because of ease of use and costs – microfilm or microfiche typically costs about $.45 per page, while scanning is about $.15 per page.

MEASUREMENT RESULTS AND ISSUES

Most companies and agencies have measured only a few of the benefits or costs of their electronic technologies – enough to justify the new process. A complete analysis is time consuming and costly. Union Bank of California has contracted with Anderson Consulting to assess the benefits of their records management and on-line manual systems as part of their broader strategic planning effort. The consultant is focusing on the easier-to-measure aspects such as distribution costs and improved efficiency. Still, they are finding that efficiency improvements are difficult to measure because of the large number of branches.

Typically, a company or agency will acknowledge those costs and benefits that are tangible and readily measured. For costs, that means the hard costs of the new system, new equipment, consultant fees, and perhaps the cost of a training class (although we found no reference to such costs specifically). Staff time to implement a system is not usually included, although some may consider research and development costs.

For benefits, companies and agencies tend to look at line-item benefits such as the elimination of contracts with couriers or microfiche developers, elimination of printers, costs savings in reduced postage and overnight shipping, employee reductions, and in some cases paper savings. Another benefit category that is fairly easily calculated is reduction in storage. In this case, when the savings are significant – such as the elimination of a warehouse – there is a finite dollar savings that can be readily calculated. Companies may also calculate a return on investment for the technology – in this case, it is the hard-numbers that are included in the calculations. Agencies and companies may also look at specific productivity measures – claims processed per month, customer response time, or the number of registration forms processed per day. While these metrics are not directly dollar-related, they are valuable because they show changes in processes that are critical to the business or agency's daily activities.

Because measuring the results of the new technology takes time and resources, measurement is usually a low priority. As long as the benefits seem to outweigh the costs of the system, there is not a strong imperative to examine them in great detail. Items which are already being measured, such as customer response time, or budget line-items, are most likely to be included in an analysis, if one is conducted. Typically, these are the only items included in the assessment. Other less tangible benefits might be mentioned, or they might not even be acknowledged. This is a pattern we saw in over twenty case studies. Except from an academic standpoint, it is difficult to see why a business or agency would conduct a complete analysis if they can justify the technology without it. Unfortunately, this approach does not give us as complete a picture of the costs and benefits of electronic document technologies as we might like.

IMPLEMENTATION STEPS

There is a logical series of steps that an agency or company interested in implementing electronic document management technologies should follow. In this section we summarize those steps, as well as lessons learned from the case studies.

1. Exploration – what are the goals? Study the business to determine what is needed, and the ability to integrate with existing systems. Identify potential services and software. Evaluate processes, workflow, paperflow, staffing, and goals. Benchmark the existing system.
2. Design – conduct a detailed analysis and design. Develop a strategy, plan the new workflow and processes. Check the plan with staff, especially future users. Identify resource needs, equipment, training, and staff changes.
3. Develop an RFP – for the system architecture and conduct vendor negotiations, select one or more vendors for the hardware, software, and potentially the implementation phase.
4. Integration and custom development – fine tune software, working with vendors and users to test system.
5. Implementation – training end-users, conversion of documents and data – get the system up and running.
6. Support and enhancements – measure and evaluate results.

There are several issues that arose for the case study companies and agencies during implementation of their new technologies. Paying attention to these issues will serve to smooth implementation of a new system.

- Take a collaborative approach. Even when a program is mandated from top-down, it is important to include the users of the new system in the development phase. This may be done through focus groups, formal teams, or informal interviews or discussions. A new system will be more readily accepted when concerns and potential problems are dealt with in the initial design of the system, rather than after the fact. If the ultimate goal is to make a particular process or task easier, then work with the experts who are doing the job on a daily basis.

- Ensure equipment is adequate. When a new system is put in place, ensure that all staff have access to the system, and that the equipment they are using can handle the job. It may be necessary to upgrade workstation computers and/or monitors so that staff can access information and see it on the screen in a reasonable timeframe.

- Alleviate and respect staff concerns. Taking a collaborative approach will help alleviate concerns, as will training. Staff needs to trust the system, and to do so they should understand it. Will their data or old reports get lost? Is the data coming through the system accurate? Are the electronic forms and on-line reports presented in a readable form? If not, the system won't be as readily used, or staff may print out reports anyway. Conduct training programs, tests, pilot projects, and demonstrations to illustrate the effectiveness of the new system and get staff on board. Support from the top executives is also important. Are they on board and using the system?

- Simplicity. Keep the program as simple and straightforward as possible. It is supposed to improve efficiency and productivity, not make life more complicated. Keep the focus on completing a given task or process more efficiently.

- Use outside help if necessary. In an age of downsizing, many businesses and agencies do not have adequate staff to develop or implement these systems. Given the large potential benefits, it is worthwhile to bring in outside assistance if that is what is needed to get a program going. In addition to jump-starting a program, outside vendors should be up-to-date on the most recent technologies. This is important in a field where your new technology may be out of date before you are even done evaluating it.

- Address legal concerns. Don't dive into a new system without checking on regulatory requirements and legal concerns first. In most cases, electronic file storage is now acceptable by the IRS and other agencies, but it is wise to check on these issues, as well as storage time and similar factors before a system is developed.

SUMMARY

Electronic document management is now a well-established field. While these technologies are still not universally applied, the benefits are well tested and documented in a number of applications. There are trade associations supporting the field, a large number of vendors, and a huge range of companies and agencies that are using these technologies. Paper reduction is certainly one of the benefits of electronic document technologies, but it is not the driving factor, and certainly not where the largest savings are seen. Improved efficiency and productivity, and reduced costs are typically the motivating factors. And, while these benefits can typically be traced back to not using paper in the first place, the link is not always clearly identified. For example, a major benefit occurs when paper files are eliminated. When records are stored electronically, employees don't have to manually file documents, storage space is eliminated, and the proper document can be easily and quickly accessed for use again at a later date. These benefits occur because staff is no longer handling as much paper.

While paperless technologies are not appropriate in all cases, there are a wide array of potential applications and technologies in electronic document management. Companies and agencies should consider their specific needs in the design and implementation of new systems. Systems will be most successful when proper thought goes into the planning phase, employees are consulted on during the development of the system, and there are enough resources to adequately implement and use the new system. Completely eliminating paper may be too big a goal, but there is great potential to reduce paper, and all the associated costs of its use, production, and disposal.

ABBREVIATIONS

ACSRRB – Alameda County Source Reduction and Recycling Board
AFPA – American Forest & Paper Association
AIIM – Association of Information and Image Management
APTA – Advanced Paper Technology Associates
CalWIN – California Welfare Information Network
CD-R – Compact Disk Recordable
CD-ROM – Compact Disk Read Only Memory
COLD – Computer Output to Laser Disk
COOL – Computer output on-line
CPU – Central Processing Unit
DFAS – Defense Financing and Accounting System
DMA – Document Management Alliance
DMV – Department of Motor Vehicles (California)
DOR – Department of Revenue (Massachusetts)
DVD – Digital video disk
EDI – Electronic Data Information
EDSF – Electronic Document Systems Foundation
EMJ – Earle M. Jorgensen Company
FDA – Food and Drug Administration
GB – Gigabyte
GM – General Motors
HP – Hewlett Packard
HTML – Hypertext markup language
IT – Information Technology
ITD – Information Technology Department (Alameda County)
IMC – International Information Management Congress
IRS – Internal Revenue Service
MB – Megabyte
NOA – Notice of Action
NSA – Network Software Associates
OCR – Optical Character Reader
RFP – Request for Proposal
ROI – Return on Investment
PC – Personal Computer
SEC – Security Exchange Commission
SG – Silicon Graphics
SSA – Social Services Agency (Alameda County)
UBOC – Union Bank of California
UCI – University of California, Irvine

SECTION 4. FINDINGS AND RECOMMENDATIONS

The study provides details on waste prevention mechanisms implemented by retailers, achieved through transportation packaging initiatives, and through expanded use of electronic communication. The study also identifies challenges faced by these businesses and institutions in attempting to implement these activities.

Federated Department Stores realized significant labor and cost savings by eliminating the multiple handling of garments that were shipped from vendors on hangers that were not of the quality and size to be displayed on the sales floor. Adopting the floor-ready merchandise guidelines allowed Federated to get garments to the sales floor more quickly. Eliminating the below standard hangers meant that the vendor no longer had to purchase non-approved hangers. The return and reuse of the hangers reduced the cost of using the higher quality hangers. Other changes in shipment of clothing from vendors to Federated further reduced handling and warehouse space requirements, and reduced handling by Federated staff at both the distribution center and individual stores.

Granny Goose Foods implemented a financial incentive program to recover a higher percentage of the product cases shipped to distributors and retailers. The rebate on cardboard cases, saved them about $0.25 per box returned to them for reuse. This program has eliminated the purchase of approximately 7,500 boxes per day. At about 3 pounds per box, the purchase of over 10 tons of fiber per day is avoided. This program saved the company over $1,730 per day in the purchase costs of boxes. Granny Goose Foods encourages distributors and direct handling vendors to return their pallets to them for reuse, but no incentive program has been implemented.

Computers have made it easier to create and print documents, so paper use has actually increased as new technologies have developed. Technologies are now available – hardware and software – that could move us closer to a paperless office by reducing the need for forms, creating electronic files, and producing and routing memos, manuals, and reports electronically. Electronic document management technology such as scanning, electronic storage, computer output to laser disk (COLD), imaging, and retrieval systems can reduce reliance on paper. These technologies can also improve efficiency and productivity, improve quality, and reduce costs. The potential benefits from improved efficiency are better customer service, reduced storage space, reduced errors, and reduced distribution costs. These benefits far exceed the waste reduction benefits of decreasing paper consumption.

Next Steps

Studies of waste prevention practices that have already been implemented by Alameda County businesses provide insight into the labor and resource savings that can be achieved, and potential for additional reduction in the amount of materials being disposed of to landfill. The identified practices are not generally implemented by businesses to reduce waste collection and disposal costs, but rather to operate more efficiently. Reducing the amount of materials consumed reduces the amount of waste generated and the cost of buying the materials. But the primary savings to the business are in reducing the labor costs associated with handling those materials.

For example, the efficiencies gained by transmitting data electronically are significant, especially when these costs are compared to the costs of printing and then distributing documents. By changing our focus to show the benefits of the efficient use of materials, these Studies present a much more compelling waste reduction message to businesses than identifying how much that can reduce the costs for disposal of their wastes.

Waste management industry professionals have often promoted increased business efficiency on the basis of avoided disposal costs. However, for most businesses, avoiding disposal costs has a very small impact on the cost of doing business. The cost of buying new paper is approximately ten times the value of that paper when it is recycled, and as much as 20 times the cost of disposing of that paper. For other, higher value added products (i.e., hangers, boxes or pallets), the cost disparity is much greater.

In funding these case studies, the Alameda County Source Reduction and Recycling Board has provided a stronger basis for those individuals working in the waste management field to approach businesses about implementing additional waste prevention measures in their operations. Development of additional waste prevention case studies will provide additional assistance in reducing wastes by businesses. Next steps in this series of case studies would be to work directly with selected companies to identify and implement additional waste prevention activities. Companies could be selected from those who are already engaged in business outreach projects of the Agency.

Implementation steps would include:
1. selection of companies from target groups
2. identification of existing waste prevention activities
3. identification of additional appropriate waste prevention activities
4. definition of required tasks, time-lines, resources, and budget
5. implementation of appropriate activities
6. analysis of programs, data, and report of findings.