Federal Facilities Beyond the 1990s: Ensuring Quality in an Era of Limited Resources: Summary of a Symposium

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Federal Facilities Beyond the 1990s

Ensuring Quality in an Era of Limited Resources

Summary of a Symposium
Federal Facilities Council
Standing Committee on Design and Construction
Standing Committee on Organization and Administration

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Preface

Today, as never before, federal facility managers are being challenged to satisfy their agencies' needs for quality facilities with limited resources. New policy directions and attrition have resulted in substantially reduced funds and staff, the consolidation and reorganization of functions within and among agencies, and an increased reliance on outside contractors to design and construct facilities.

As agencies downsize, "right-size," and reinvent themselves, facility managers must find new ways to provide and maintain quality facilities, so that the missions of their agencies can be met. Our two committees of the Federal Facilities Council (FFC) had been watching these developments for some time. We were both concerned that facilities managers adapt to the new environment in ways that sustain the quality of federal facilities. Learning of each other's interest, the FFC standing Committees on Design and Construction, and Organization and Administration decided to pool talents and efforts, to sponsor a symposium on ensuring quality facilities in this era of limited resources.

In keeping with the missions of both standing committees, the symposium covered a broad range of facilities-related issues, including design and construction, project delivery, operations and maintenance, management, and customers. Therefore, we defined quality in several ways. Quality in new construction means a facility is built on time and within budget and satisfies the customer. With respect to maintenance, quality means a product or service that provides value to a facility, and whose cost is not disproportionately high, and which is provided on time.

For the customer—both federal employees and the general public—quality means an environment in which they can achieve their intended purpose efficiently, safely, and comfortably.

The symposium, entitled "Federal Facilities Beyond the 1990s: Ensuring Quality in an Era of Limited Resources," was held May 30–31, 1996, at the National Academy of Sciences in Washington, D.C. Representatives from federal government, private corporations, and academia described their experiences in reengineering their organizations and business practices to maintain or improve the quality of their facilities despite fewer resources. The speakers were selected above all for their successful innovations. We wanted the symposium to provide an opportunity for the facilities management community to learn of practical approaches and achievements, as well as to sharpen their understanding of the current environment and provide their own views about the issues they face. This report includes papers based on many of the presentations made at the symposium. We hope that you will find the ideas here as stimulating as we did.

DANIEL HIGHTOWER,
CHAIR, COMMITTEE ON DESIGN AND CONSTRUCTION
WILLIAM MAY,
CHAIR, COMMITTEE ON ORGANIZATION AND ADMINISTRATION

Content

Executive Summary

Today, federal facilities managers are challenged increasingly to ensure the quality of their facilities in the face of limited funds and reduced staff resources. Often, facility managers must try to resolve these issues while also responding to new policy directions and internal and external reorganizations. For all these reasons, managers have been seeking ways to restructure their organizations and reengineer their operations, to best design, acquire, operate, and maintain quality facilities in the demanding new environment.

Toward addressing these challenges, the standing Committees on Design and Construction, and Organization and Administration of the Federal Facilities Council convened a two-day symposium, May 30–31, 1996, to hear federal, academic, and private sector representatives report on their reengineering of facilities management organizations, current trends in their own arenas, and their experience with novel organizational and process solutions.

During the two days, over 25 speakers and 100 attendees participated. Speakers provided a wide variety of information and personal perspectives on facilities management trends. Attendees had the opportunity to question the speakers, identify additional issues, and relate their own experiences. Neither the speakers nor the audience were asked to come to any consensus on the issues or recommendations for federal facility managers. However, over the course of the symposium, a number of recurrent themes emerged from these reports and the final discussion at the meeting's end.

CONTINUING CHANGE

In both private and federal sectors, continuing financial and regulatory pressures, and mergers, consolidations, and acquisitions have led to the long-term trend to downsize or "right size" organizations and to reshape structures and processes fundamentally. In the private sector, many changes have been forced by ever growing competition and shorter product cycles—on the order of 18 months for many high-technology businesses. In the federal sector, recent legislative and executive actions—notably, the Federal Acquisition Streamlining Act of 1994, the Federal Acquisition Reform Act of 1995, and Vice President Gore's National Performance Review—have prompted federal innovations and experiments that are widely viewed as the greatest transformations in federal government in the last 30 years or more. Several speakers suggested that facilities managers should recognize that changes in operating procedures and functions will continue into the foreseeable future and should incorporate plans to manage such change into their long-term strategic planning.

COMMUNICATION

Today, participants emphasized, communication in general is increasingly important in facilities management of any kind. The growing multidisciplinary nature of facilities management alone makes mutual understanding of the different roles and requirements involved essential. Moreover, open and frequent communications among employees and between employees and management are required for good business process reengineering. Communications between government and industry are also required for government to identify and adopt those commercial practices that will serve it best. Participants noted that interagency cooperation in exchanging best practices has additionally been employed to mutual benefit, and might be developed further.

According to several speakers, communicating effectively with the building users or clients is essential in this new environment for the facilities manager to understand users' needs. They emphasized that facilities managers should learn to "market" their services to clients, clearly articulating how facilities contribute to agencies and their missions. Further, to know the customer well, facilities managers must be full

members of the teams involved with staffing plans and process reengineering.

PEOPLE

In the various discussions of organizational change, several speakers and participants noted that managers should not forget that people are an organization's most valuable resource. One private sector manager stated that if you do a good job taking care of your employees, they will do a good job serving your clients. Training and a supportive environment are key ingredients to growing as an organization. In this manager's firm, considerable emphasis is placed on developing strong project managers who can assume ownership of a project and, at the same time, be held accountable for results.

LEADERSHIP AND RISK TAKING

The critical, if more intangible, success factors of leadership and risk taking in quality facility management were also common themes in the symposium reports. In reorganizing or reengineering an organization, strong leadership and a clear future direction for the organization are necessary to success. The open communication encouraged in construction contracting partnerships, despite its potential legal difficulties, was reportedly one of the factors behind the success of several difficult projects. Several new streamlined requests for proposals and procurement processes also proved highly successful, according to the reports. These and other achievements in facilities management were possible only through leadership and risk taking, participants observed. These qualities should be encouraged in federal facilities management, if quality services are to be provided at reduced costs. The Bureau of Reclamation, in its recent award-winning reinvention program, devised an explicit strategy to promote these attitudes among staff.

SPACE UTILIZATION AND BUILDING DESIGN

In both private and federal sectors, organizational structures have been flattened, with layers of management, along with total personnel, reduced. At the same time, many organizations are reengineering their

business practices. Such organizational changes lead to new work patterns that affect the needs for facilities and the way space is used. In many corporations, headquarters staff is being cut and/or relocated to field offices, reducing or eliminating the need for headquarters buildings. The use of "teaming" approaches, telecommuting, "hoteling" and other shared office concepts, and greater reliance on technology all have implications for the need and use of space. Private companies report that they also expect to use more consultants and part-time workers in the future. This continuous and rapid turnover of space and people suggests that buildings and furniture systems need to be designed with sufficient flexibility to allow for cost-effective reconfigurations as new tenants and new functions emerge.

Despite the focus on the bottom line of an organization's ledger, many participants and speakers emphasized that a building or facility must be more than a weatherized, economical box. Buildings should blend with and enhance their surroundings, enhance the users' quality of life, and enable the user to work productively, comfortably, and safely. Federal buildings should also be civic structures that inspire and add value to the community.

PRODUCTIVITY METRICS

The need for metrics was another recurrent symposium theme. A large number of participants emphasized the implications of any facility's lifetime costs. Over the life of a building, roughly 5 percent of costs go to construction, less than 5 percent to operations and maintenance, and more than 90 percent to personnel salaries and equipment. If the first two investments are leveraged to produce a better quality workplace, it is possible that employee productivity can be greatly enhanced at very low relative cost. For example, if a 1 percent improvement in performance is obtained by investing 10 percent more in construction, the return on that investment is 100 percent. A calculation made specifically for the U.S. Department of Defense, where personnel accounts for 95 percent of total costs, showed that a 3.7 percent productivity gain in personnel would pay for all facility costs over a facility's 40-year lifetime. Speakers noted that this broader view of the lifetime costs of a facility is difficult to convey to decision makers in part because of the emphasis given to facilities' initial costs.

Calculating the effect of workplace on the productivity of the workers who occupy those facilities is difficult, although Carnegie Mellon University and the Army's Construction Engineering Research Laboratories have tried to do so. While this obstacle to analysis has proved stubborn, the speakers noted, it is worth taking on. In manufacturing industries, where the productivity of personnel can be measured in terms of units produced, the quality of facilities in supporting productivity is taken quite seriously. Research on recent business reengineering at Fortune 500 companies, one speaker noted, indicated that, in the course of their reengineering, these companies clearly came to view facilities as enabling factors, and made investments accordingly, even though initially they thought of facilities merely as costs to be reduced. Unlike the private sector, federal agencies do not review project and building operating costs relative to program costs. One speaker suggested that federal agencies should begin to analyze real estate as a production factor in the broader scheme of providing public service, while another suggested that facilities be considered part of an organization's investment portfolio.

MAINTAINING PUBLIC ASSETS

Another overarching theme of the reports was the importance of maintaining public assets—an area of federal facility management that has often been neglected. Again, the lifecycle costs of facilities are often ignored in the public sector, in large part because of the way they are budgeted. Great attention is given to initial costs—which again represent only about 5 percent of total facility costs. On the other hand, the budget structures of federal, state, county, and community governments are highly obscure and flexible about the funding of facility operations and maintenance. Federal managers can use maintenance and repair funds for other purposes, and they often do. In contrast, many industries allocate a specific percentage of their annual budget to fund operations and maintenance as a cost of doing business; they recognize that deteriorated facilities will negatively affect the bottom line, through lost productivity, and reduced quality and safety.

Federal facilities represent a very substantial investment. They are also intended to serve essential public functions. Deteriorated public facilities affect the quality of public life as well as the productivity of federal employees.

Three strategies would help address these shortcomings, according to one symposium report: designing budgets that clearly reflect all the costs of facility ownership over the facility's life; encouraging responsible stewardship on the part of facility managers; and educating the public about the true costs of ownership. The Department of Defense and Army Corps of Engineers have both begun initiatives emphasizing the importance of lifecycle costs, toward ensuring that investments are optimized and that mission needs are met.

PARTNERING AND OTHER COOPERATIVE TECHNIQUES

Partnering in construction contracting and other multi-interest endeavors was highly praised by meeting participants. In construction contracting, this approach teams the owner, user, designer, and constructor, who meet early in the project and regularly thereafter to discuss their expectations and roles. Emphasis is given to win/win decision making, in which all involved are treated as full stakeholders. The input and contributions of employees and other interested parties (such as adjacent properties) are also clearly recognized. Some noted that this cooperative approach is greatly rewarding to those involved —and it may be the most effective way to leverage project resources. Particularly when team members can serve as the final decision makers for their constituencies, partnering allows not only well-informed action, but also timely project delivery.

The value of other cooperative techniques was also described. A *charrette* is an intensive brainstorming session that occurs over several days, in which a working group that brings together talent from various disciplines and interests develops solutions to sensitive problems in design. The objectives of a charrette include helping to develop a shared vision for all the stakeholders and educating the client. A charrette was successfully used to establish design guidelines for the problematic facade of the Bureau of Engraving and Printing, which must serve as both the visitors' entrance of a major monumental building and the service entrance for the regular passage of industrial equipment.

FLEXIBLE PROJECT DELIVERY SYSTEMS

To provide quality facilities in this fast-changing environment, facilities managers must be flexible. There is no one best method of contracting for facilities, or of managing or financing projects, presenters said. Facility acquisition methods should be chosen based on the individual project and situation. All the contracting methods available for project delivery should be assessed against project requirements, because the acquisition method chosen can affect the delivery schedule, the quality of the facility, life-cycle costs, and the extent of supervision required. Factors in decision making should include, for example, expertise of staff, criticality of schedule, ability to issue performance specifications, tolerance of risk, expertise of available design and construction firms, complexity of the project, and ability to make decisions as quickly as the contractor requires.

Speakers also described several specific innovations in project delivery systems, to overcome some of the drawbacks of particular approaches while maintaining their benefits. For example, one symposium report described a design/build strategy that relied on a greatly streamlined request for proposal, minimal documentation from proposers, and a one-step evaluation process, with a highly successful outcome. Other speakers described their successful use of simplified procurement processes. As in the case above, some of these success stories depended on identifying a limited number of very carefully chosen technical selection criteria, including the past performance of the contractor and/or architect.

According to the symposium reports, recent acquisition reform laws have provided other powerful tools for quality project delivery at lower cost as well. These tools include the ability to limit award consideration to the best qualified; awards based on best value, rather than simply lowest bid; and multiyear and multiple task and delivery order contracts, which provide new incentives for vendors to compete. A large number of speakers, based on their own experience, praised the best value approach particularly, for achieving the best quality design and delivery within the constraints of cost.

Also in keeping with the new legislation, a variety of commercial standards and practices have been successfully adapted to government use. Examples include the General Service Administration's (GSA) use of professional design specifications in place of its own, and the Naval Facilities Engineering Command's use of the contractor's quality assurance

program, rather than the Navy's. The use of performance, rather than procedural, specifications in construction contracting was also endorsed by some participants.

QUALITY AND COST CONTROL

Several reports noted the value of quality and cost control programs. Development of the new Health Care Financing Administration headquarters relied on the general contractor's project quality planning process, which the industry has recognized as a best practice in total quality management (TQM). This practice identifies specific project roles and objectives, and trains and tracks personnel to meet these goals. One speaker noted that TQM can make innovation and significant change in business processes possible.

The Department of Veterans Affairs (VA), with its annual construction budget of approximately $1 billion, analyzed all the agency's construction change orders, to identify problem areas and issue corrective design alerts. In one case, they found, over $1 million could be saved annually simply by correcting an electrical wiring diagram. The VA has also analyzed the activity flow within its surgical suites and other medical departments to develop new design guidelines. In the design programs of GSA's Public Buildings Service, post-occupancy evaluations have been used to validate design criteria, to ensure that users' needs are met. Many speakers, representing private and public organizations alike, emphasized that business process reengineering should be based on a rational process, such as TQM, to avoid well-intentioned, but sometimes unsuccessful, attempts to control costs.

INCREASING USE OF ELECTRONIC TECHNOLOGIES

The use of electronic and computer technologies to communicate and accomplish tasks continues to grow, and shows every sign of growing further. Notable developments in the public sector include the communications networks ARNET and FACNET, and the General Services Administration's electronic catalogue, with electronic ordering and payment.

In facilities management in particular, it was observed, electronic technologies will likely be used increasingly, because of the reporting

requirements of outsourcing programs, quality assurance, and increased regulation. Such technologies can permit real cost savings—if they are carefully implemented. (The term "shelfware" has been coined to cover the vast amount of software that is acquired but never used.)

Four areas of computer-aided facilities management (CAFM) show more immediate promise, according to one symposium report: space and asset management, strategic space planning, facilities/conditions assessment, and infrastructure support project communications. Such technologies permit data to be integrated among business units for efficiency, more efficient project management, the calculation of features (such as floor space and adjacency and trip space analyses), and the calculation of optimal facility investments.

Additionally, business use of the Internet, World Wide Web, and videoconferencing are all expanding rapidly.

OUTSOURCING AND OUT-TASKING

Outsourcing, the hiring of a private full-service vendor, and out-tasking, the hiring of a specialized vendor for one or two services, are now commonly used in both public and private sectors. Outsourcing and out-tasking are often pursued for cost savings, but several symposium speakers observed that this purported gain may be overrated. More important, they suggested, outsourcing and out-tasking can achieve the flexibility needed to respond to continuing change, can buy superior expertise, and can allow the organization to focus on its core mission. Outsourcing may also be used as a catalyst for change in an organization.

One speaker noted that with the outsourcing of facilities services functions comes the need for facility managers with project management and contracting skills. Outsourcing contracts can benefit from including performance incentives, to achieve better services and cost savings for both organization and vendor.

NEXT STEPS

Symposium presenters and participants identified several follow-on activities prompted by their reports and discussions. The productivity of federal facilities and the quality of the federal workplace might be explored, to help clarify the most cost-effective investments in federal facilities. Other

topics of interest included the management of renovations and smaller projects; these projects represent a large part of federal facilities management, will likely be of greater relative importance in the fiscally constrained future, and may offer special lessons in management. Finally, participants noted the value of the present exchange for their own roles in facility management, and suggested that a similar symposium be held in two years' time, to exchange information again on new developments and practices.

Maintaining Quality in an Era of Reduced Resources

Robert A. Peck
General Services Administration

The reality of reduced resources confronts all of us who serve in the federal government. At the General Services Administration (GSA), one way this trend can be defined is in terms of our shrinking workforce. In the past two and one-half years, the GSA's Public Buildings Service (PBS) has lost between 20 and 24 percent of its workforce. At the end of the 1970s, PBS had around 18,000 people; today we number only about 8,000.

Much of this loss has been due to contracting out. Of our budget of $5.5 billion for fiscal year 1996, about 90 percent is for services that are contracted out. PBS has done about all the downsizing of federal employees that it can. As I have discussed with members of Congress, we cannot spend more than 90 percent of our budget for outside services without turning over critical management functions to the private sector. We are already a well-developed, public-private partnership as envisioned by the National Performance Review.

GREATER EFFICIENCY

Last year, under the guidance of the Arthur Andersen Company, we conducted a series of studies called the Federal Operations Review Model, or FORM. Our intention was to identify the best organizational models for the work we do, using relevant examples and methods from the private sector. Teams were formed to study each major part of PBS and compare our service delivery costs with those of the private sector. GSA was found

to be generally competitive with the private sector. Many of our building management costs turned out to be lower than the costs for comparable private buildings, as reported by the Building Owners and Managers Association. We are also near private sector benchmarks both in general and specialized facilities construction. In workmanship, courtroom size, and especially security, the federal government generally builds better courthouses than state governments.

In defending our budget recently, I realized there is one thing the private sector does that we fail to do. Unlike the private sector, we do not review our project and building operating costs relative to program costs. As a rule of thumb, 25 percent of gross operating costs is about what an average company is prepared to pay annually for real estate. The public sector generally does not think about real estate in this way. I believe that our $5.5 billion budget in the Public Buildings Service ought to be compared to some output measure, rather than being considered simply a cost.

Using this approach, we first consider that we accommodate roughly 1 million federal employees. According to the Office of Personnel Management, on average, about $55,000 is spent for salaries and benefits for a federal employee annually. If so, we have about $55 billion in personnel costs (as a sort of output measure) compared to $5.5 billion of real estate costs. That is not a bad ratio.

However, such ratios are elusive in government. In manufacturing, facilities costs would be reflected as a percentage of cost-per-unit. But much of government is a service industry. Some government agencies disperse money (e.g., Social Security), and some collect it (e.g., Internal Revenue Service). However the calculation is done, we should begin to analyze our real estate as a production factor in the broader scheme of providing public service. At a time when government budgets are increasingly viewed from a private sector perspective, such an analysis would depict government programs as more than mere cost centers.

MANAGING QUALITY

How are we managing quality, given our limited resources? Throughout government we are confronting changed ways of working. I recently attended a conference, sponsored in part by a high-tech firm (in cellular and military communications). This firm expects their people to

do completely different functions every 18 months, on average. Of course, this is driven by their product cycle. But their engineers shift the product teams and often the work environment every 18 months.

This high-tech company has devised many adaptive arrangements, similar to those shown in a recent popular article on the office of the future. Workstations in these cases may be very small, but the coffee break areas look like work areas, with chairs, computer consoles, and whiteboards. People can meet and exchange information well in these spaces. When we talk of quality in the workplace, we need to start pushing these kinds of ideas. I am convinced that taking a fresh look at the nature of our workplaces could lead to an increase in productivity.

GSA has had projects before on the workplace of the future. We have begun something internally that we call the "skunk works," after the Lockheed plant that produced some of the better secret airplanes for America. We wanted to keep this activity somewhat under wraps until we thought we knew what we were doing.

One group is looking more closely at how we can achieve better productivity in the federal workplace. I do believe we lag behind the private sector in developing work environments that foster productivity. If we are to fund the construction of such work environments, we will need tools to measure the resulting gain in productivity and thereby justify the expenditure. It is a daunting prospect. Some business professors have warned me that we would not be the first to try to measure white collar productivity gains, but I am hoping we will be the first to do it successfully.

We are all familiar with the studies which conclude that over the course of a building's life, say, 20 years, only 5 percent of the facility's costs are in initial construction. Another 5 percent are in operating expenses, the last 90 percent in personnel costs. I keep pointing this out to people who are not in real estate, and I keep getting glazed looks. Some of the spending on design and construction or maintenance and operations might well affect the return on the 90 percent spent on personnel.

DOWNSIZING

We are as interested as anyone in the governmentwide outcome of downsizing. But I find throughout government that agency heads can seldom divine the impact of downsizing on their space needs. Many

agencies only recently received their fiscal year 1996 budgets. Until then, they could not have projected their space needs for this year, let alone for the two-to-three year timeframe needed for federal office building leases. Generally speaking, however, we know that GSA's huge inventory of government-owned space will be affected by downsizing. About half of our employees are in leased space, about half in government-owned space. We expect that the proportion in owned space will increase, because, obviously, we can let some leases expire as personnel decline.

On the other hand, it sometimes costs money to save money over the long run. We have begun to educate our stakeholders regarding the front-end cost to reconfigure government-owned space to accommodate staff from vacated leased space. So far, we have been unsuccessful in these discussions. Those who control the purse strings expect to reap the benefits of downsized government in real estate costs, but they have not provided us with the money needed for the transition. We will need the help of federal agencies to make that transition. We will all need to manage this well if we wish to avoid embarrassing newspaper exposes, such as those about a vacant government building with five years left on its lease.

REENGINEERING

We are undertaking several reengineering initiatives in GSA. Federal executives tell me our processes take too long, and if we really want to serve our customers, we will provide quality space. I believe we have accomplished the second part of this; gone are the days when we leased third-tier buildings. However, we still need to work more expeditiously.

The Arthur Andersen study also recommended that we improve our information systems. Our basic computer system is a mainframe with batched processing, the same system I was introduced to in 1979. I believe it was obsolete then. We are developing better systems, something we owe to the agencies and to ourselves.

Our reengineering efforts began with our leasing process. The procurement system requires, correctly, I think, that GSA use fair and open competition for most major expenditures of federal money. A largely tacit policy says that we should break our purchases down into small units to allow the maximum participation by various firms around the country. Such a system well reflects the intention of our Founding Fathers in

Philadelphia in 1787. It springs from the core of our representative form of government. Still, that system will allow improvement, mainly where we have regulations that are not legally required.

In July 1996, GSA will hold a nationwide meeting of our 700 leasing people, from the top managers in Washington to the support people in the regions. We will reinvent the leasing process so that it works faster for our clients and for private sector building owners. Our process will look much more like that of the private sector. We believe it will tremendously reduce the amount of time it takes to acquire space and sign a lease. Some of regions around the country have done a terrific job reinventing the process themselves. We are going to adopt their insights and build upon them. Surely this new process will save money. I was once a private sector lawyer representing landlords who leased to the government. We included in our bids to government an expense factor, for the additional time and inconvenience of negotiating with them.

GSA has also been operating several pilot projects to have commercial brokers provide leasing services in several regions. However, while the Office of Management and Budget may be saying, "Privatize," the Federal Acquisition Streamlining Act makes doing so quite difficult. This act suggests that we cannot contract out to the private sector for these services before surveying all other federal agencies to see if a leasing specialist is momentarily available.

At GSA we have made the very consequential commitment to give up our mandatory status as provider of leasing services to the federal government, once our leasing program is overhauled, and to compete with other agencies and the private sector. We do hope that we will not be competing with one hand tied behind our back. For example, we should be able to contract with two or three vendors to provide all our maintenance and custodial services, as the private sector would, at a deep discount, given our 73 million square feet of space in the Washington metropolitan area.

Or we might model ourselves after the Swedes, who take a very capitalistic approach to facility management. They are permitted to lease space to the private as well as the public sector. If our government did this, GSA would need the authority to borrow money to modernize our space so it could compete in the marketplace. I hope we will get the tools we need to meet the challenges ahead. By the same token, those promoting privatization should consider exactly what it is they mean, including

changing the rules the agencies must follow. A capital budget, while hardly a new idea, may seem appealing, but the notion now faces bipartisan and OMB opposition. While such a budget may appear to be an attractive funding vehicle, it has the disadvantage of distancing expenditures from budgetary review.

CONCLUSION

In sum, GSA needs to broaden its project-by-project focus to encompass a broader, management perspective. We need to develop investment measures that demonstrate the value we add. The Federal Facilities Council may help us develop the means to justify our programs, whether by gauging the investment value of our inventory, or the value of our real estate in promoting staff productivity.

If we can do this, we can win the argument for resources. If we do not devise such measures, we may well fail to obtain even the minimal resources needed to maintain our inventories, to operate our buildings efficiently, and to build those facilities needed for the government to perform its mission.

Key Facility Implications and Results of Business Reengineering: The Private Sector Experience and an Outlook for the Future

Jon Ryburg
Facility Performance Group

I will review some of the research our firm has conducted over the last three years, on about 60 private companies, most of them among the Fortune 500.

These companies are being bombarded by tremendous changes driven by competition. They are all in the middle of downsizing, restructuring, and reengineering their business processes. They have all been coming to grips with the fact that they must continue to change from this time forward. They also had to conclude eventually that their new business arrangements and their business facilities no longer matched. It became obvious that everything, from facilities' locations, capacities, and configurations, down to the furniture layouts, had to be rethought.

All of the companies we looked at are operating under a total quality management program of some kind. They were concerned first with defining their vision and direction; senior management had primary responsibility for that. Focusing on the business, the mission, and the customer, they developed various strategies.

Three key strategies were common to all these companies as they sought their new vision and direction as an organization:

1. *Be quicker to market*. The companies saw they had to develop and deliver products and services in much less time with significantly fewer resources. The Japanese automobile industry could do in half the time what Chrysler, Ford, and General Motors did; certainly the U.S. automobile industry had to match that.

2. *Emphasize concurrent over linear processes*. To be quicker, the companies had to develop concurrent processes and move away from purely linear processes. Concurrent processes are vertically integrated from concept through sales. They led to the stress on the team and the cross-functional team; the more complex the products or services, the more complex the team organizations needed.
3. *Continually improve*. As these companies continue to evolve, they expect to continually improve the time it takes for teams to move products from concept through marketing, out into the field. This continual improvement also implies continual change.

It is important to note at the outset that, in discussions of downsizing, cost-cutting mergers, teaming, restructuring, and reengineering, these concepts are often all mixed up.

All of the companies reported that their restructuring occurred in waves and was often neither systematic nor clean. They frequently did not get it right the first time, or even the second or third time, and there were serious conflicts in space strategies that were often costly. As senior managers developed the organization's restructuring direction, the rest of the company coped as best it could with loss of market share and increasing cost burden.

This approach often led to a so-called "shoehorn" space consolidation approach. In other words, "How much space can we get rid of?" People would be arranged together in the best manner possible secondarily. This process occurred as part of the cost-cutting venture, generally across-the-board cost-cutting.

However, within two years of initiating this process, and having eliminated a great deal of property and made many decisions about preferable locations and needed capacity requirements—which most people thought of as an essentially strategic activity—the basic business process reengineering would begin. This, in turn, led to identifying quite different location, capacity, and configuration requirements.

Thus, a company can get caught up in trying to save space. You can be linked to vice presidents of operations and feel that you are operating in a very strategic manner by being there and servicing the customer. Yet, on a near-term basis you may be doing something that is extremely detrimental to the company two or three years in the future, as actual reengineering begins. All the companies reported this kind of

complexity and laughed about it later, but not before some people were fired and a lot of cost was incurred in that shoehorning of space.

REENGINEERING IMPACTS ON SPACE UTILIZATION

There were two major focuses of reengineering itself. One was rapid product or service development and roll-out, producing products and services faster and cheaper. This required the involvement of four parts of the organization: administration, engineering, manufacturing, and marketing/sales. The second focus was to move closer to customers and to the markets, which especially involved marketing, sales, and customer service.

These two reengineering focuses led to major new work patterns as shown in Figure 1. These new patterns generally required collocating all the different functions that had to be integrated at a single site or campus, often called the "tech center." Customer service might be consolidated at headquarters or moved to a field location; in either case, the goal was to come closer to the customer to get customer feedback into research and development and product development and to service the customer better. Such arrangements had never been needed in these companies before.

These changes represented an incredibly difficult process and massive cultural shifts within the organizations. They could not be achieved overnight. They were achieved only after tremendous resistance. The only way they were ever achieved at all was through extremely strong leadership from the top.

With the new work patterns, very new kinds of office spaces were needed (Figure 2). The vertical axis on Figure 2 represents the dimension from the most to the least centralized work pattern. Space requirements, from dedicated space to no space, are plotted against these new kinds of work. This figure shows the distribution of the different kinds of office spaces described in the media and by furniture companies; it is also the distribution we found in our 60 studied companies.

All of the companies began their new work patterns and reengineered business processes with traditional office layouts. They quickly found that, particularly for the centralized work pattern, they needed to develop something called a home-based/shared approach to office space. Instead of large dedicated private offices or an open plan with individual

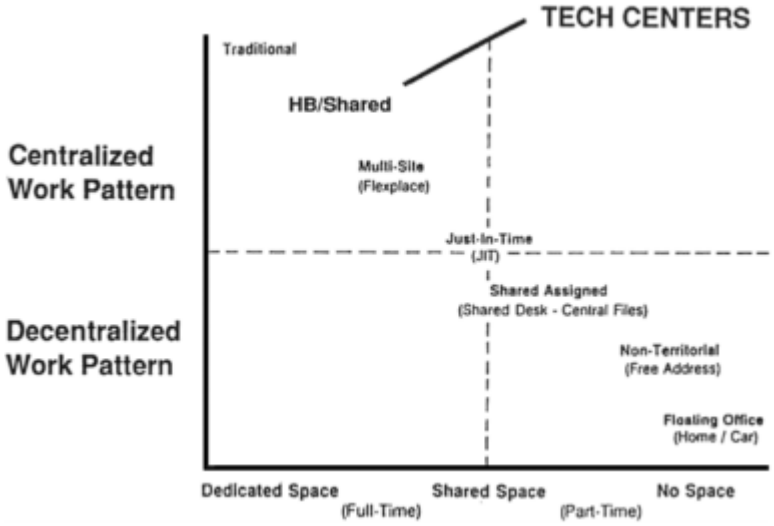

Figure 1.
Work pattern trends in the recent reengineering of organizations (H.R., Human Resources; see text for further detail).

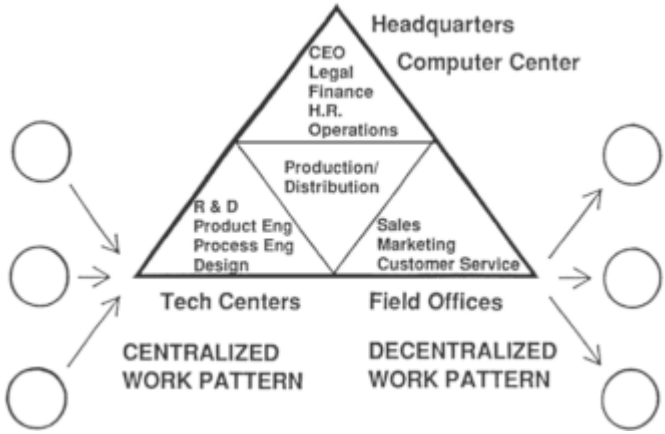

Figure 2.
Office space requirements following the recent reengineering of organizations.

office spaces, the optimal arrangement was seen to be smaller offices close to a larger shared space, where teams could work.

There are at least two different types of home-based/shared office concepts, whose differential use depends on the kind of company. The first concept is used for smaller, less complex products and services like personal computers, tires, banks, and insurance companies, which have about 70 percent of the floor space collocated; the departments are collocated, and smaller footprint home-based offices are near team meeting rooms, which take up about 20 percent of the space. This arrangement continues to work very effectively for these companies today. Teaming occurs within the departments, the home-based offices, and the team meeting rooms. The various spaces support the different kinds of teaming.

This concept is exemplified in a tire and rubber facility in the Mid-West—a tech center that collocated all functions, for all company products and services, from concept through sales (Figure 3). The company wanted to build a strong community of people, to address constantly changing processes. They moved to very open configurations, in which partitions and furniture could be easily moved. An atrium in the facility's center fosters this sense of community, with everyone using the same entrance and thereby encouraged to have accidental conversations—which company management considers just as important as planned communications. Broad stairways, rather than elevators, are used, since the latter tend to separate people. No raised flooring is used. Team rooms are located around the outside. People are assigned to four to six small teams; the idea is that fewer can do more. All the technology, the wiring and cable, is in the spine wall running down the center of these walls.

Most manufacturing companies had much underutilized manufacturing space around, and they found they could renovate it to get these very large collocated sites.

The other concept of home-based/shared office space is suited to larger companies that provide much more complex services or products, like automobiles, jumbo jets, and the services of large system providers, perhaps to NASA, air traffic controllers, or other businesses.

Space allocation in this case is reversed from that in the first concept. Here, because of the complexity of the products, the larger sizes of the vertically integrated teams, and the complexity of team tasks, the

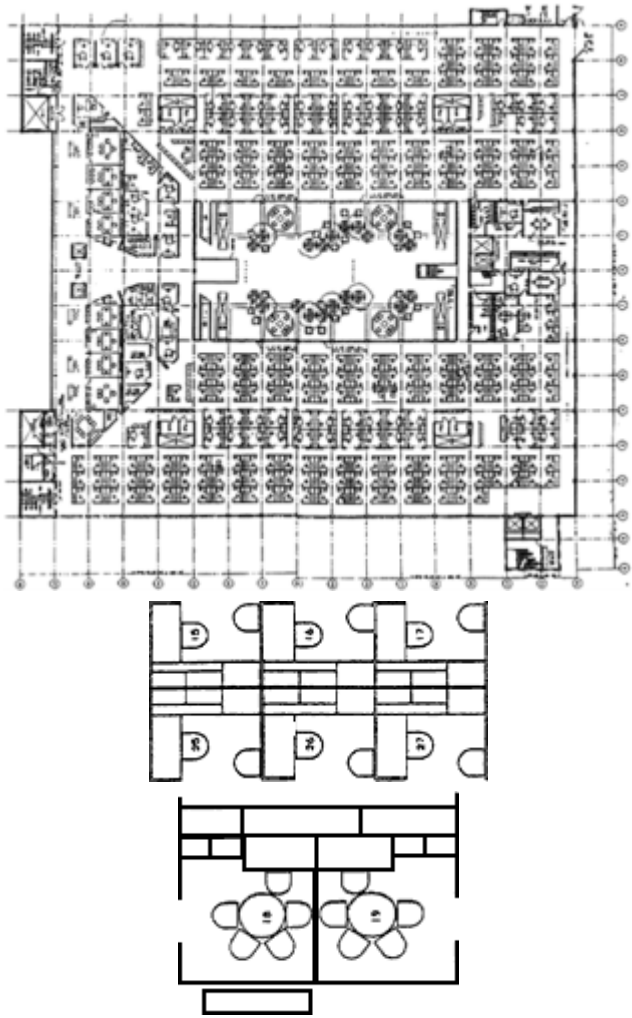

Figure 3.
Concept 1 for home-based/shared office space, for smaller, less complex products (tire manufacturer in the Mid-West): Greater collocated departmental space with small-footprint, home-based offices near team meeting rooms.

team spaces and home bases take up most of the space, and there is simply token representation of the departments nearby.

Figure 4 shows an auto manufacturer, a facility about twice the size of the tire and rubber facility. The auto manufacturer produces several car models. All the space is team space. Departments are down in the corners, with just a small staff to service facility personnel, such as human resources representation. The company will not allow us to show details of the space layout, because they consider it part of their competitive advantage. However, you can see the spine walls, which are very long. They hold the technology, the wires and cables and so on, for the very dense technology utilization in the space. This facility also does not use raised floors; in fact, few of these facilities do.

There are five areas of an organization that reengineering affects most, in terms of both business processes and spaces. The five areas are headquarters, tech centers, computer centers, sales field offices, and customer service. Perhaps these areas will be those most affected in federal agencies over the next three to five years, though one may need to understand these areas slightly differently in the context of government.

Headquarters tend to empty out. Restructuring does not allow for a large bureaucracy of people. Moreover, people tend to become isolated when relegated to a headquarters facility. They need to be distributed where they will do the most good in creating or delivering the product or service. All of the action now is out of the tech center. Chrysler Corporation headquarters in Highland Park, Michigan, for example, is now emptying out and moving to the tech center 30 miles away.

The Dow Chemical Company, in Midland, Michigan, has just built a new headquarters facility that is quite unlike any traditional headquarters facility. It is not a place for bureaucrats to gather, but rather more of a machine for rapid development of products and services.

General Motors is about ready to shift from its venerable old building in downtown Detroit to a building called the RENCEN, short for the Detroit "Renaissance Center," a very large, primarily commercial office structure mixed with shopping, hotel, and some residential space. Their headquarters facility has essentially been emptied. The new senior job requirement is to be out supporting the plants where automotive devices and vehicles are actually designed and manufactured.

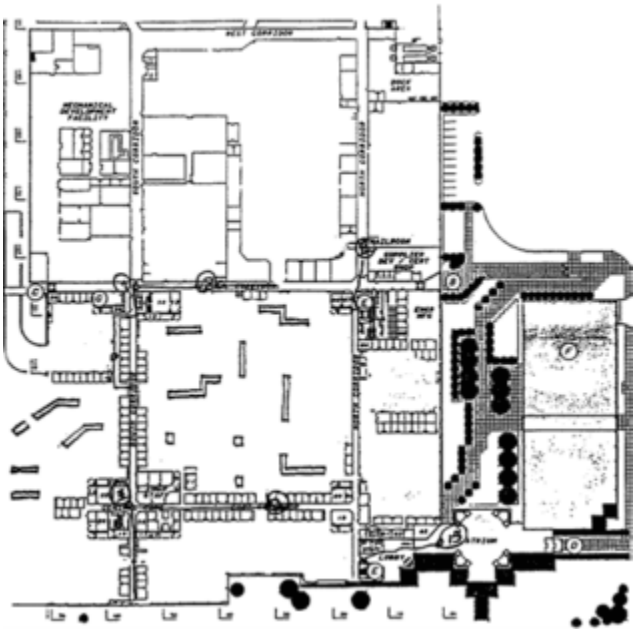

Figure 4.
Concept 2 for home-based/shared office space, for larger, more complex products (auto manufacturer): minimal departmental space, with larger, flexibly arranged team meeting spaces.

Sears is delighted to finally be out of the Sears Tower. It is a wonderful structure with nine towers. Each tower has a footprint of about 50,000 square feet. This arrangement works well for hierarchical organizations, but is terrible for team-based organizations.

The company has moved to the northwest Chicago suburbs, to a lower rise building with a much bigger footprint, which is much more suitable for the broad-based teams the company needs now. The company is pleased with these larger uninterrupted floor spans and with being only two or three levels high. The greater the number of levels, the greater the distance created among groups, and the less productive the teams. As you probably have heard, Sears is getting market share back.

ServiceMaster recently created one of its first regional headquarters, in Memphis, Tennessee. They hired an architectural firm that had a great deal of experience in hospital design. The headquarters looks like a hospital with wings, and it separates rather than integrates. The vice presidents of operations are arguing over their turfs, while senior management hoped to integrate these activities.

Another critical area is the computer center. All this reorganization and reengineering requires new computer-based systems to support it. Most of these companies are converting one-quarter to one-half of the space within the computer center itself to team-based programming and systems development office space, or adding space nearby or onto the building, to accommodate all the team-based activities that are essential to rapid development.

Field offices attempting to get closer to customers and markets can often substitute technology for office space. Portable computers and cellular phones, using e-mail and faxes, can determine the status of a customer's order and allow administrative work, even in a car. There is no need to return to an office.

Companies are eliminating as much space devoted to field offices as they can. They are seeing 50 to 100 percent reductions in the real estate needed in the field. They are moving to shared office concepts, like hoteling. Half of these companies report difficulty in disposing of their unneeded space, because of the real estate market or their leases.

At most of these companies, the customer service centers, while having various business marketing groups and various lines of services and products, often sell to the same customers. In reengineering, it made sense, then, to consolidate customer service centers to a single site. Now the

customer has a single point of connection to all the different lines of business, and the different lines of business can leverage their knowledge of the customer. General Electric, whose plastics now represent about 30 percent of company revenues, and are expected to reach about 40 percent in the next five years, put customer service in their headquarters facility, where their reengineering provided a lot of spare space.

Churn rates for both people and space in these companies are extremely high. By "churn" we mean, when referring to people, a full move from one office or location to another. When referring to space, we mean any kind of facility change that requires moving or adjusting something within an individual office, or a whole office move, and the results of these changes in terms of square feet. The high churn rates have come about because of organizational changes, not because of regularly scheduled maintenance, best use abatement, or the Americans with Disabilities Act.

Companywide churn rates are higher for companies that have turned to the second concept of home-based/shared office space, that aimed at more complex production. Their churn rates, for both people and space, stand at over 100 percent annually, vs 75 to 100 percent for concept 1 companies. Companies with more complex products have had to pass through more organizational changes to find the best distribution of people.

In contrast, at the department level, with its business process reengineering, churn rates for people are slightly higher for concept 1 companies; space churn rates at this level are the same for both concepts, 20 to 30 percent. At the team level, churn rates reflect the project team's work methods throughout the project lifecycle. Churn rates for both people and space at this level are higher for concept 2 companies. However, space churn rate is relatively low (about 20 percent) for the few kinds of companies, like insurance companies and banks, that can use universal templates for their space; in these concept 1 companies, team rooms can be shared. These companies can still operate very efficiently in high-rise buildings with long, double-loaded corridors, unlike most manufacturing companies.

What controls are being used for these extraordinary churn rates? No one forecasts that these rates will be reduced by very much. No one yet sees the end of mergers and acquisitions.

The first and most important control is to project both long-and short-term requirements. Surprisingly, most of the companies were not

doing this well prior to reengineering. They found that as much as 50 percent of all churn within two years of reengineering business processes resulted from poor understanding of where the corresponding parts of the organization were going to go.

There was, in fact, very little true strategic planning. To reduce churn as much as possible, then, you want to be tightly connected to corporate planners, who are developing the organization's board-approved futures, to see the facility implications of these plans. You also want to be very tightly connected to all the vice presidents of the operations. However, these people should clearly be in a reengineering phase, not just in a cost-cutting phase.

The other technique that was very successful in reducing churn, but used by very few of the 60 companies, was to move people rather than facilities. You can eliminate current churn by using universal plans or templates, or free address systems. In free address, no one has an assigned office space to use. You use whatever space is free (or available). Only the insurance companies used a universal plan template, however. The concept is that one or two sizes fit all. We did find that department managers were not very happy with this approach, but they could live with it.

Because of the high cost of moving technology, particularly wires and cables, another approach has been to move everything except the technology. Of the 60 companies, perhaps fewer than 10 had raised flooring throughout their facilities. Raised flooring has various disadvantages, particularly cost. The main alternative has been the use of spine walls. Furniture companies are coming out with some interesting new products for better spine walls, such as better lay-in and take-out cables in furniture systems, so the systems can be more easily moved. With all the change, companies would like to see their investments in the furniture be maintained.

Another approach is to move everything, including the technology. There were companies like Chrysler Corporation that embraced churn to an extraordinary degree. While facility managers and real estate people think of churn as a huge headache and a big cost, which it is, companies came to see churn as good for the company, reflecting valuable business reengineering. They want facilities that can keep up with the changes and be cost-effective at the same time.

Another strategy was to adapt instead of move. At department and team levels, much of the churn resulted from the inability to change just a few workstations, without tearing out a large number of them. The related churn control objective has been to keep churn as localized as possible. Methods being used are module-adjustable furniture, which is becoming more common; flexible roll-around furniture, which can be adjusted and moved by the users themselves; and far more flexible wall systems, including flexible spine walls for cabling.

Still another tactic was making electronic instead of physical moves. This type of churn control may be the most interesting of all. Many of the companies expect to develop their tech centers further, along with increasing their market share, by means of virtual connections, rather than by building larger and larger complexes where people have to meet together to work. Instead, they can tele-team through desktop and portable teleconferencing and other techniques already in use.

Companies around the country are now using this approach across two or three states. For example, Xerox has finally given up on meetings on the West Coast between its Portland and Palo Alto facilities. Given the congestion, pollution, and expense that these meetings would entail, the company's high-value workforce uses a teleconferencing utility available 24 hours a day. Even the coffee break areas at the two sites have full screen projection of each other, because the company so highly rates accidental encounters between these high-value people.

The uses of teleconferencing will likely increase elsewhere as prices come down. Some of the tech centers we observed were already hardwiring with coaxial cable throughout, to bring closed-circuit television into more team spaces. This will allow teams to talk to people on different floors easily and see them at the same time.

For facility managers, three very important recent emphases have been to control costs, to control quality, and to control churn. One overarching question is how to make current buildings work for the new team environments. Finding an answer is very difficult. Many companies developed award-winning buildings in the 1970s and 1980s that do not work well today. Some have venerable R&D facilities in which seminal experiments were carried out 50 years ago, providing foundations for whole new industries. Companies would like to remain in these facilities, which is an enormously difficult challenge.

To have facilities support high performance, the focus must be strategic, with tactical work outsourced. For example, outsourcing maintenance may not save much money, but over time many companies have found their costs do not rise as rapidly as when the maintenance function is kept in house.

To help control quality, facilities management must be a full member of the new team. Yet it was often not invited into the process in the cases we examined. To know the customer well, facilities management must be closely involved in the change process, particularly in reengineering, because no one knows exactly what the outcome will be in the future. For others in the company to see you as a resource, you must be considered integral to the change process. Moreover, facilities managers are facilitators, not police; they bring their own contributions to the table.

OUTLOOK FOR THE FUTURE

Companies state quite strongly that the current business trends affecting facilities management are not fads. Continuous improvement is a long-range strategy.

One paradox is that companies must be both big and small simultaneously. Economies of scale are extremely critical, and mergers and acquisitions to support company core markets and capabilities will continue. But the objective is to increase market share, not company size. If you double your market, you do not want to double the size of the company. Keeping the company small is essential to remain innovative, flexible, and responsive. To ensure quality, these companies have found it is critical to remain small.

We will likely see many more just-in-time workforces as well as workplaces, because large companies or empires are too risky, costly, and slow. Similarly, there will be more part-time people, more joint ventures, and more outsourcing. Today, our average company may be a 80/20 company, with about 80 percent of those at a site actual full-time employees and 20 percent vendors, part-time people, and consultants. Senior managers, particularly at the tech centers, have been saying that they are shooting to be 60/40 companies within the next 10 years. All of them appear excited about the notion that we will become workers for many companies and that many virtual advances in technology and telecommuting will be occurring over the same time.

Still, the concept we found most interesting was the goal of senior managers to be able to do in 10 years with a telecommunications link between team members nearly anything you can do or accomplish in a face-to-face meeting today. When you talk to the telephone company and other companies providing these services, this is actually one of the goals they have as well.

Within the Fortune 500 companies right now, approximately 5-10 percent of the people are affected by these virtual technologies, in their use of teleconferencing and as telecommuters. Smaller companies are reporting a much higher percentage of such users today. We do not really know whether the trend will explode, or take its place alongside the paperless office, but we believe that it will eventually evolve enough to significantly reduce company need to collocate hundreds or thousands of employees at a common site, reducing the need for additional, new facilities.

The companies believe this trend is very important, particularly the ability to use virtual links to develop tech centers in very different ways. These links permit organizations to be as large as needed, and in a manner that can be quite transparent to all those involved, when done right, working almost as well or better than face-to-face meetings.

Again, there are many continuing pressures to take such an approach: local and regional congestion pressures, with their monetary, environmental, and quality of life costs, and the high costs of living associated with large centralized sites. Additionally, some of the needed high-value people are relatively scarce, and they have new attitudes about quality of life issues, such as where and how they live, and the balance they want to achieve between home and the workplace.

To summarize, all these companies found facilities to be a very important enabling factor—one they had developed ways of measuring and justifying in various parts of the company. Tech centers had a different way than headquarters of justifying this value, and customer service centers a different way than field offices, but they all did come around to this idea. They did not all begin this way. Most felt at first that facilities were non-earning assets, whose costs should be reduced to nothing if possible. Of course, that is still a goal. But, while most of these companies did not originally see the locations, capacities, and configurations of their facilities as enabling influences, this was the conclusion they finally reached.

Organizational Transformation: A Case Study

Charles I. Homan
Michael Baker Corporation

The Michael Baker Corporation provides a case study of a private sector organization in transition. About one-third of our business is with federal agencies. I personally work often with the Federal Emergency Management Agency (FEMA). In the past few years, FEMA, like my company, has undergone great change. I have been able to draw on many of the strategies that Director James Lee Witt employed at FEMA.

The Michael Baker Corporation—a highly diversified engineering, construction, and operations and maintenance firm—was very successful until the 1990s. In the mid-1980s, we began to change the core of our business. Around 1993, we reached a crisis. But we have begun to succeed in turning the company around.

The company was founded in 1940 near Pittsburgh. In 1995, we had revenues of $355 million. The company's 3,200 employees hold 42 percent of the stock of the publicly traded firm. Nearly 85 percent of the eligible employees hold stock, giving the company good access to capital and the employees a liquid form of participation (upon retirement). This is not always the case in employee stock ownership plans. Baker's offices are mainly on the East and Gulf coasts, with a few offices overseas.

THE ROOTS OF CRISIS

Figure 1 traces some of the roots of the recent crisis. In 1983, the company was restructured. Michael Baker, Jr., the founder, had died in 1977, and the company had not prepared new leadership at that time. By

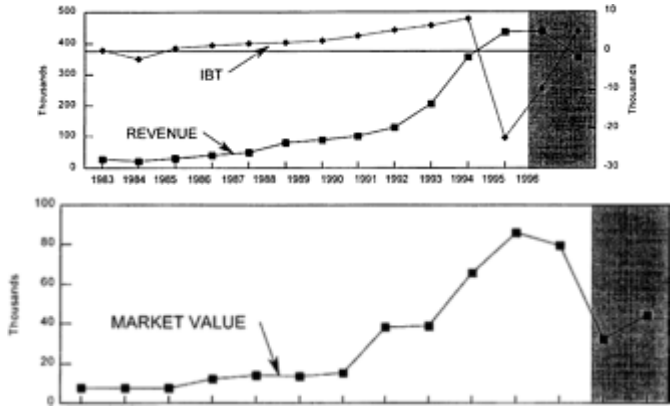

Figure 1.
Revenue and market value of the Michael Baker Corporation 1983 to present.

the early 1980s the company was in trouble, intensified by the recession in the Pittsburgh area. The employee stock ownership plan was formed at that time, to give employees the incentives of ownership. Baker began to perform well, concentrating on its core engineering business.

In 1987, the company made its first acquisition. The object was to diversify the company, moving into operations and maintenance, and ultimately construction. We saw the coming trends of outsourcing, privatization, and design-build, and we wanted to position the company to take advantage of them. Baker acquired three companies that operate and maintain facilities: one that operates public facilities, and two that operate private facilities in oil and gas. Then, in 1991, we acquired the Mellon-Stuart Construction Company in Pittsburgh.

Revenue began to grow rapidly, peaking at about $430 million in 1994. We proceeded to lose $20 million in 1993, and another $10 million the next year, by failing to understand, integrate, and control the acquired companies. The company's market value, which had grown significantly along with revenues and profits, dropped, too. However, we did complete those projects we were committed to.

Deep financial losses damaged our credibility with all of our constituencies except, perhaps, our clients, with whom we maintained our standards of service and commitment. The financial community was frustrated with Baker, as were employees and other shareholders.

We experienced significant litigation. We had taken over a construction company that had a culture of litigation and adversarial relations with clients. Many construction companies share that attitude. The Baker Company had not only litigation to resolve, but a corporate culture to change.

Baker's long-standing credit facility was withdrawn by the bank in the fourth quarter of 1994, at a time when the company had $15 million borrowed on that facility. Baker was in a difficult situation.

The company also faced growing competition, especially in the individual areas of engineering, construction, and operations.

ORGANIZATIONAL TRANSFORMATION

We needed to change the company dramatically and very immediately, and we needed to do it so that we could be profitable in 1995. The company began to transform itself to meet these challenges. With all

of the bad news, we did have a few advantages. First, the market was changing rapidly. If we could create an entrepreneurial organization that was creative and innovative, we could take advantage of that market change.

Baker also had a very strong core engineering business, operating rather independently of the other businesses. It had a strong internal infrastructure (including project management, finance, and technology) and an excellent, seasoned management team. It had done many things right, such as implementing a total quality management practice in 1991, which touched every major process in the company.

The board of directors made a national search for a chief executive officer and was leaning toward an outsider, because they recognized that we needed significant change. But, with my understanding of the company, and working with key people from the engineering part of the company, I was able to put together a restructuring plan to present to the board. I knew that I had to take a great deal of risk. When Baker competes for projects, if we think we have a good position we tend to be cautious. But if not, we take some risks. I felt I was in that position. The board accepted the plan.

The approach, briefly, was threefold:

1. *Build on strengths*. Our central strength was the core engineering business, which now had the design-build-operate capability of which the marketplace was demanding more. Another strength was our established reputation; we had served our clients well throughout this time. Market trends were positive for the company; as I noted, the market has been full of change, which has been helpful.
2. *Remove barriers*. One serious barrier was the managers of the acquired companies, who did not share the values of Baker's engineering culture.
3. *Fix weaknesses*. Weaknesses existed mainly in reporting systems, human resources, and technology—all those infrastructure systems that make an organization healthy.

In October 1994, we announced the reorganization plan to all employees. We presented the guiding vision: "An integrated, high-performance engineering, construction, operations, and technical services company, servicing focused, global markets." We announced that Baker,

to be a high-performance company, must earn customer loyalty and repeat business; must be the employer of choice; must consistently achieve 15 to 20 percent return on equity; and must be recognized for its community service.

Another subject of that announcement was the company's values, those that should drive Baker employees' behavior:

- Value our employees
- Have unquestionable integrity
- Meet our commitments
- Emphasize leadership (which implies empowerment of employees)
- Be performance-driven
- Build teamwork
- Be a technology leader
- Communicate openly and honestly.

To give employees a better definition of Baker's business philosophy, we developed two graphics.

Figure 2 graphs shareholder value against time, as a way of contrasting Baker's new approach with its old one. One line indicates conventional "hero leadership" and conventional strategic planning, which tries to predict the future, and then takes action (such as an acquisition) to be positioned for that future. The marketplace is changing so rapidly that this approach no longer works. The Baker Company is following the business philosophy built instead on "empowered culture strategic management" and progressive small successes.

Figure 3 illustrates the second element of Baker's business philosophy, which we call our "quality service chain," and which has the end goals of increasing revenue and profitability. The way we will achieve them is through customer loyalty, gained through continuous customer satisfaction with the quality of service, and so on, back to the basics: taking good care of Baker people. Some companies say, "Our clients are number 1." Baker's people are number 1, because we believe that if we do a good job of taking care of Baker people, they will do a good job of serving our clients.

Figure 2.
Baker's old vs new business philosophy.

Figure 3.
Baker's operating strategy and service delivery system.

The other first priorities were to reorganize the corporation's structure and staff the leadership team. The new structure is a rather conventional one, but has the virtue of simplicity and clarity. One important change is to have the major business units report directly to the office of the chief executive officer, which removes a layer of general management. In addition, the earlier organization, in the three areas of engineering, construction, and operations and maintenance, has been integrated and reformed around the five major markets that we serve—environmental, civil, buildings, energy, and transportation. For example, we provide design-build services for transportation and for buildings. We have operations and maintenance under our energy business unit and under certain other business units. We also added information technology as a separate staff function, because leadership at the top in information technology is critical today.

Among our other first priorities, we had to assess the situation, which we did within about two months, to avoid carrying any more baggage than necessary into 1995. Conjointly, we reorganized. We took a further $10 million loss in the fourth quarter of 1994, because we knew we had a lot of litigation. Our litigation problems were resolved finally in great part by working with the clients to find win/win solutions. Even the most "difficult" clients responded favorably to this direct approach.

We made our organizational changes quickly as well, because doing so is better for morale; partly for this reason, we also kept our people very well informed of what we were doing and what we were attempting to do.

Secondary priorities included arranging a new credit facility and tight controls on cash flow; putting the new leadership team in place; building internal infrastructure, such as reporting systems and technology; building a marketing culture through training; and establishing a distinctive technological competence—in our case, geographical information systems, which are increasingly vital to facility management, and in which Baker has unique expertise.

With regard to the success of our new organization: we have become profitable; we have increased backlog; our employee turnover rate has been reduced dramatically; and our client satisfaction index ratings have gone up. Those are some of the measures we have used to assess our progress. Together, they suggest that our reorganization has been extraordinarily successful.

VISION 2000

The last thing Baker did in 1995 was to tell our people where we wanted to go, defining a longer term vision around which managers could plan. We established visions for the year 2000 for both operations and staff functions.

The vision for operations set goals for the year 2000 in revenue (doubling the size of the company), for earnings per share ($1.25 per share), for business scope, and for geographic coverage (with international revenue growing more rapidly than domestic revenue).

For staff functions, the vision statement sets additional concrete expectations. In 2000, for example, the measurements taken in employee surveys are expected to be above corresponding values for comparable companies.

CONCLUSION

Excellent performance requires leadership. Baker's leadership has been shown in its vision, values, business philosophy, strategic management (as opposed to conventional strategic planning), and motivating and rewarding employees in their achievement of incremental successes.

Finally, any organization today that is operating in Baker's marketplace must practice some form of total quality management, that is, a formal process that provides for continuous improvement of the organization, so that it remains competitive and provides good service to its clients. The total quality management process can also make innovation and significant change possible.

Reengineering Business Practices: A University's Experience Outsourcing Facility Management Services

Kathryn West
Harvard Medical School

As the Associate Dean for Operations, I am responsible for the provision of facilities management, construction and renovation, environmental health and safety, energy management, and support services for Harvard Medical School, which owns 1.5 million square feet of real estate on 17 acres of campus, and 13 commercial and residential facilities off campus. The medical school has some unique features, but it has experienced many of the same trends as other facilities. In the past year or so, in particular, it has begun outsourcing facilities management. I shall discuss that experience, and review one case of such outsourcing.

HARVARD MEDICAL SCHOOL

Harvard Medical School was founded in 1782, with the mission to shape the future of medicine through education, research, and discovery of new ideas. While Harvard Medical School is perhaps best known for training physicians, much of its effort and funds are directed at basic scientific research. Its more than 7,000 faculty researchers received about $440 million in grants from the National Institutes of Health in 1995. Six basic science departments and two social science oriented departments are housed on Harvard's quadrangle. The student body is relatively small (735 in the M.D. program, 470 in the Ph.D. program, and 170 in the joint M.D.-Ph.D. programs).

OPERATING ISSUES

My group is responsible for facilities management as well as administrative and support services for 16 buildings in a compact urban setting. We also have 300,000 gross square feet under construction. My group provides the full range of operations and administrative services, from security and food services to maintenance and renovation services. In addition, we undertake an annual planning process for our capital investment program, which is about $65 million over six years.

About 85 percent of the 1.5 million square feet on campus is occupied by research laboratories, and the rest by offices, a dental clinic, and teaching and dormitory space. We operate 24 hours a day, 365 days a year, to accommodate research activity and student life. Facilities management in such a setting is different from that in office or retail space. Additionally, our urban site means there is little buildable space left in the area.

The facilities services provided are generally traditional, but there are several areas we have emphasized over the past few years. The first is preventive maintenance. In the past year we initiated a comprehensive preventive maintenance program, complete with a detailed asset inventory, protocols for maintaining each asset, and a regular maintenance schedule. We are confident that through this program we will save money on breakdowns and unplanned repairs.

Energy—a big part of the budget—is another concern. Three years ago our energy expenditures were escalating at an alarming rate. In response, we developed a sophisticated program for tracking energy consumption on a daily basis and now have the energy budget well under control.

Waste management for a research institution like ours is also unusually challenging. In addition to the usual solid waste management issues, a scientific research institution's waste stream includes various biological and radioactive materials.

EMERGING TRENDS

Like other organizations, Harvard Medical School operates within the context of several emerging trends. Three important trends deserve separate discussion: increased regulatory pressures, especially in

environmental safety and health; financial pressures; and a wave of acquisitions and mergers.

Regulatory Pressures. In my environment, one of the most challenging operating issues these days is environmental health and safety. In the last four years, regulatory pressures have greatly increased, particularly in environmental, health, and safety regulation. Many of these pressures come from the federal government. The Environmental Protection Agency has focused considerable compliance efforts in academic and research institutions in the past year or two. We have changing regulatory pressures and guidelines from the Occupational Safety and Health Administration. The Nuclear Regulatory Commission oversees the use of radioactive materials. Finally, there is the alphabet soup of local agencies: the Boston Fire Department, the Massachusetts Department of Environmental Protection, and the Massachusetts Water Research Authority, which is tasked with cleaning up Boston harbor and which requires us to measure everything that goes into the sewer system on a quarterly basis at nine or ten different sampling points. All of these requirements are important and beneficial to the environment and to workers, but they place heavy demands on management and staff.

Financial Pressures. All facilities managers are familiar with the second trend: financial pressures. These pressures are coming from several sources: the recent recession, which hit New England particularly hard; stockholders' demands for profits, which has lead to downsizing, among other things; declining federal funds for research; and reduced overhead recovery rates.

These pressures have had a number of practical impacts. They have led to downsizing and the loss of many jobs. They have also cut demand for space. Outsourcing has become increasingly common. And industrial shifts have occurred, as developers and general contractors, with declining revenues in their core businesses in the late 1980s, have moved into facilities management. Finally, organizations are being reengineered to adapt to these austere conditions.

Mergers and Acquisitions. The third trend we see consists of mergers, acquisitions, consolidations, and the like. This trend is certainly taking place in the private sector, and the health care industry is no

exception. We also see it in the federal government, where divisions are disappearing overnight and are being collapsed into other divisions.

OUTSOURCING CASE STUDY: THE HARVARD INSTITUTES OF MEDICINE

First, let me define what I mean by outsourcing. Outsourcing in facilities management is the hiring of a full-service, single-source vendor to provide many services bundled together. I distinguish it from out-tasking, which is the familiar process of hiring a specialized vendor to provide one or more facilities management services; security, housekeeping, and custodial work are common examples of out-tasked services.

Many large organizations—both companies and nonprofit institutions—have outsourced facilities management and other services to better concentrate on their core enterprises. Increasingly, we see vendors providing the full range of services, and not just pieces of those services.

My own recent experience with the 300,000 gross-square-foot building that houses the Harvard Institutes of Medicine may be instructive. This ten-story building had originally been a Boston high school, but had been vacant for years when the medical school purchased it two years ago. The city had closed the building in the late 1970s, owing to a declining inner city population, the energy crisis, and the unsuitability of a high-rise structure for a high school.

We are currently renovating the building for biomedical research. The project will integrate a number of different institutions and research centers in the building, in partnership with three of our affiliated hospitals. Each of the hospitals will take three floors, and another floor will be devoted to a multi-institutional center for genetics research.

We have outsourced 100 percent of the services provided in this building, from the mail and receiving room on up through the environmental health and safety function.

Objectives of Outsourcing. The objectives of outsourcing are generally well known. The first and most obvious is to enable an organization to focus on its core business or core competency. The core competency of a medical school, for example, is teaching and research, while the core competency of a facilities maintenance organization is the provision of maintenance services. The employees of such an organization are revenue producers for that company, while the employees of a facilities

maintenance department within a company or institution engaged in another business are viewed as overhead.

Another objective is to control costs, though I think the often heralded notion that outsourcing will result in significant cost savings may be something of a myth. There may be substantial savings when first outsourcing to a private company, but the costs of outsourcing may actually be similar to the cost of providing services in house over time.

Delivering high-quality and reliable services is our prime objective in outsourcing, for a facility such as ours. The expertise of facilities maintenance personnel must be sustained for reliability of service. The lights and heat in an office building are less critical than the basic services in a research environment; a temperature variation, for example, can ruin years of work for a research project.

A final objective may be to force change. If the organization has an inefficient or inappropriate structure, outsourcing is sometimes one way to induce dramatic change in the way business is done.

Outsourcing at the Harvard Institutes of Medicine. Our objectives for the Harvard Institutes of Medicine were to provide extremely efficient facility operations, emphasizing performance, quality, and responsiveness.

Biomedical researchers are demanding tenants, largely because of the nature of their work. They need a highly responsive and flexible service provider; management needs a skilled and flexible provider who can meet the research-associated environmental and safety regulations. This case had the added complexity of having three different partner organizations as tenants, each with its own needs and practices.

In considering how best to serve the needs of the multiple tenants, we established a collective decision process. Four or five task groups were assigned to work on developing a service specification for the building over several months. We were unanimous in our decision to outsource the management of the building, so our energy was directed at providing as much detail as we could about how the facility should be operated.

The partner tenants thus agreed to this approach from the beginning, except for environmental health and safety management, which they wanted kept in the hands of Harvard's environmental health and safety group. However, since the outsource contract started last fall, we have

changed that arrangement, and even the health and safety services are outsourced.

Timeline. Figure 1 shows the timeline for implementing vendor selection. Some of the steps are worth highlighting.

We prequalified. vendors. There are many vendors, but few can handle this 100 percent service provision requirement. Of the 20 firms considered, many were former custodial companies that were trying to shift into fuller service offerings, some with more success than others. We identified about a dozen we thought were qualified, then narrowed the group down to four, who were invited to respond to our request for proposals.

After receiving the proposals, we interviewed the bidders at length and in detail. Then we did thorough reference checks. I have found that who vendors give as a reference is as important as what the reference says. One firm thought it would be good to use a Harvard reference; when I telephoned, someone answered, "Housekeeping." The work they were doing had nothing to do with what we were interested in. It is also important for one person to do all the reference checks and to try to ask consistent questions, because doing so allows better comparison and a more balanced view.

In this building, the first tenant moved in March 1996; the final tenants will not move in until June 1997. So the vendor had to accept the challenge of managing a partially occupied building while tenant fit-out is proceeding on seven other floors.

In addition, we wanted our vendor on site last fall as full-time facility manager, in time to work with an independent commissioning agent to commission the building over a three-month period during the winter. This approach has proven to be of great benefit because, instead of walking into a situation and trying to manage a site that they know very little about, the facility management staff has been there from the beginning and understands the building well.

Selection Criteria. The vendor selection criteria are important. Cultural compatibility is most important of all, in my view. For example, an organization with a relaxed management style and informal people may not want to engage a "buttoned-down" firm. It was particularly important

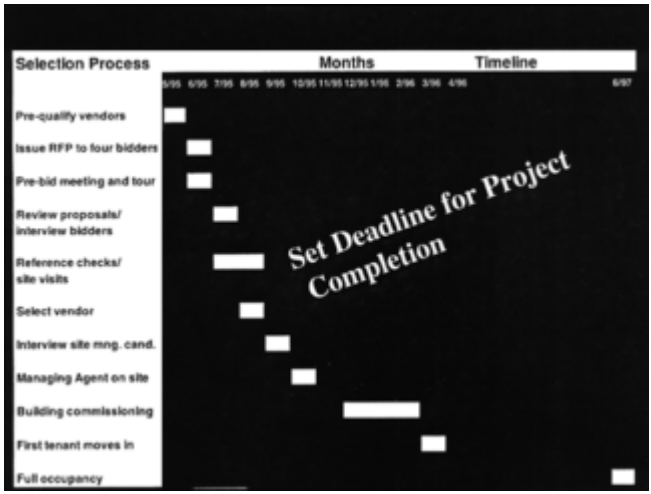

Figure 1.
Set Deadline for Project Completion.

in our case to find a vendor with experience in similar settings; doing so was not easy, because very few research laboratories outsource the delivery of all facilities services and very few facilities management companies have experience in managing in these environments. We were also interested in someone who could manage a multitenant site.

Flexibility was also very important. We needed a firm that could function in a demanding environment, that could "go with the flow," because the needs and demands of our client tenants can change daily. We needed someone with a very strong customer service orientation.

The quality of a vendor's reporting systems is important, because outsourcing often involves handing one's money to someone else to spend. A vendor with sophisticated, high-quality reporting systems can relieve much of the anxiety associated with such an arrangement and insure that financial controls are sufficient.

Finally, in a partnership, good "chemistry" is critical. One must work very closely with the vendor, solving problems together. If the customer is trying to hold the vendor's feet to the fire, the relationship is not one of partnership.

Track Record to Date. We met our implementation schedule, and we had our vendor (Codman Corporate Services) on board for the commissioning. The vendor has been able to provide very flexible staffing to meet the phased schedule for occupancy.

Yet our contract with the vendor is not very complicated. Codman is responsible for hiring and managing the staff employed to maintain the building and for subcontracting out services such as housekeeping, snow removal, and environmental health and safety. The tenants occupying the building advance funds for all operating expenses (against an approved budget) to a bank account managed by the vendor serving as our agent. The vendor receives a fixed monthly management fee. In addition, once a performance baseline has been established, we will create financial incentives for performance through which Codman could be compensated above the fixed fee if they saved us money or did other things that we found to be beneficial or attractive.

In the meantime, what we have bought is access to superior levels of expertise. Buying these services from a company who provides them for a living is different from putting the same kinds of people on your own payroll. The vendor is extraordinarily responsive to me and the group of

partners (who meet as an operating committee) and to the tenants who occupy the building.

We have also bought access to expertise in budget development. The vendor's people have worked in many different settings. Although our demands for reporting detail and different budget approaches are somewhat extreme, because of the multitenant situation, the vendor has met them.

This outsourcing arrangement allows senior management to focus on its core business. It would have been difficult to add a 300,000 gross-square-foot building to my portfolio or to one of my facility manager's portfolios. I have really been able to focus on other things that are more critical than managing this one building. A strong partnership is evolving. And partnership of this kind offers great opportunities for cost savings and increased service.

In a related partnering arrangement, Harvard University has entered into three institutionwide outsourcing partnerships that are much broader than the medical school's partnership with the Codman Company for this one building. The university has partnerships for office supplies, travel services, and laboratory supplies and equipment. The pricing and service levels under these arrangements is very attractive.

CONCLUSION

We learned at least two lessons from this outsourcing experience. First, it is important to adhere to your schedule. Keeping to the schedule does more than accomplishing your program goals. It also gives you credibility within your own organization as well as with the vendor community.

Second, it is important to build a team to obtain consensus from top to bottom. Every member of the team must participate. But within the team—and this may sound heretical, because team members are supposed to be co-equal—I believe a senior manager should own the process, lead the team to closure, and appreciate that it is his or her responsibility to deliver the product. That way some measure of control is possible.

Reinventing the Bureau of Reclamation

Stephen Magnussen
Bureau of Reclamation

THE BUREAU'S HISTORICAL MISSION

I am glad for the opportunity to tell you a little about the re-invention of the Bureau of Reclamation. We are very proud of our internally generated effort, which has been carried out over the last few years.

In 1902, Congress passed the Reclamation Act to bring water to the and West and to facilitate settlement of the western states. The Bureau of Reclamation was created and structured as a civil works construction agency, and built such magnificent projects as the Hoover Dam, Glen Canyon Dam on the Colorado River, which has recently been in the news, Shasta Dam on the Sacramento River, and Grand Coulee Dam on the Columbia River.

Today the bureau is the largest wholesaler of water supply utility in the nation and the sixth largest electric power generator. We supply water to 40 million people and 240,000 farms in the 17 western states. We have a budget of $836 million and 6,200 employees.

While we had a glorious past, the dam-building era is over, and a new mission had to be adopted. In early 1993, in keeping with the recommendations of the National Performance Review, the President, Interior Secretary Bruce Babbitt, and former Bureau Commissioner Daniel Beard made public their commitment to transform the bureau from a civil works agency with a primary focus on dam construction, to a leading water

resource management agency. Implementation of the bureau's new structure was authorized by Secretary Babbitt's order in April 1994.

NEW BUREAU DIRECTIONS

The new program emphasis is being placed on water conservation and reuse, environmental protection and restoration, expansion of the customer base beyond agricultural interests to include rural and urban water users, Native American tribes, and environmental and recreational communities. Our new mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interests of the American public.

The Bureau of Reclamation has moved quickly in reinventing itself. Its progress led to the receipt of the Vice President's Hammer Award in 1994, the Innovations in American Government Award, and a $100,000 grant from the Ford Foundation and John F. Kennedy School of Government in late 1995.

The first of our nationwide reinvention conferences was held in Sacramento in May 1996. We will be talking to a number of private and public agencies about our reinvention efforts, in the hope our experiences might be of help. Two additional conferences will be held, in Denver and San Antonio the summer and fall of 1996.

SUCCESS FACTORS IN AGENCY REENGINEERING

Five critical elements allowed us to transform our mission, reengineer our processes, streamline the organization, and improve efficiency within an 18-month period. They were:

- forceful leadership and a direction clearly articulated by the organization's head
- legitimate and responsible participation of all employees
- a strong focus on benefits for the organization's customers
- a commitment to implementing a mission consistent with contemporary values, and
- encouraging innovation and challenging fears of risk taking.

In May 1993, former Commissioner Beard informed all employees of the appointment of seven employees from various disciplines, grade levels, and geographic distribution, to study and recommend within 90 days what actions needed to be taken to successfully complete the transition to a water resource management agency. This group was named the Commissioner's Program and Organization Review Team (CPORT). The Commissioner also informed employees that no actions would be taken before they all could review and comment on CPORT's findings and recommendations.

CPORT adopted a charter and requested early input from all employees. The team's work was conducted independently from management. With the help of teams and individual interviews CPORT:

- reviewed all programmatic and organizational documents;
- examined the bureau's activities for consistency with the new organizational goals;
- examined its business processes and organizational relationships; and
- made recommendations on how the organization could eliminate inefficiencies and otherwise improve.

In August 1993, the CPORT report was distributed to all employees, who returned roughly 1,000 written comments and recommendations. Numerous employee meetings were held in the field with the Commissioner or other management officials, to verify that employee input was reflected accurately in the final agency response to the CPORT report.

In August and September of 1993, a manager's conference formulated implementation strategies and assigned another team to draft the final strategic plan.

In November 1993, the "blueprint for reform," including total restructuring of the organization, was issued. Subsequently, specific implementation plans were developed for Denver, Washington, and regional organizations; they were adopted by the Secretary's order in April 1994.

THE POSITIVE RESULTS

I will describe only a few of the significant results. Corporate headquarters in Denver previously had 2,000 employees. This force has

been reduced by 400 positions. Headquarters has been restructured as a customer-based technical and administrative service center. The technical center is managed by a board of directors made up of regional area office and Washington office staff, that is, by their customers.

Project offices, which once numbered 35 and were responsible for construction, operation, and maintenance for a small number of water projects, have been reduced to 26 redesigned regional area offices; each is now responsible for water resource issues within its geographical area.

Area managers have been delegated authorities formerly held by the headquarters staff in Denver and have been encouraged to innovate. They were even issued two "forgiveness coupons" by the Commissioner, to inspire greater risk taking—a necessary strategy for improvements to occur.

Management layers have been reduced from five to three, and the ratio of supervisors to employees has increased threefold, from 1: 5 to 1: 15. In some areas, employees were working on self-directed teams. The number of senior executive positions was reduced from 23 to 18.

The Commissioner's office provides corporate leadership, policy direction, and program and budget support. But it has been flattened by abolishing two Deputy Commissioner positions and five Assistant Commissioner positions, replacing them with three directors.

In October 1993, we had almost 8,000 employees. Now we are at about 6,200, and projected to be under 6,000 by the end of this fiscal year, a 25 percent total reduction. This has all been accomplished through buy-outs, hiring freezes, and some reductions in force.

Streamlining and reengineering the organization, the bureau's budget has been reduced by $100 million. The total budget was cut 12 percent over the last 2 years; it is expected to decline further, for a 25 percent total reduction.

The decision and review processes for the design of project components have been reduced from 3 years to 6 months, and from roughly 20 review steps to only 8—in large part by simply eliminating layers of management. Funding approvals have also been reduced, from 15 levels of review over 6 months, to 5 levels over 1 week, allowing much faster response to our customers.

The levels of review for dam safety checks were reduced from 28 to 8, and evaluation time has been cut from 5 to 2 years. Commissioner Elvid Martinez, who was confirmed in December 1995, has initiated an independent review of our dam safety program; a number of our dams are

aging (40 percent are more than 50 years old), and the health and safety of these facilities should be ensured, while improving our processes.

We have also established an enterprise fund, to allow area managers to use a certain amount of savings in special programs, such as those on the environment. The savings will be shared with customers, through reductions in unit costs, and with the taxpayer, who will finance a much lower congressional appropriation.

Commissioner Martinez, a former state engineer from New Mexico, has been maintaining the reinvention momentum through other initiatives. In March 1996, he held an informal and open meeting on the bureau's mission and on successes and problems observed. The resulting report is now out for comment. The philosophy—and practice—is to reexamine our goals and performance continually. Commissioner Martinez is also overseeing the bureau's Power Management Laboratory, to benchmark our power facilities against the industry.

We are currently pursuing a transfer of title for some of our structures and facilities that are no longer just of national interest. We executed a transfer of title of our Rio Grande project in New Mexico to the Elephant Butte Irrigation District in the El Paso County Water Improvement District just this past February.

Another success has been in working better with our external, as well as our internal, customers. In early April 1996 we reoperated Glen Canyon Dam to create a flood in the Grand Canyon for ecological purposes. It was a very successful demonstration project. It also showed that we can broaden our customer base and help large numbers of stakeholders work together. I must admit we also enjoyed the very favorable press we received, given the criticism we have sometimes received. I hope we can have many more such successful experiences.

Our goal, so often repeated, is to have a smarter, more efficient organization. Much remains to be done, including further realignment of functions and processes, retraining of our employees, and transformation of our institutional culture. With the enthusiasm and creativity of our employees, we look forward to an interesting and successful future at the Bureau of Reclamation.

Technologies for Effective Facility Management

Eric Teicholz
Graphic Systems

As private sector organizations increasingly downsize, outsource, and insource, technology has played an ever greater part in the process. One of the issues that facility managers face is the integration of facilities management technology with other organizational systems, such as human resource and financial data. Additionally, to employ technology effectively, the processes that relate to the technology must also be changed.

It has been estimated that more than half of the computer-aided facilities management (CAFM) systems that are deployed end up as "shelfware"—that is, the software ends up unused on someone's shelf. These packages can cost more than $10,000, and acquiring and updating the data for them generally costs several times as much. The technology has a steep learning curve, and it requires continuous investments of time and resources to keep up with both organizational and technological change.

Today, I would like to address three related topics:

- Facilities management technology drivers in the private and public sectors;
- The state of the technology today (including the growing importance of the Internet and organizations' own "intranets") for facility management;
- Some case studies.

I will focus on four technologies that appear more mature and potentially important: space and asset management, strategic space

planning, facilities/conditions assessment, and infrastructure and support technologies. For each, I will try to describe the corresponding manual process, as well as how technology affects this process procedurally.

ORGANIZATIONAL AND TECHNOLOGICAL DRIVERS OF CHANGE

Advancing technology, together with organizational change, is opening opportunities for information technology in facility management. In automating facility management, organizations often look for technology partners. The organizations often lack technical expertise in house, leading to outsourcing or facility management groups becoming cost centers in their own right and charging services back to business units. In outsourcing facility functions' facility management staffs need greater project management and contract management skills. All these newer organizational models result in more intensive use of information technology. It is nearly impossible to charge for services without having some form of technology to collect and manage a variety of information about the facility.

Other trends are also driving organizations to use more information technology. Quality assurance (using quantitative metrics of performance) is one such force. Increasing regulation also demands technology, because of the growing amount of reporting required.

Finally, the declining costs of computer processors and memory are making CAFM technology more attractive. As Gordon Moore of Intel observed 30 years ago, the number of circuits that can be put on a chip doubles roughly every 18 months. So every 18 months, the same amount of processing power can be bought for half the price, or twice the power can be bought for the same price.

With adequate investments in quality control, training, and data creation and maintenance, the use of technology permits very significant savings. It is not uncommon for mature CAFM users to realize high operational savings—up to 5 percent of the facility budget. These savings occur when data are created early in the process and reused as often as possible. For example, if an organization creates a computer-aided design (CAD) drawing for space planning and management purposes, the reuse of this graphic data base for other applications (asset tracking, risk management, telecommunications, etc.) becomes highly cost-effective.

INFORMATION ON THE WORLD WIDE WEB

The World Wide Web is a increasingly important source of information for business units, and facility managers are no exception. There are literally hundreds of Web sites by companies offering information on facility management automation products and services. Additional online forums allows facility managers to "chat" with each other about all aspects of automation. My company, Graphic Systems, has a list of some of these sites for those interested (http://www.graphsys.com).

The Internet is important not only as a source of information but as a vehicle for sharing information within an organization. Various internal Web sites (intranets) are being developed for e-mail, file transfer, chat capabilities, shared file (whiteboard) applications, and a host of other uses related to sharing information and communicating with internal and external clients.

COMPUTER-AIDED FACILITY MANAGEMENT TECHNOLOGY

The term "computer-aided facility management" (CAFM) is used, loosely, to cover practically every kind of information system for real estate or facility management. The fundamental purpose of CAFM systems is to join graphic CAD systems with database technology, to create application modules for facility managers.

Primary applications concern space and asset management, chargebacks of space and assets to business units, lease tracking, computerized maintenance management systems (CMMS), room scheduling and so forth. The CAFM vendors provide the integration tools and the data management tools such that there is no data duplication among applications. Additional tools permit facility data to be linked to other organizational databases, such as human resource data (for occupancy data) and corporate IS databases for financial and accounting applications.

Of the applications mentioned above, CMMS software is perhaps the most mature and most significant to facility managers. Software to process requests for maintenance, generate work orders, schedule staff, perform emergency, scheduled and deferred maintenance, order inventory, perform preventive maintenance, link work orders to accounting and budget

information, bar code equipment, and so forth has been around for 20 years and is the "meat and potatoes" of many facility management organizations.

However, there are other applications that link facility management data to other corporate databases (such as financial and human resource data, as mentioned earlier) that offer new opportunities for uses with implications far beyond the facilities management department alone.

Space and Asset Management. Space and asset management software concerns the automated tracking of space and assets, such as people, furniture, and fixtures. The sizes and scales of the databases depend on which items are tracked (e.g., furniture versus business unit outlines) and determine the costs of creating and maintaining the database.

Doing this task manually requires going out in the field to determine and record the locations of items, the floor space per person, and the like, for a particular purpose at a particular time.

The automated process takes advantage of the fact that much of the data about a facility is used by more than one function. It may already exist in a database for a different application; in any case, it should be shared by different applications to the extent possible. Again, automated CAFM systems link the graphical representation of the facility to the nongraphic databases used by various applications.

As Figure 1 suggests, a "real property database" is developed and maintained for use by different groups, for different purposes. Once the trouble and expense have been invested in creating those data, it becomes cost-effective to use those data for other applications, such as lease management, utility cost tracking, and so forth.

Occupancy and CAD data can be used to track moves of people and associated assets. One vendor, for example, offers a packing crate icon on its graphic representation of an office space. To record a move, one simply clicks on the assets that are to be moved with the person, and assigns them to a new business unit. Because the database contains information on the location of the business units, the packing crate icon appears at the new location, ready to be "unpacked" with a click of the mouse. Automatically, all of the necessary information is updated with the new locational/organizational information.

The benefits of the automated approach are fairly obvious. Creating a corporate record of each move allows the analysis of trends of various kinds, including "churn" rates and costs associated with moves.

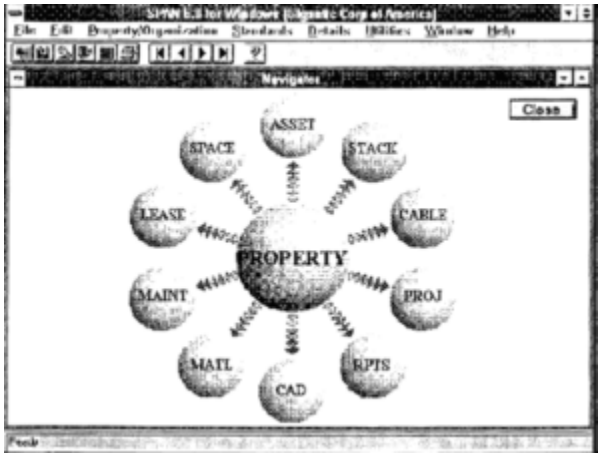

Figure 1.
Common Types of Information in a Real Property Database

Space Planning as a Strategic Tool. Space planning involves forecasting space requirements in terms of layout and support requirements. In industries that introduce new product lines frequently, space planning is difficult but crucial. Many high-technology manufacturing industries have strategic planning horizons as short as 18 months. For example, a high-technology hardware manufacturer we worked for had to be able to fabricate a totally new product line every 18 months, and to revise that line a dozen times within that period. Until recently, the company owned almost no space, leasing instead, since the company operates worldwide, with research and development groups in Ireland, China, Russia, and elsewhere. This company ended up outsourcing all design, space planning, and operations to a consortium of companies operating worldwide. The outsourcing space planning company had to use space planning forecasting tools and maintain occupancy and space databases on a worldwide basis. Individuals from the outsourcing company staffed the project with people located inside the manufacturing company.

Automated software today can use a variety of methods for forecasting anticipated space requirements (e.g., by headcount or by area), automatically place functions using adjacency analysis, and link to other systems such as human resource and master planning technologies and databases. Stacking and blocking plans, produced from such software, link CAD to the process as well. Such "What if?" design scenarios have proved a powerful tool for space planning.

The U.S. Department of the Interior, in its recent modernization, used computerized stacking and blocking diagrams to forecast the changing space needs in consolidating different units. The computer generated best fit solutions under various assumptions (Figure 2). The department fed the results to a CAD system to generate the floor plans. The result was minimal disruption by moves. The decisions were fully and automatically documented. The benefits, beyond more accurate and flexible forecasting, include the marketing benefits of transparency and objectivity. Employees more willingly accept solutions that are based on quantitative analysis, in which they can compare alternatives.

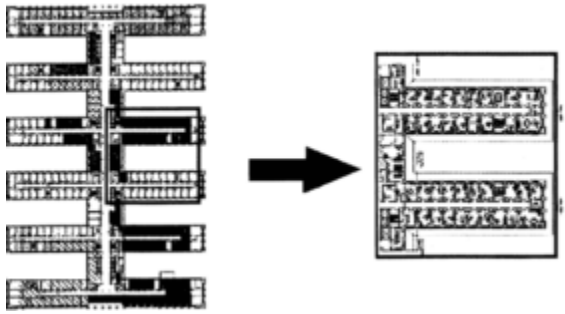

Figure 2.
Modernization of the U.S. Department of the Interior.

Facilities/Conditions Assessment. Facilities/conditions assessment is a relatively new area of software/database technology. It has to do with documenting either the real property valuations of buildings or the conditions of deficiencies associated with a facility. The assessments are done for real estate investors, insurance companies, and facility managers. Among other things, organizations are trying to assess the extent of the deferred maintenance backlog resulting from the real estate recession of the 1990s, which is measured in billions of dollars. These assessments require expertise on the part of the person doing the assessment. A structural assessment, for example, requires a structural engineer, not just someone who knows how to use the technology.

Done manually, the task is very labor-intensive. The relevant experts go through a building looking for deficiencies and estimating the costs of repairs. They issue a report on the building's condition, including statements of any liabilities or risks or of the valuation, depending on the assessment's purpose. Automation of this process requires professionals to visit the buildings with laptop computers to record deficiencies and priorities associated with the deficiencies. Databases of repair costs and CAD drawings for recording locational information enable a variety of reports to be generated that aid both facility and corporate managers in making intelligent decisions regarding risk assessment and investment in the building.

Figure 3 shows such an assessment for a 400,000-square-foot teaching hospital in Boston, in two or three different buildings. The assessment included life and safety issues, large deferred maintenance issues, large compliance issues, and issues of interest to the accreditation group and other regulatory agencies (e.g. for the Americans with Disabilities Act). Deficiencies were measured in such categories as hazardous materials, maintenance, life and safety issues, energy, and building integrity.

It is possible to analyze the data in many different ways. In this case, on the basis of the deficiency information, a renewal forecast was generated. A model was used to take account of the special characteristics of a teaching and research hospital. For example, building foundations account for 6.35 percent of the original cost, have a life span of 100 years, and a renewal cost at the end of that time of 5 percent; while roofing is 4.33 percent of the original cost, has a 20-year life span, and a renewal cost of 100 percent.

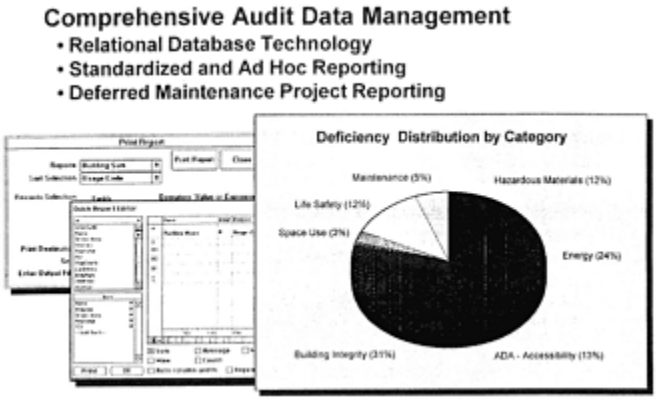

Figure 3.
Example of a Facilities Assessment Report

From this information the optimal investment in maintenance can be calculated for different assumed levels of funding over time. One can calculate, for example, the net cost of required replacement or repair resulting from the Americans with Disabilities Act. Such geographically and financially precise information can be the basis of a bond issue or other funding mechanism (including improved recovery of indirect facility costs for institutions receiving federal grants). It can be used to document submissions to regulatory agencies and accreditation bodies. The growing power of this technology makes it important not only to the facilities manager, but at the highest level of strategic planning within the organization.

Infrastructure Support and Project Communications. Infrastructure support and project communications are processes associated with enabling technology. They might involve routing of documents, approval of documents, and other kinds of information flow. Manual techniques involve telephone calls, faxes, meetings, and memos.

The automated techniques, which include "groupware," affect both design and project management. Groupware products such as Lotus Notes handle forms processing, automatic routing, revision and document control, data integration of different systems, database access, and a variety of issues associated with quality control. Groupware often has the ability to employ technologies such as the Internet for electronic mail and network management, multimedia (for images), technical document management, data warehousing, client-server environments, and videoconferencing.

Groupware was more or less invented by the Lotus Development Corporation, which was recently bought by IBM. The product Lotus Notes represents the state of the art of such products. Notes can handle electronic mail, word processing, graphics, sound, scanned images, video, and spreadsheets. Thus, all participants in a project can have access to documents and databases, no matter where they are.

Lotus constructed a building of more than 100,000 square feet. It gave the Lotus Notes system to the developer-contractor, the architect, and the interior design firm. They used it in a limited way, for all of the forms processing and automatic routing of information. The primary result of using groupware on the design project related to project management. During the course of the project, project management meetings almost disappeared, because all parties could review the documents on-line. The

project changed dramatically, because feedback was nearly instantaneous, and the various contractors were able to comment on each others' suggestions.

For videoconferencing, the Intel Corporation has developed a system called ProShare, which involves the sharing of information (using a chatboard or shared whiteboard concept), as well as video and audio information. Using high-speed communication via an ISDN connection, the user can dynamically allocate this increased bandwidth to the data, video, or audio function. This promising technology should dramatically reduce the cost of real-time videoconferencing over the next few years.

CONCLUSION

The applications and case studies I have discussed may help clients and users better understand the process of automated facility management. Before attempting to implement any of these systems, it is necessary to study what the current, manual process is and to understand the best practices among one's peers. On that basis, realistic expectations can be established for the technology of automation.

For a successful transition to automation, management must be involved at all levels. Careful strategic planning must assess the intended benefits and the expected organizational impacts of automation. The process itself must be examined and reengineered if necessary; simply automating the manual process will not yield the desired results.

Federal Acquisition Reform: a Status Report and Outlook for The Future

Ida Ustad
General Services Administration

As a Senior Procurement Specialist at the General Services Administration (GSA), I am responsible for issuing regulations in the Federal Acquisition Regulations (FAR) and for internal GSA acquisition policy. I also took part in Vice President Gore's National Performance Review (NPR), reviewing federal procurement policies and practices.

The past three years have seen unprecedented changes in federal acquisition practices, changes prompted by both Congress and the Executive Branch. I will address what I see as the main themes of that change, focusing on issues directly affecting facility management.

The 1991 Department of Defense (DoD) authorization act established an industry-government panel to review DoD's acquisition laws, with the goal of greater efficiency. The Section 800 Panel, as it was known, issued its report in early 1993. The NPR's report came out later that year. The extensive proposals in these two reports provided the foundation of today's reforms. However, change was made possible above all by the concern to balance the budget and to control government costs, which has been the catalyst for much greater innovation in government.

Legislative action was seen in the Federal Acquisition Streamlining Act (FASA) of 1994, hailed as the most significant change in acquisition since the Armed Services Act and Property Act of the early 1950s. Congress followed up FASA in 1995 with the Federal Acquisition Reform Act (FARA) and the Information Technology Management Reform Act. Simultaneously, initiatives of the NPR, the Office of Federal Procurement

Policy, and various agencies have made the procurement system more efficient, more cost-effective, and better able to serve its customers.

KEY ELEMENTS OF REFORM

The statutory and regulatory procurement reforms have several major themes. The first is flexibility. Federal procurement has traditionally been highly regulated and rather rigid. We are moving toward a system that is more flexible and promotes innovation.

The traditional complex system is being streamlined and simplified.

The federal purchasing monopolies, such as GSA, are fading away and being replaced by competing sources. The NPR has encouraged letting program offices choose among contracting offices, so that the most effective can be used.

Procurement personnel are being encouraged to focus on the customer, rather than the process of procurement. Previously, there was too much concern for the process and not enough for the result.

Electronic transactions are replacing the traditional paper-based system. The administrative costs of electronic commerce are lower for both buyer and seller. In addition, electronic commerce makes information available more freely to bidders.

The traditional short-term contracts are being deemphasized, to stress multiyear contracts that allow building more productive relationships between buyer and seller.

Under the authority of FASA and various Presidential executive orders, government-unique specifications and standards are being eliminated whenever possible, to follow commercial practice, such as the use of commercial specifications and private sector voluntary standards.

The practice of buying from the lowest bidder, with little or no regard for other considerations, is giving way to the search for best value over the long term.

Vendors' past performance is being weighed more heavily in selection. In the past, although it could be considered, it generally was not, largely because procurement people feared protests and lawsuits. Rewarding those contractors who perform well makes good business sense.

Finally, we are working more in partnership with contractors. The traditional confrontational government contracting relationship led to too many disputes and appeals.

FLEXIBILITY AND INNOVATION

Innovation has been stifled in the past by the prevailing view among procurement personnel that a method or approach may not be used unless the FAR gives explicit permission to use it. To correct that misapprehension, we have added some "guiding principles" to the first part of the FAR. One is a clear statement that the absence of direction in the FAR should not be interpreted as precluding the process or approach one wishes to use, so long as it reflects sound business judgment.

FASA and FARA also have encouraged innovation by calling for a number of pilot projects to test new approaches, many of them involving waivers of certain laws. Some of these projects are mandated for specific agencies. Others are spelled out in general terms, to be implemented by agencies with the Office of Federal Procurement Policy. The aim is to encourage innovation and to find better ways of doing business.

SIMPLIFIED PROCEDURES

The efforts to simplify the procurement process include a variety of far-reaching reforms for smaller purchases. FASA established the use of government credit cards or purchase cards for so-called micro purchases, those of less than $2,500. Virtually all procurement laws are eliminated below that threshold (except for requirements to buy from the Federal Prison Industries and the National Industries for the Blind and Severely Handicapped), so people who have the authority can make purchases as one does in one's personal life. A minimum of paperwork is required, and it is not necessary to go through a procurement office.

The potential savings are very great. About 75 percent of government transactions are below this threshold, and each transaction with a purchase card saves about $50 in administrative costs over the use of a purchase order. In addition, the contract for the current card provides a rebate on sales made with the card. In 1990, about 18,000 cardholders governmentwide made 270,000 transactions, totaling about $56 million. By the end of 1995, 180,000 cardholders made more than 4 million transactions, totaling $1.6 billion. Moreover, potential total transaction savings are estimated to be $10 to $12 billion dollars annually.

Another FASA initiative is to raise the "small purchase" threshold (which for years was at $25,000) to $100,000. In the process, Congress

waived a number of statutory requirements below that threshold, simplifying the process and getting rid of some boilerplate terms and conditions that contractors for small transactions had been saddled with.

In FARA, Congress authorized a test, now underway, of simplified procedures for commercial items of between $100,000 and $5 million. Commercial items include services as well as supplies.

COMPETING SOURCES

The National Performance Review has worked to introduce competition among government contracting offices, to promote better service and customer focus. NPR recommended that agencies allow their program offices to deal with other agencies' procurement offices when they can provide better service.

The NPR also recommended that GSA eliminate its monopoly as the mandatory source of products and services. GSA has done so in all new contracts, and all active mandatory contracts will expire within the year.

PERFORMANCE-BASED CONTRACTING

Performance-based contracting, in pilot tests, has shown significant potential for cost savings, better service, and shorter delivery times. The Office of Federal Procurement Policy, more than Congress, has pushed for performance-based contracting. Such contracts define the product or service required, rather than specifying how the contractor will do the work. The contractor is then able to innovate, instead of simply following directions.

These contracts provide objective, measurable performance requirements and quality standards, and establish criteria in selecting the contracting approach. Performance-based contracting makes it easier to use incentives for quality, and it assigns responsibility for quality performance to the contractor, rather than relying on government inspectors. The 26 agencies that tested this approach have had some very promising results. On average, it has reduced costs by about 15 percent; procurement lead times have been reduced, and the quality of service has improved. Performance-based contracting has been tested in a number of areas, including facilities management, janitorial services, grounds maintenance, and mechanical equipment maintenance.

ELECTRONIC COMMERCE

In the federal government, the use of electronic communications and data processing in contracting has come to be known as "electronic commerce." The Acquisition Reform Network (ARNET), initiated by the National Performance Review, was originally a relatively modest project to put contracting information on the World Wide Web. But ARNET has evolved into a more comprehensive system, providing contractors a much larger window into the federal acquisition world, covering contracting opportunities, solicitations, regulations, and more.

For federal contracting personnel, ARNET is becoming a vital source of professional information. It will soon provide training materials and handbooks, the list of parties excluded from doing business with government, the list of vendors who accept electronic funds transfer payments, Davis-Bacon wage rates, service contract blanket wages, and other information needed on a daily basis.

Another vehicle for electronic commerce, mandated by FASA, is the Federal Acquisition Computer Network (FACNET). Congress, in raising the threshold for simplified procedures from $25,000 to $100,000, linked that provision to the use of electronic commerce. FASA required the creation of FACNET as a way to broadcast small transactions to potential competitors, who would themselves submit their quotes back electronically. Orders, payments, and notices of shipments would also be transmitted on the network. FACNET has had a slow start, with some problems, but in the past three or four months, the volume of transactions and number of agencies using FACNET have begun to increase.

Both ARNET and FACNET contain electronic catalogs. GSA has the catalog "GSA Advantage!" and other agencies, such as the Defense Logistics Agency and Department of Veterans Affairs, are developing similar catalogs. One can access the GSA Advantage on-line shopping service through GSA's home page on the Web. Users can browse the products, read product descriptions (and sometimes see pictures of products), and order products, using a GSA billing account or a purchase card; and the item will be delivered directly. About 20,000 items are available through the system now; within the next two years about 4 million products, representing all of GSA's contracts, will be available.

Electronic invoicing and fund transfer are underused tools in federal contracting. Recent legislation (the Debt Collection Improvement Act of

1996) requires all new contracts after July 1996 to stipulate that payments be made electronically, whenever practical. Electronic fund transfer is more cost-effective for government and vendors receive their payments sooner. More and more business will be conducted electronically: submitting procurement requests, conducting transactions, receiving invoices, making payments, and so forth.

MULTIYEAR CONTRACTS

Some agencies have had multiyear contracting authority in the past, though most federal civilian agencies have not. FASA provides authority for five-year contracts. While government cannot be obligated for more than five years, agencies are now writing five-year contracts with an additional five-year option or two, to allow for longer-term contracts and relationships. GSA, for example, has a current solicitation for elevator maintenance in a 15-state area for a five-year period with two five-year options, an arrangement closer to commercial practice for the types of supplies and services being acquired.

STREAMLINED SOLICITATIONS FOR COMMERCIAL ITEMS

FASA contains an important provision encouraging agencies to move closer to commercial practice. The law requires agencies to do market research, not only to identify needed products and services, but also to ascertain exactly how the commercial world buys them, and to seek similar terms and conditions. FASA streamlines the solicitation process dramatically as well, regarding the length and structure of the contract, and warranties. It waives certain laws at the prime and subcontractor levels when commercial items—whether products or services—are bought. (The list of laws is contained at FAR 12.503 and 12.504.) Minimum bidding times can be avoided. The *Commerce Business Daily* can simply be used in some cases, such as for commercial furniture and computers. The goal is to achieve the same efficiencies that a large corporation does in contracting. For all these reasons, program personnel, in defining their needs with acquisition personnel, will need to be more involved in market research.

The GSA elevator maintenance solicitation incorporates the new commercial item provision. GSA has aggregated its maintenance requirements to give the agency more leverage with contractors; instead of

105 contracts for about 160 facilities, there will be five of the five-year contracts described above and performance-based specifications. GSA has not received the offers yet, but it is looking forward to substantial savings, not only in administrative costs, but also in reduced prices for service and better quality service.

NEW TECHNIQUES AND APPROACHES UNDER FASA AND FARA

Several specific contracting approaches and techniques authorized by FASA and FARA bear on facilities management.

FARA allows agencies to carry out a two-phase selection process for a design-build project in a single contract. In Phase I, interested parties submit their qualifications along with a general description of their proposed approach to the project, without any pricing information. The agency selects a designated number from among these parties (the statute suggests five). The chosen few go to Phase II, involving a more detailed proposal, including price. The process is then completed like a traditional negotiated procurement, with a best-value award. GSA has received industry comments on an advance notice of proposed rulemaking for this provision, and will publish the notice for public comment within the next two or three weeks.

Another FASA provision of interest to architect-engineer (AE) and construction companies is one expressing a preference for multiple task order contracts. A task order contract is a contract for services that does not procure or specify a firm quantity of services (other than a minimum or maximum quantity) and that provides for the issuance of orders for the performance of tasks during the period of the contract. The law provides a general preference for the award of multiple contracts under a single solicitation to two or more sources. When multiple awards are made, all of the contract holders must be given "fair consideration" when placing orders. In other words, you in effect create a continual competition for the work among the contract holders. The AE firms have asked how this provision interacts with the Brooks Architect-Engineer Act under which agencies now procure AE services. The FAR to be published in June will clarify the current rule to indicate that the preference for multiple awards does not apply to AE contracts, but that there is no prohibition against awarding multiple contracts, as long as they are awarded consistently with the Brooks AE Act.

There has also been much interest and concern about the multiple task order contracts on the part of those who use indefinite-quantity contracts or task order contracts for minor construction. The industry is concerned that if multiple contracts are not used in appropriate cases and the general preference is taken literally, it will increase costs to contractors for bid and proposal preparation, as well as setup costs for construction.

The multiple award provision has also raised concerns about extremely sensitive tasks, such as some environmental remediation, for which multiple contracts may not be appropriate. The next change in the FAR, in June, will make it clear that agencies can make class determinations; if they conclude that a particular class of procurements would not be appropriate for multiple awards, they can make exceptions for those classes of contracts.

A third streamlining provision in this year's reform (FARA) allows the government to limit the competitive range, to permit an efficient procurement. Typically today, when an agency issues a request for proposals, it may receive 25 offers back. Those offers are reviewed, and the government looks to establish a competitive range, often by identifying some natural breaks among the offers considering their quality and price. However, this approach often results in a large number of offers being included, and all these potential contractors then go through a lengthy process of negotiating and submitting more information, and sometimes audits, before the contract is awarded.

Under the new authority, if the normal competitive range includes too many offers to permit an efficient procurement, the contracting officer can limit the number for efficiency. Potential contractors could be limited to the best three, for example. This strategy restricts the competition to those who have a real chance to succeed, saving time and resources for both contractors and government. This change will be issued shortly as a proposed rule for public comment.

BEST VALUE

One of the other shifts I have mentioned is to the use of best value rather than lowest price. Best value considers what is most advantageous to the government, considering price or cost and other factors such as experience, past performance, and management plans. This criterion is being used increasingly.

PAST PERFORMANCE OF CONTRACTORS

Contractors' past performance is also being used more and more, in a variety of ways. It is used in selecting contractors, in deciding whether to exercise contract options, and in deciding who receives task orders under multiple task and delivery order contracts.

To that end, agencies are giving contractors "report cards" to help them improve their performance and have better chances for future contracts.

PARTNERING

Partnering has been an important trend in construction contracting and is spreading to other areas of contracting. The traditional adversarial contract relationship is giving way to a joint focus on results by government and contractors.

Alternative forms of dispute resolution are taking hold. Provisions in the law (FASA) designed to reduce the number of protests are beginning to take effect. A provision providing for debriefings in source selection allows greater disclosure to unsuccessful offerers. The agency tells these offerers why they failed to win. Many agencies find that this more open exchange of information is already reducing the number of protests, because often in the past offerers would protest simply to get to discovery, to learn how the decision was made.

To expedite and simplify protests that do occur, the law (FASA) includes some changes in the protest process. Agencies have been encouraged to establish internal processes as alternatives to the traditional external avenues of protest. Solving these problems within the agency is quicker and more efficient, and does not impede procurement so much.

SUMMARY AND OUTLOOK FOR THE FUTURE

The recent and ongoing reforms offer a great opportunity to re-engineer processes to take advantage of the flexibility and efficiency of commercial practices, electronic commerce, and other procedures. In the past three years, most of the reform has been devoted to changing procurement laws and regulations. The next year or two will require greater attention to the operational level: using the authority provided by new laws

and regulations. Procurement personnel will need the training and tools to ensure that we take full advantage of the new procedures, the new flexibility, and the new opportunities to innovate. Rather than pushing Congress for further changes, procurement officials should seek out untapped opportunities and begin experimenting to take full advantage of them. With the continuing pressure for downsizing and cost reduction, the old way of doing things is no longer tenable. To survive we must continue to create a government that works better and costs less.

Design-Build: Not Necessarily What You Thought it Was

Terrel M. Emmons
Naval Facilities Engineering Command

Because of shrinking resources, all federal agencies are undertaking innovative initiatives, especially in contracting. Within the Naval Facilities Engineering Command (NAVFAC), new contracting approaches include privatization, especially for housing; the use of various indefinite delivery contracting approaches for design services; the bundling of two or more projects together in a single design and/or construction contract; and design-build.

I will describe one design-build innovation NAVFAC used for the new Naval Facilities Engineering Services Center headquarters facility in Port Hueneme, California. In this case, we applied many of the concepts that are being promoted as a result of the National Performance Review and other government reforms. I will also raise one overarching question about the use of such novel approaches, namely, do they sacrifice quality, particularly the approach of design-build?

NAVFAC is a very decentralized organization. Our field offices have a great deal of leeway to experiment with different concepts in contracting. Thus, we have looked at privatization, and also at "bundling" (perhaps over even more than one fiscal year), to make a more attractive package to an architect-engineer (AE) firm to do design, although bundling does not appeal very much to small business.

Recently, at a visit to our southern division in Charleston, I found they were using an indefinite delivery requirements approach that I at first found disturbing. As the design advocate at NAVFAC headquarters, I tend

to prefer the traditional design-bid-build approach, which provides an ideal solution for every project, with the AE selected uniquely for that project.

My initial reaction was to wonder how design quality could possibly be guaranteed. They were awarding a single contract to an AE firm, renewable in one-year increments over five years, to do all the installation's design work. How could one AE firm be best for all these different types of projects?

On further inspection, I found that, for these 33 projects, the AE firm was able to use various contractors, when the prime contractor did not have the capabilities for a particular project. Additionally, after appropriate reviews and approvals, the AE could contract for a project using the traditional approach.

DESIGN-BUILD AT NAVFAC

NAVFAC uses essentially four variations of design-build. New legislation requires us to use a two-step design-build process. But of NAVFAC's four different approaches, the two-step approach is probably the one that we use least and like least. My case study illustrates that there are better ways of doing design-build. I hope that as we begin using newer approaches to contracting we maintain the quality of our facilities.

When we talk about design-build, we often talk about trade-offs: what they are, when we should make them, and whether they sacrifice design quality. However, we may be overemphasizing the trade-offs between facility quality and project execution, as I believe the case study also shows.

The case, again, is our Naval Facilities Engineering Services Center headquarters in Port Hueneme, California. In 1993, as part of the Base Closure and Realignment (BRAC) initiative, we were directed to vacate the aging, Navy-owned, 13 acre compound adjacent to the harbor in Port Hueneme. We were to consolidate critical engineering functions in a single building at the adjacent Pacific Seabees base. The facility will house many diverse technical functions as well as provide engineering office space for five major departments.

The budget for this project was $20 million. We had deadlines associated with the base closure that prevented us from using traditional design-bid-build. We also had various congressional mandates that we wanted to accommodate: to use commercial products, reduce project cycle

time, use performance specifications, and encourage alternatives through different contractors.

We solved these challenges through innovation, creativity, leadership, commitment, and appropriate risk taking by the Navy in partnership with industry. Nevertheless, there were still five major hurdles that we had to clear.

OVERCOMING BARRIERS TO SUCCESSFUL DESIGN-BUILD

First, we had to minimize the owner's control of project design. In the Navy, we have the philosophy not simply to satisfy the customer, but to delight the customer. How can the customer be delighted without participating significantly in project design? Yet, in design-build, by definition, problems are not solved initially, but by the designer-builder.

In this case, the owner was quite resistant to the approach, however much the circumstances seemed to demand it. We finally sat down and discussed it at length, which I believe is the key to getting any customer to agree to design-build. We observed that the current facilities were not designed for their current use, and that anything would be better. Moreover, in the private sector, industrial parks and office buildings seem to serve multiple purposes—and even changing purposes—quite well. We decided the real issue was not the new building's appearance or mechanical system, but the individual work spaces. And this is what most customers want to know: how am I going to function?

We decided to use general purpose spaces for work layouts and to accommodate the layouts during construction. We finally convinced the customer to take a leap of faith, and we guaranteed a quality facility.

With this step undertaken, the second challenge was to determine the content of the request for proposal (RFP). We think the best value or source selection approach is the key to successful design-build. In the best value approach, the technical selection factors must accurately reflect facility requirements. Based on these factors, a respondent is selected from among all respondents, based on a combination of price and technical solution (or best value), in a one-step process.

Initially, we believed that the technical requirements must be specified very tightly for successful design-build. However, Captain Robert Moeller, then Commanding Officer of NAVFAC's Engineering Field Division in San Bruno, California, suggested that we limit the RFP to 25

pages, to allow the proposers to come up with more innovative ideas. Rear Admiral Patrick Drennon, the Director of Military Construction Programs for the Navy, agreed, asking that the new engineering facility additionally provide a model of energy efficiency and maintainability to show what can be done when the customer supports the initial investment in quality.

Clearly, writing this RFP would be a challenge. We consulted industry, which suggested that the burden on proposers be minimized and that technical evaluation factors be limited, to avoid distracting attention from the more critical factors. They also observed that, the more specific we became in our requirements, the more we limited the proposers' alternatives. In short, we should carefully stipulate anything genuinely required, and leave everything else to the design-builder.

For example, we felt very strongly that we needed raised flooring because of the facility's research purpose and changing technology. Raised flooring systems in an office environment provide the ability to reconfigure office layouts with minimum cost and labor. They also make it possible to accommodate evolving electronic equipment support requirements with minimum impacts on the facility or the workers. Raised flooring therefore became a requirement. Many other features, including the building's appearance, footprint, number of stories, construction system, and heating, ventilating, and air-conditioning (HVAC) systems went unspecified.

One strategy we took from the project's beginning also facilitated creative solutions: the establishment of an "acquisition team," with representatives from contracts, project management, engineering, and field construction.

A third challenge we faced was ensuring quality in the design-build process. In the Navy, we typically provide contractors with a 75-page quality assurance program. Industry has told us, however, that any major company in business today must have its own quality program to be competitive. To save time all around, then, we decided instead to ask the proposers how they themselves would maintain quality. Ultimately, we found that any of the proposers' quality programs would have been acceptable.

Our final RFP even beat the 25 pages; we did it in 18 pages. For the technical design requirements, we identified four basic kinds of functional space that we needed: engineering and administrative office space, a small amount of wet and dry bench laboratory space, indoor high-bay industrial area where we could do research and which had utilities on

perimeter walls, and enclosed storage. We assigned a square footage value to each of these four types of space. We also decided we were really interested in flexible general purpose space and made that one of the technical evaluation factors.

Since we had decided not to be overly prescriptive in our technical RFP, we needed to introduce quality as an incentive in the proposals. We chose five evaluation factors to achieve that objective:

1. *Flexibility of the facility*. We felt it was critical that there be flexibility within individual spaces across the entire building, and even in the outside area, to make any modifications we needed to the building. Flexibility was required to reconfigure office and laboratory space and associated utilities easily.
2. *Energy efficiency*. We wanted a state-of-the-art, energy-efficient facility that took into account life-cycle costs of the proposed lighting, heating, cooling, and ventilation systems, including initial capital costs, annual energy consumption, and annual operations and maintenance costs.
3. *Architectural features*. The military base had a Spanish Colonial architectural theme. We wanted a design that was compatible with the adjacent station environment, including the headquarters building and the proposed Naval Reserve Center, while still distinctive in its own right. We also wanted laboratory, office, and lay-down spaces to show good integration, relationships, and work flow patterns.
4. *Project management plan*. The proposers plan was to be evaluated in terms of completeness, practicality, and efficiency. Specifically, we wanted information on the schedule, qualifications of key personnel, qualifications and experience of subcontractors, quality controls, and a subcontracting plan.
5. *Past performance*. Our final evaluation factor was the contractor's performance record with projects of similar scope and complexity, where a design-build format was used.

While the first three factors related to the project solution itself, the last two had to do with the design-builder. For pricing, we asked that proposers use a variant of the Army's total cost method. Under this method, proposers are asked to set the construction completion time and to give the price for the work, as well as to pre-price their overhead rates for any time extensions. A formula is used to estimate the total cost of the

completed project by adding to the basic price a predetermined change order rate and time extensions with their associated costs. The formula also made adjustments based on differences in completion time using rates for liquidated damages to put a value on time differences. This Evaluated Total Cost was then used as project cost in the price analysis required under source selection procedures for best value determination.

The fourth barrier we confronted was how to limit the burden on proposers. We have consistently heard from those doing design-build that it is too expensive and cumbersome, in short, too much of an investment for the potential payback. In fact, the current legislation on design-build has a provision that allows federal agencies to pay the design-builders for their proposals.

When we talked to industry, they indicated that the critical issue was to control the proposal's documentation. We therefore told contractors to limit the proposal to 50 pages and 5 drawings. Instead of interviews, which may or may not be uniformly conducted and usually require travel for some members, the contracting officer allowed a one hour videotape to be included with the proposals. We did not want to expend everyone's time on presentations, and we even asked that the video not be professionally prepared. (In fact, the videos we received were all excellent, rich in information and short on glitz.) Additionally, the award was to be based on the initial proposal, without further burdening the proposers.

The fifth and final challenge we faced was limiting the burden on us, the government. Historically, the technical evaluation and selection process has been viewed by many as labor-intensive and lengthy. The solution flowed naturally in part from the submission requirements. However, we also assembled a team of experts who, in one week, reviewed all the proposals and made an award. First, they evaluated technical merit without knowledge of price, and then they assessed these results against price, to identify best value. This evaluation was a success, because we used top-level people for the team. The single most important factor in a project's success, we believe, is the selection of the AE firm or design-builder. Therefore, the best resources must go to this selection.

Our evaluation team consisted of nine technical experts who reviewed the proposals from a technical standpoint during two days. They were then joined for the last few days by two captains, a GS-15, and a senior executive service (SES) person, to complete the review.

This endeavor proceeded so smoothly that the contract award was ready to be made long before the program managers expected it. The contract was awarded in May 1994, at a fixed price of $16,188,000. Even with change orders the Navy later made and contract administration costs, the project was delivered under the $20 million initial budget. Groundbreaking occurred June 24, 1994. The project utilities, site preparation, and foundation work were all underway while final design of the building was being completed. Interior layout and finishing schemes followed. The project was completed in early 1996, nearly two years sooner than it would have been had we used the traditional design-bid-build approach.

We also went back and debriefed the other eight bidders who were not successful. Most welcomed the opportunity for feedback and dialogue. All said that they liked the process and felt it was fair and valuable to go through. We may use the process again should the situation arise.

ADDITIONAL KEYS TO SUCCESS

Another key to our success was tailoring our acquisition plan specifically to the project. I strongly believe that you have to take every project individually, with decision making based on an acquisition board or some other mechanism, or at least on good knowledge of the customer, the nature of the project, its complexity, and similar factors. All methods of procurement should initially be available for consideration.

Additionally, we used formal partnering techniques. NAVFAC has had nothing but success using partnering techniques similar to those developed and promoted by the Army Corps of Engineers and the Associated General Contractors of America. In keeping with the partnering requirement that we included in our RFP, from the outset we had extensive participation of the contractors, the users, the host Seabee base where the building was to be located, and the claimant.

We also put the project on a fast-track basis, and we kept it there no matter what.

CONCLUSIONS

Our project captured all the traditional benefits of design-build: saving time, avoiding change orders, and encouraging creative design solutions. Through the specific process that we used, we also eliminated most, if not all, of the drawbacks of design-build. The jury is still out on the quality of the facility—how it functions over time—but we are looking forward to assessing this against our acquisition strategy. We do have a mechanism in place to evaluate the functionality of the building. I would emphasize again that the quality of a facility does not reduce simply to meeting schedule and budget, but must be understood also in terms of the productivity and pleasure of those who use it.

Let me sum up by noting the comments of one of our senior engineering directors over in the Navy Yard. Seeing the 18 page RFP, he said, "You are crazy." When we awarded the contract, he said, "You are still crazy." His reaction when the building was finished was, "You were lucky." In fact, we suggest that luck had nothing to do with it. We applied creative but well-founded methods to determine the best solution.

Alternative Methods for Delivering Facilities at The U.S. Postal Service

Rudy Umscheid
U.S. Postal Service

Having now been at the U.S. Postal Service for more than three years, and having worked for Mr. Marvin Runyon, the Postmaster General, I have learned several things. First of all, Mr. Runyon understands the facilities business and the importance of our having a state-of-the-art infrastructure in place to create the proper work environment for our employees. His mandate to me when I joined the Postal Service in 1994 was to develop a facilities strategy that combined the best attributes of the private sector to ensure consistent building standards, improved delivery systems, and better utilization of our people to put the right facility in the right place at the right price at the right time.

I have now had an opportunity to compare my 30 years of commercial experience with what we are doing today in the Postal Service. My assessment today is that the Postal Service is on the "cutting edge" of providing professional facility management services to the organization, and we are prepared to continue to change our strategies to be more responsive to our internal customers, the operating organizations that process and deliver mail day in and day out. What I would like to share with you today is an overview of the Postal Service and its facilities organization. In addition, I will review some alternative methods we have used to produce facilities, to ensure quality, and to improve performance. Finally, I will tell you something about the rationale behind our methods.

THE U.S. POSTAL SERVICE AND ITS FACILITIES ORGANIZATION

The Postal Service is an independent agency of the U.S. government. Its revenue (about $58 billion per year) is drawn entirely from the sale of stamps and other products and services. Last year, the Postal Service had a net income of $1.8 billion, which was a record for the corporation. We have over 800,000 employees, which, I have been told, makes us the third largest employer in the world, after the Chinese Army and the Indian National Railroad.

My job is to create the building infrastructure that allows our employees to work efficiently in a comfortable and environmentally safe place to best serve the performance objectives of the Postal Service. We maintain almost 40,000 facilities nationwide, in addition to building new ones as mail volume increases and population centers expand. The Postal Service is not subject to the Federal Acquisition Regulations (FAR), although it complies voluntarily with many federal requirements, such as the Brooks Architect-Engineer Act and the Buy American and Prompt Payment acts. Our policies are established by the Postal Service Procurement Manual. Like federal agencies, we are moving in the direction of responsible competition and simplification. We do have our design and construction handbooks and our real estate handbooks, but they are changing dramatically as we move toward commercial practices.

The Postal Service has a capital budget of $1.2 billion for fiscal year 1996, and we will spend every cent of it. Since 1992, when we incurred a 40 percent staff reduction in facilities, we have had to rethink our entire process for delivering new facilities, knowing that adding staff back was not an option. Today I am convinced that we have the capacity to meet our ever expanding program and achieve far more aggressive performance goals than we ever expected.

Simplified procurement policies and other techniques from the commercial world have clearly paid off in high-priority projects. In Atlanta, the Postal Service spent more than $22 million in less than 12 months to put the right face on its facilities in time for the Olympics. The project manager was initially skeptical, but I maintained that if funding were available and the organization had the tolerance and commitment to make timely decisions to support our design and construction activities, we could make it happen with an extraordinary effort. I am pleased to say that

our mission was an outstanding success and a tremendous learning experience.

Similarly, in Albuquerque we implemented a total market intervention retail conversion program, which was accomplished within 6 months. We again evaluated every post office in the city to insure that we were best located and designed to attract and serve our customers. The delivery strategy involved a fast-track decision-making program and indefinite-quantity contracts with experienced, retail-oriented contractors who were accustomed to working on projects where operations could not be suspended and where it was necessary to work during very limited, off-business hours. Again, the project team delivered a high-quality product within a very accelerated schedule to the delight of our in-house customer.

Can the Postal Service continue to undertake such high-intensity, rapid deployment programs? It is my assessment that we cannot without simply "burning out" our professional staff and eventually taking on more risk for errors and other problems than I think is prudent for the organization. Our capital budget for the next five years is more than $6.6 billion. Actual spending may in fact be even greater if our business grows as expected. This is forcing us to continue to plan for change, simplify our delivery systems, and provide additional training to our staff as our expectations for more accountability increase.

The Postal Service's facilities organization has 10 facility service offices around the country building or leasing new post offices. We have one major facility in Memphis, Tennessee, to build our processing plants and other specialized facilities. The offices are organized under cross-functional teams that assume responsibility for defined geographic areas. The partnership involves architects, real estate specialists, environmental specialists, and support staff who become very knowledgeable about the market area, the service providers, and the needs of our customer (Operations), as we continue to improve our real estate assets. We have been very pleased with the cross-functional team concept and the level of accountability our employees have assumed. Clearly, we think this approach breaks down the pure functional alignment issues of the past. Now we are all committed to the same goals.

The facilities staff, including headquarters, includes 654 positions. Only 130 are design architect-engineer (AE) professionals, so each person is responsible for spending on average nearly $10 million per year. During my initial two years with the Postal Service, I have focused on how to

improve individual productivity. Why can one person manage 130 to 150 leases each year while someone else can manage only 40? Why can one project manager be responsible for 10 to 15 small new construction-leased facilities, 6 new construction-owned facilities, and another 6 repair and alteration projects, while someone else only handles a fraction of that? Finding the right combination of leadership, training, goal-setting, and individual motivation continues to be my challenge. If our results are an indicator, I think that I am making progress.

ALTERNATIVE METHODS

The Postal Service facilities organization has developed alternative methods in human systems, design, construction, and real estate to meet the ever-increasing challenge, methods that I would like to share with you.

Human Systems. The people in an organization are its most valuable resource. We devote an extraordinary amount of time and training to developing our employees' professional skills and productivity. I am proud to say that the program is recognized by the American Institute of Architects (AIA) for continuing education. Training combined with a supportive environment where we take some prudent risks, recognizing that mistakes will occur, is how we grow as an organization.

The goal is to develop strong project managers who assume ownership and are held accountable for their projects. We need to be moving further toward better serving our customers, the public, and a shared vision for the future of the Postal Service.

In developing the curriculum for project managers, we confronted the issue of accountability repeatedly. Accountability is the answer to the questions: "How do we control quality?" "How do we control schedules?" "How do we control budgets?" For example, I note that certain project managers are quite proud of underrunning budgets by 15 percent; I view the underrun as a lost opportunity to have initiated another project from the savings. A 15 percent underrun for a $50 million budget is enough to build four new post offices. One challenge is to have our people budget to within 5 percent of final costs.

Internal communications are vital. We recently held, for the first time in many years, an "AE expo" for all of our professionals. We brought in people from private industry, in everything including better brand

management (where and how to place our signs and national logo), obtaining better construction management services, and developing better criteria to support our design-build delivery system. Having people who are on the daily firing line explain their best practices provides a real opportunity for continued improvement. For example, we could have one design-build firm do 8 or 10 similar projects, or have developers help us identify facility sites and have them build and maintain them—say, 6 to 10 buildings in return for a 20-year lease, which would allow the developers to secure financing. I honestly believe we will develop more ideas using the bottom-up rather than the top-down approach with our professional staff.

We have begun giving people developmental assignments: taking them out of their positions and assigning them for six months as an acting manager, manager of design and construction, manager of real estate, team leader, or even acting manager of the Facilities Service Office. This strategy allows us to see how people perform. It allows the individual to develop a much broader perspective on being a manager and understanding the dynamics of the organization.

Communication with industry is important. We have active liaison relationships with a wide variety of organizations, including American Institute of Architects, Associated General Contractors, and International Institute of Building. Our people work with those organizations as a way of benchmarking our practices. We also continue to look to recruit new talent, because we have a large percentage of our staff approaching retirement in the next five years.

Design. Standardization of design is an absolute necessity as we look to expand our program and establish a national image. Developing our standard designs, particularly for our post offices, is an especially challenging task due to the geographic distribution, differing operating situations, differing climatic conditions, and other factors. We have made significant strides toward producing building formats that are gaining acceptance with our customers, both internal and the general public. We are benchmarking our product with private organizations, such as McDonald's, Wal-Mart, and others, to compare costs, life-cycle, building acceptance, and other measures. I forecast that it will take two to four years to fully implement standard products and to begin to obtain reliable post-occupancy data to evaluate our designs.

We are now well along in design standardization for smaller facilities (generally under 6,500 square feet), and are working toward standardization of medium-sized buildings (up to about 60,000 square feet).

One of our more successful programs will be our modular post offices, typically under 1,000 square feet, which are factory-built for over-the-road delivery to remote rural areas where conventional on-site construction is difficult to procure. I was recently in Peerless, Montana, a farming community of 800 people in need of a new postal facility. Here we produced a quality factory-built unit, complete with furnishings, ready to occupy within four months, including site preparation, drilling a well, adding a septic field, and placing the foundations. The total cost was in the $80,000 range, which may not represent a significant savings in building costs, but reduced our delivery time and overhead costs to manage an on-site building program. We are working with modular manufacturers who can produce four or five units per month and want to identify suppliers across the country to serve a significant percentage of our rural districts. Our goal is to reduce the price to $60,000 or $70,000 for a unit of about 1,000 square feet—$60 to $70 per square foot for a completely built-out, ready-for-business facility that should last 40 years. In addition, these units will have a distinct postal image and a very customer friendly appearance. While we are pleased with this program, we continue to strive for further improvements.

Standardization does not mean identical buildings. We will not construct the same building in New England as we do in New Mexico. While we are becoming more retail-oriented, we also recognize the importance of a post office to a community, including its historical significance and heritage. This is where we differ from the retail chains we see across the country; we have 250 years of tradition. There are various alternative schemes, but in general new postal stores are more customer-focused. Our design standards will utilize the latest electronic concepts for transmitting data, updating standards, and Internet access, just to name a few, as we look to roll out the program on a national scale.

Construction. There are many alternative contracting strategies that work. The challenge for the Postal Service is controlling the process from the initial site acquisition through design and construction. There are quite a few projects, particularly in growing communities and urban areas, where it takes years to secure a site acceptable to all constituencies. The major

challenge is to improve our advance planning process, which establishes a five-year priority plan and allows us sufficient time to position ourselves correctly in a particular market. This planning has now begun; in several instances we have prioritized lists of projects two years in advance of when construction is scheduled.

The construction contracting technique we use depends on the type of facility. If it is one of our standardized buildings, we use a competitive design-build strategy based on a guaranteed maximum price (GMP) contract from a prequalified list of contractors. For a sophisticated special-purpose facility, such as the $60 million data-processing center in Minneapolis, we adopted the design-build strategy with a negotiated GMP, because we needed the talents of the design and construction experts to support the process.

We are moving away from conventional design-bid-build contracts to a design-build strategy where we look for the best value, not necessarily the lowest bid. I want our project managers to be part of the evaluation team because there are qualitative as well as quantitative considerations and, most importantly, we want them to take ownership of the project from the very start.

Real Estate. The Postal Service is also beginning to use a variety of innovative real estate techniques. It is using land banking, for example, in addition to advanced site acquisition programs. Both offer protection against rising land prices in places such as Las Vegas, where real estate prices are growing 14 percent annually. Land banking involves positioning the Postal Service in the local market well in advance of anticipated need. Advanced site acquisition is the shorter term acquisition of land for facilities that are already in the five-year plan.

We are participating in more joint ventures in the disposition of Postal Service properties. For example, we are considering taking limited partnership positions in properties we want to redevelop, particularly those in excellent markets on sites that have high potential for commercial use. We are willing to take some modest risks in this respect, at least to present such proposals for consideration to the Board of Governors, identifying the risks and rewards.

We are looking at our inventory as a portfolio. We recently completed a $150 million acquisition of properties in a joint venture with a major grain company. The Postal Service and our partner each

contributed $75 million for the properties, which had an assessed value in excess of $240 million. Some of our properties in this portfolio will be disposed of; others will be retained, refurbished, or recycled. We think such investments offer a tremendous opportunity to add value to the organization.

CONCLUSION

The Facilities Organization today generates about $150 million in revenue each year; it is self-supporting and contributes to the Postal Service's overhead. Notwithstanding our success, the Facilities Organization continues to face the challenges of being more competitive and reallocating our resources to meet customers' needs. However, the real challenge for the Postal Service is to hold rates at the same level through the year 2000, without degrading service.

Ensuring Quality in Buildings Despite Fewer Resources

George Hartman, Jr.
Hartman-Cox Architects

The dawn of the modern era, going back to the 17th century, was signaled by the unprecedented ability to see things independently of their context: easel painting, noncommissioned art, and the dilemma of styles are symptomatic of this. On architecture, Ada Louise Huxtable has written, "It has become acceptable for a building to exist as an art object in itself rather than to be integrated, through its art, into the rich and complex life and use that makes architecture the strongest and most far-reaching art of all."

Attention to context is in fact vital in a major facility project: attention to physical context, design context, and the context given by the purpose and utility of the building. With an eye to these contextual elements, clear priorities can be drawn, so that the inevitable trade-offs yield an optimal solution, accommodating the needs of the builder, the owner, the user, and the public.

The observation that the capital cost of facilities is only 5 or 10 percent of their true fall cost is a case in point. The implications of that fact are striking: for example, if a 1 percent improvement in performance can be obtained by investing 10 percent more in construction, the return on that investment is an astonishing 100 percent. Yet we cannot measure that return. If we devised measures for this return, we would change the course of funding forever. It is a simple matter of context, which a narrow focus on first costs obscures.

I have pondered this question over the years in my service on design review boards, including those on landmarks and foreign buildings, and for the Commission of Fine Arts. Although these design review boards

are advisory, they are very effective and very good buys for government and other organizations that assemble them. Over the past 90 years, only two projects, to my knowledge, have been built in Washington, D.C., without approval by the Commission of Fine Arts. One—John Russell Pope's Jefferson Memorial—was built by President Franklin D. Roosevelt. The other, Washington Harbor in Georgetown, was the responsibility of a mayor of Washington.

I love the optimism behind this conference: "Ensuring Quality in an Era of Limited Resources. " Maintaining quality in any era is a great achievement, given the pressures on government projects, with the number of agencies involved in every decision, the proliferation of single-issue constituencies, and the growing complexity and specialization of programs. The courts and hospitals, backed up by the arrogance of their major representatives, have, at least in the case of hospitals, brought about the end of their construction. They became so expensive that no one could pay for them.

Security standards at the State Department's Foreign Buildings Operations (FBO) approached the same impasse. Buildings were costing up to $1,000 a square foot because of this single-issue focus on security. The government, as a result, housed most of its representatives in buildings that were inadequately secure, because it could not afford buildings that were overly secure. Those standards have been reformed to some extent, but security concerns have prompted FBO to use standard designs and even prefabrication. The General Services Administration, for similar pragmatic reasons, tends to use design-build. The needs of the occupant and the representational functions of the building are thus sacrificed to secondary considerations.

Review boards help bring projects into balance, especially in managing single-issue interests, by taking a comprehensive view, and insisting on context. Projects can be bedeviled by the failure of government and other builders and developers to set priorities. Clearly, some things are more important than others. Churches or capitols are more important than warehouses, blocks are more important than buildings, neighborhoods are more important than blocks, and cities are more important than neighborhoods.

Projects that reflect an awareness of larger issues are simply more successful. Serving on the Commission of Fine Arts was easy, because every issue, every project, could be tested by the criterion of whether it

reinforced the L'Enfant-McMillan master plans for the City of Washington, D.C. If it did not, one did not have to look at it. If it did, one could delve into it.

Review boards are not easy to establish and use. They are unpopular with architects, who see them as impediments to artistic self-expression. For this reason, review boards are very hard to staff. Staffing these boards with academics is not the solution—however good they are at what do, they do not have the experience of designing buildings.

These problems do not mean that we should not have review boards. They simply suggest that care is needed.

Modern architecture was not a popular movement because it tended to ignore the urban context. Its big names—Frank Lloyd Wright, Mies van der Rohe, and Le Corbusier—were all anti-urban, and their work does not stress the relationships of buildings to the buildings surroundings. They gave the public 75 years of modern architecture, and the public responded with the greatest wave of architectural preservation in history. Modern architecture is still being taught in the schools, and it is still rather strongly oriented to the building as object.

Not all architects have been oblivious to context. Paul Cret designed the Folger Theater, a very contextual building, which resolved an Elizabethan interior with an Art Deco exterior appropriate to the Capitol and Supreme Court. The National Academy of Sciences building is a very sympathetic one. But its architect, Bertram Goodhue, originally proposed a design in a much more personal style. Members of the Commission of Fine Arts took Goodhue aside and pointed out how it was supposed to fit in, and he responded with this quite wonderful building. (We hope to put an addition on it some day.) The Federal Triangle, being completed right now, is the work of at least a half dozen architects over 50 years; it is now being completed in the spirit of the original design.

I am looking forward to a Federal Design Commission whose main responsibility would be to encourage good design in all federal buildings, much as the Commission of Fine Arts does for buildings in Washington, D.C. The obligation would be to help owners and architects produce good design. Like the Commission of Fine Arts, one of its important roles would be the obstruction of poor design. The real problem is the definition of "good design." It can't be legislated. You need good people who can

respond to changing situations, to broaden the issues to community and urban concerns.

As we do at the FBO, it is useful to analyze the projects, to recommend architects, and then to review the designs. The secret is to hold everybody—owners, architects, and special interests—to a higher standard.

Senator James McMillan, author of the McMillan Plan for Washington, D.C., 100 years ago, said, "Nothing is too good for the United States. When a problem is to be solved, see that the most competent individuals in the country solve it. And then see that their advice is realized." I often paraphrase his words as, "Nothing is too good for government work."

Achieving Outstanding Design Efficiently

Ed Feiner
General Services Administration

As the symposium title indicates, we are at a turning point. The government is changing. We will be doing things differently. We will very likely be doing fewer things, with fewer of us to do them.

GSA AND THE PUBLIC BUILDINGS SERVICE

The General Services Administration (GSA) has had a good head start in this trend. We began our personnel reductions back in 1981, and we have gone through all of the right sizing, downsizing, and whatever sizing there is, over the last 15 years. When I came to GSA as Division Director for Design Management in 1981, GSA had 41,000 people. We are now about 16,000. The Public Buildings Service, GSA's largest division, stands at about 8,000, a 60 percent decrease in personnel in the last 15 years.

Over that same period, nevertheless, our construction program has grown from a budget of about $400 million annually, primarily for repair, alteration, and maintenance of inventory projects, to a program of about $1.2 billion per year. If you consider all ongoing projects, we now have about $9 billion of work in progress at any time.

How are we managing it? We have had to work smarter, out of necessity more than anything else. But in fact we are working relatively well.

GSA's Public Buildings Service is known as the government's landlord. We house about 50 percent of the federal workforce, in about

260 million square feet of space. We have built many different building types—including office buildings, courthouses, and museums (including most of the Smithsonian buildings), and border stations. We recently took on the World War II Memorial, a $100 million project that will be sited on the axis between the Lincoln Memorial and the Washington Monument on the Mall. It will be a very challenging project and will be based on a nationwide design competition. Generally, we work for other clients, such as agencies and branches of government like the courts, rather than for ourselves.

Public Buildings Service projects vary from very small to enormous. In a few days, we will be signing a contract to construct a Richard Meier-designed, 900,000 square foot courthouse, which will be one of the largest buildings on Long Island, New York (Figure 1). Generally,

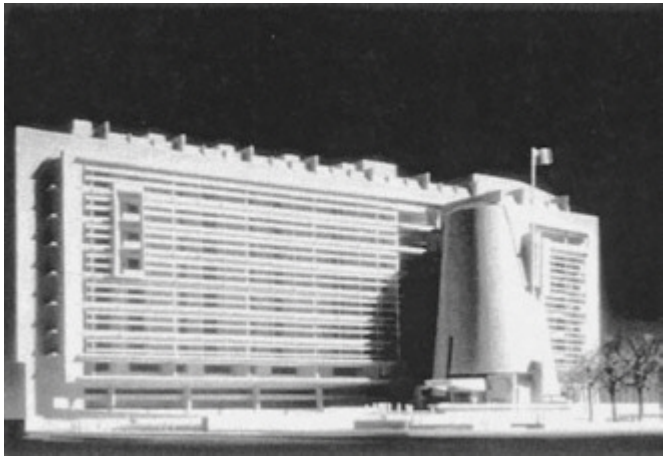

Figure 1:
Model for Long Island Courthouse Designed by Richard Meier.

our buildings are more modest. Our last major building program, the purchase contract program through which GSA built roughly 70 buildings in about 10 years, was really substantial at the time. It represented the growth of federal government and the Great Society programs of the Johnson and Nixon years. The results of that program were generally not very good. Many of our buildings of that period were either glass boxes or precast concrete boxes. We offered a choice! The main objective was build it fast and build it cheap. But we did learn a lot from this experience. Cheap is not always least cost in the long run for any organization.

This issue is worth further discussion. The fact is that the life-cycle cost distribution for a typical service organization is about 3 to 4 percent for the facility, 4 percent for operations, 1 percent for furniture, and 90 to 91 percent for salaries. If we can leverage our 3 to 4 percent contribution to improve the productivity of the workplace, we can have a very dramatic effect on those representing the 90 to 91 percent of costs. We do consider the quality of the workplace environment to be very important, particularly as the federal government streamlines and downsizes.

THE EARLY DESIGN QUALITY PROGRAM

At GSA, we have been thinking about this issue for a long time. About 15 years ago, the Public Buildings Service began what was called at that time a design quality program. It was predicated on now very run-of-the-mill ideas: programming, which we defined then as problem identification; design and design review, particularly owner review and ensuring that the design meets the requirements of the owner and occupants; and post-occupancy evaluation, to test the criteria used to get the results that were programmed. Finally, we initiated a major research and demonstration project program. Some of these buildings are built now, with post-occupancy evaluations recently completed.

During the last 10 years, we did a good amount of research. The resulting publications (available from the National Technical Information Service in Springfield, Virginia) cover interim design guidelines for automated offices, and productivity enhancements.

The problem with the concept of productivity is, of course, that no one has been able to quantify it. We have tried. Some of the information in our reports is quite useful.

One of the first things I did at GSA, when we were beginning to

look at systems furniture, was to try to demonstrate a cost advantage to using one versus another type of systems furniture. It got down to calculating how often and for how long someone would be interrupted if the phone rang audibly on the other side of the systems furniture. There are many ways to address productivity, though there is no definitive method. Nevertheless, we will continue to try.

ADVANCED TECHNOLOGY PROGRAM

During the mid-1980s, we developed five major buildings around the country, to take advantage of emerging and proven technologies designed to improve the workplace environment. We used some very sophisticated and extensive design programming for these projects. Three of these buildings were new construction projects and two were repair and modernization amounting to total overhaul of existing federal buildings. These buildings included the Bonneville Power Authority in Portland, Oregon; the Long Beach Federal Building in Long Beach, California; and the Army Records Center in Overland, Missouri. The Bonneville facility was the first building in which we made a conscious effort to integrate an atrium with the working area. The offices actually look out right onto the atrium, which is also used as an auditorium.

The Mart Building in St. Louis was a major retrofit, and the Oakland Federal Building, which came immediately afterward, though not part of the program, met all the advanced technology requirements. These were a raised floor, or access floor, fiberoptics capability, control systems that were monitored throughout, with elevators, heating, ventilation, and air-conditioning (HVAC), and other systems all on computer-aided design (CAD) and coordinated from one room. All these buildings are built and occupied now, and we have done several post-occupancy evaluations. The post-occupancy evaluation program is not meant to ask whether a building was built right, but to validate the design criteria and to test the design solutions. The worst way to proceed, in a time of reduced resources, is by doing the same stupid things over and over again. There is something to be said for investing in evaluation, to see whether you could have done something better, and whether the criteria should be changed to improve the performance.

One needed feature identified in our early post-occupancy evaluations was the access floor. Since government tenants move very

frequently (almost every 18 months), the flexibility for adjustments provided by access floors is a major advantage. As part of our requirements, we do specify some form of an electrified system in the floor, particularly for general office space. A 1981 General Accounting Office audit commended our post-occupancy evaluation approach.

GSA'S DESIGN EXCELLENCE PROGRAM

I also want to address GSA's Design Excellence Program. This program is not really a prescriptive program, but an attitude, a cultural change. Its main thrust is to achieve the highest quality possible within the resources available. The first step—as any architect will tell you—is to pick the right architect. While I may be a bit partial in this department, I do believe that, without the right architect, you get no place.

We therefore considered the architect selection process to be a very important part of design excellence. We brought in leaders from the architectural field, the American Institute of Architects, and the architects who were working on our program, and we asked "what's wrong with what we do?" They were very kind to tell us what was wrong with what we did. And within about two months, we completely reformed what we did.

At that same time, it was clear that we no longer had the human resources to do things the way we had in the past. In a typical architect-engineer (AE) selection, firms would submit the required standard forms (SFs 254/255), reflecting the entire team's qualifications, from the acoustician to the hydrologist —everyone you could imagine. GSA would then have a very thick stack of forms to review. And that was simply the first submission. The HVAC consultant probably received as much weight as the lead architect in that first phase of the selection process.

We decided that this is not a good way to go. We wanted to make sure that of the teams to make the first cut, every one of them would have a first-class designer. And, because we didn't have hundreds of thousands of people to review these materials, we decided we wanted a submission package no more than one-quarter-inch thick, something along the lines of a portfolio. The main objective of the review would be to determine the design talent of the lead designers and their immediate firms rather than the whole teams.

In the second phase, we interview the entire team, and review their qualifications as required by the Brooks Act. In this way we are assured

that the team has all the "horses" to efficiently and effectively execute the design.

The results of the Design Excellence Program are beginning to take shape. Richard Meier, selected under the Design Excellence Program, has designed a new courthouse for us, for Phoenix, Arizona, now in the working drawing stage. This building has won a Progressive Architecture Award, the first time this prestigious award has been won by GSA and probably by any federal agency. Progressive Architecture gave only two awards this year worldwide. Our courthouse is quite an exciting building.

HIGHER QUALITY AT LOWER COST

Can you achieve design excellence in a period of diminishing resources? We benchmark the cost of all our projects. The approach is not prescriptive in the sense of a design budget, but is rather more like a planning budget.

All of the buildings in our program are cost-benchmarked. The benchmarks are based on the R. S. Means Company indices and other construction indices for every location in the country. Our construction costs are consistent with those of private sector buildings whose functions can be reasonably compared. Costs for the new regional Internal Revenue Service headquarters in New Carrollton, Maryland, clearly an exceptional design, are well within the range of the costs for privately developed general purpose office space in the Washington, D.C., area. And we will have a much better building than most private office buildings in the area.

Our technical specifications have also changed over the years. Now it is much less costly than it was in the early 1980s. In 1981, we had a specification system just like that of the Army Corps of Engineers, the Naval Facilities Engineering Command, and the Department of Veterans Affairs. It was very elaborate, taking up volumes and volumes. We do not use that system any more. We were not building airfields or submarine bases. We found that a commercially based specification system was fine. Once there were a dozen people in GSA's central office writing specifications. We signed a contract with the American Institute of Architects and we bought several subscriptions to AIA's Masterspec. For a short time, we actually had a Masterspec/GSA version, but now we use the real thing. However, if the architect-engineer firm has a specification system that is based on the Construction Specifications Institute format and

is otherwise sound, that can also be used.

This is just one example of ways in which we have instituted private sector concepts. Many GSA people once agonized over every single line in design review. We no longer do this. We have construction managers do constructability review, to make sure that the documents are ready to go out for competitive bid. We are doing things much more in keeping with private industry practices. We also focus more on the implementation of important Executive Orders, like those concerned with energy and water conservation. The details, such as making sure the door swings are right, we contract for. We concentrate on the major issues—federal mandates and issues such as accessibility. The nature of our staff has changed for this reason, acting more as managers of design than as frustrated designers.

CONCLUSION

The major thrust of GSA's program for the next 10 to 15 years will be major adaptive reuse projects, to bring our huge inventory up to modern standards. The big question is how we will do that. Of course, the office of the future may be in your house as a result of telecommuting. We have many unknowns to face.

However, we feel that, working together with our client agencies and other government branches, we can use the methods of our design quality program—problem identification, followed by research, development, and prototypes—to move the discussion to practical solutions. We have seen these methods produce results, such as the innovative HVAC approach of the Phoenix courthouse, which was specifically cited in the Progressive Architecture Award.

We really need to look at the role of government. Government cannot do everything, and probably should do less than it does. However, architecture and art have historically reflected the values and the long-term goals of our society. I believe government can, in fact, reinforce certain values that we hold as a people. We do have a responsibility to try to highlight the positive aspirations of our people and our society. We can have a balanced budget in 10 years and have nothing but balanced books. Is the goal only a balanced checkbook, or is it also that what we have bought is of value? The civic responsibility of our professions—engineering and architecture—I believe, is a truly important calling.

The Charrette Process: a Tool for Achieving Design Excellence

Thomas Grooms
General Services Administration

I will not talk to you today about a new technique but instead about something old. We often come to conferences to hear about new developments. But sometimes it is useful to look at something we already know in a new way.

The term *charrette* is not well known among lay people or engineers, but it is familiar to architects. A charrette is an intensive brainstorming session over several days that focuses on a particular issue or problem. A charrette can be a very useful tool to develop the right framework to support design and construction excellence.

When we build federal facilities, we often have trouble seeing the forest for the trees. Each member of the project team concentrates on his or her aspect of the project—budget and financing, procurement, site analysis and acquisition, design development, or cost and construction management. We develop elaborate timelines and production schedules. It is all very compartmentalized and linear thinking. We hope that when we finish putting all the trees in a row, we will have a beautiful forest, or, in the case of a building, a beautifully functioning facility that is built on time and within budget. Often, we find out too late, however, that we don't have the "object of our desire"—a quality facility.

The reason is that a critical element was missing at the very beginning of the project: a shared vision of what the project is, can be, and should be. Without this shared vision to provide a framework for decision making throughout the project, the ultimate goal—a quality facility—is often unfulfilled.

A facility must obviously be more than a weather-tight, economical box. It must enhance the users' quality of life, enable them to work productively, and be a civic structure that inspires and adds value to the community.

While each participant involved in producing a facility is an expert and has a vision, this vision is generally fairly narrow. I would suggest that the charrette is a valuable, economical tool to arrive at a broad shared vision, and is particularly helpful in developing an informed client.

It is important to get the best design talent possible, but if the client has an inadequate vision at the start, you may not get the best work out of the architect. In the end, it is the client's facility not the architect's. The architect's vision is very important for a quality facility, but the facility must meet the client's needs.

THE BUREAU OF ENGRAVING AND PRINTING FACADE

To illustrate, I will describe a particular charrette I organized for the Bureau of Engraving and Printing in Washington, D.C. Located between 14th and 15th streets, Southwest, by the Tidal Basin, the bureau is an anomaly in Washington. It is a factory within the monumental core of the city. Its 15th Street side is neoclassical in design. However, its 14th Street side is industrial in character (Figure 1). For the facility to be

Figure 1.
Existing 14th Street Side of the Bureau of Engraving and Printing.

maintained to current standards for security and environmental concerns, its exterior often requires altering. Two of the three open courts on the 14th Street side are slowly being filled in with new mechanical equipment. These changes cause concern to the Commission of Fine Arts and National Capital Planning Commission, who must approve them.

Over the years, the bureau has taken many proposed changes to these reviewing commissions. Several years ago, these two commissions—worn down by what they saw as piecemeal changes that harmed the architectural integrity of the building and the monumental core area—approved a new wastewater treatment plant, contingent on the bureau's development of a long-term urban master plan.

Thus, the Southwest Gateway Project was born. The bureau is interested in turning the 14th Street side, the industrial side, into a gateway into Washington. Fourteenth Street is a main entrance into the city's monumental core from Virginia. What was once the back door of the bureau has become the front door, providing, in addition to service access, the entrance for 500,000 visitors a year. The bureau asked me to help develop this master plan and guidelines on how to proceed with future alterations to the building and simultaneously provide a new visitor experience. I responded by assembling a charrette team. The six-person national design team included two architects, two urban planners, one historic preservationist, and one landscape architect. We met for two days with bureau officials, including the Director, facilities manager, and staff architects.

The first day of the charrette was devoted mainly to presentations from the bureau's chief engineer and facilities manager, and from the public relations staff about tour needs. We heard from the National Park Service, which controls the land on the 15th Street side of the building, and from the architects of the Holocaust Museum, which was being built next door. The bureau expected many more visitors once the Holocaust Museum opened. We also heard from Arthur Cotton Moore, the architect for the Portals project, a mixed-use complex across the street from the bureau's annex. We wanted to find out about all the construction projects happening in the area and how the bureau might be affected by them.

As part of the charrette, we had a very detailed site visit. The bureau is not an easy place to go through. One needs to understand how the production facility works and the tremendous security issues involved.

The charrette team made 26 recommendations to the bureau. These ranged from the type of design team and design process that the bureau should engage for the project, to a number of urban, architectural, and landscape design questions. (A professor of architecture served as the group's rapporteur and drafted its report.)

Most important, the charrette gave the bureau a clear vision of the project and what design could do to help meet their needs. One of the biggest issues was whether the 14th Street side should be given a classical facade or still be recognized as an industrial building. The team agreed unanimously that a balanced expression of monumental and technical images would best capture the bureau's unique work.

What did the bureau do with our recommendations? I helped them develop a scope of work for Phase I—or a concept development of the master plan, including the visitor center. The bureau then gave $30,000 each to three of their task order architect-engineer contractors to form a multidisciplinary team and develop a design concept based on the charrettes recommendations. I then brought back three members of the charrette team to evaluate these three concepts based on the guidelines in the charrette report. The team recommended one of the concepts to the bureau, which the bureau endorsed. This concept has been developed and recently received final approval from the Commission of Fine Arts and the National Capitol Planning Commission (Figure 2).

The two open courts on the 14th Street side that were being filled in with mechanical equipment will now have huge screens set back from the street to hide new equipment. The screens can be raised for easy installation of equipment. In the center court of the building will be a new free-standing visitor center to replace the old visitors bridge.

I do not mean to suggest that a two-or three-day charrette is the be-all and end-all for achieving design excellence. But I do believe it is a very inexpensive and flexible tool to help establish the vision and framework required to produce a quality facility. The charrette team reviewers have helped keep the bureau and architect on track and focused on the big picture. The team has no vested interest except in the quality and design excellence of the project. They can say things to the architect or contractor that the bureau is unwilling to say to those they work with every day; the charrette team can also say things to the bureau that the architect cannot say to its client. In this way, the charrette members perform a very useful communication function.

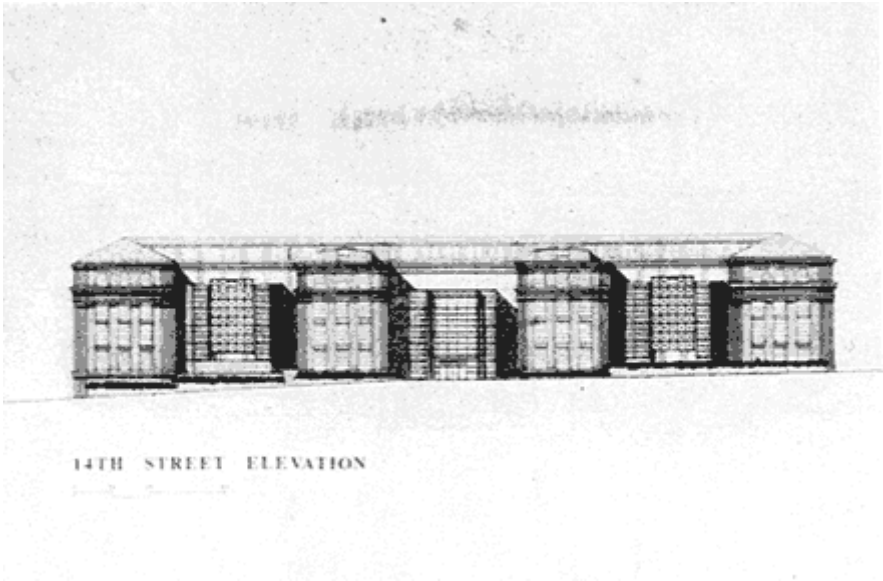

Figure 2.
Design Solution, 14th Street Elevation.

Figure 3.
Enlarged view of 14th Street Elevation.

The charrette is also fairly inexpensive. The bureau charrette cost $15,000, including the production of the report. The three design reviews to date cost $6,000. After several more reviews, the bureau will have spent less than $25,000—less than one-half of one percent of the estimated design and construction cost of the project.

The charrette process dovetails with the basic goal of the General Services Administration's (GSA) Design Excellence Program: finding the best design talent. A GSA limited design competition for a new courthouse in Beckley, West Virginia, used private sector peer reviewers to help select the best design talent and to review the architect's concept development. The process was very similar to the one used for the bureau project.

Charrettes are a very flexible tool. While they are probably most useful at the beginning of a project, they can also be used very effectively at other stages.

ACHIEVING A SENSITIVE REDESIGN: DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT PLAZA

I will briefly describe another charrette I organized for the Department of Housing and Urban Development (HUD) in Washington, D.C. GSA, which owns and manages the building, was about to tear up the plaza in front of HUD for a waterproofing project. Water was leaking into the garage below. GSA was about to sign the contract when the Secretary of HUD said, since you will be tearing up the plaza, why not redesign it for better employee and community use?

GSA rose to the occasion to meet its client's needs and asked me to organize a charrette to develop ideas and guidelines for the plaza's redesign.

The HUD building and plaza were designed by the acclaimed modern architect Marcel Breuer and his partner Herbert Beckhard. The building was finished in 1968, one of the first completed under President Kennedy's "Guiding Principles for Federal Architecture." When President Johnson dedicated the building, he challenged Americans to "create a nation that will always be like this building—bold and beautiful." The redesign project was therefore an architecturally sensitive one. There were many viewpoints to reconcile in any shared vision for the new plaza.

Again, I put together an interdisciplinary team: an urban planner, architect, architectural historian, landscape architect, artist, and public

performance producer, as well as HUD and GSA staff. Additionally, I included the Executive Director of the D.C. Commission on the Arts and Humanities, the Executive Director of the National Capital Planning Commission, and a member of the Commission of Fine Arts. The 38 guidelines and recommendations, that the charrette team formulated were used by a landscape architect engaged by GSA to put together a project team and develop three concepts for the plaza. The charrette team met several months later to review the concepts and recommend one to GSA and HUD. This design was recently approved by the Commission of Fine Arts and the National Capital Planning Commission. The Garden Scheme, as it is called, will have some permanent structures; others will be on tracks and can be moved around for different kinds of events and seating on the plaza.

This relatively modest redesign will enhance the quality of the facility for everyone who uses it. But it probably would never have been approved without the charrette.

Charrettes can be extremely useful when an agency is reducing staff, redesigning, or moving to new space. A charrette is an excellent vehicle for developing layouts to increase worker productivity or encourage collaboration and communication.

ELEMENTS OF A SUCCESSFUL CHARRETTE

Putting together a successful charrette is a challenge. There are several essential elements, which are obvious once pointed out. One is what I call commitment. A successful event cannot be organized without the full, open, and enthusiastic commitment of the client agency and construction agency's staff. Hidden agendas can completely undermine the charrette, as can staff resentment over the advice of outsiders. Unless the individuals responsible for executing the project are committed to the charrettes objectives and willing to suspend preconceived ideas about the project, the charrette will fail. While the agency staff must provide a reality check for the national team members, they must also be willing to entertain a wide range of new ideas.

Second, all the right players from the agencies must participate. By this I mean top agency officials who must champion the project and shepherd it through the budgetary, administrative, and legal difficulties it must overcome. For the Bureau of Engraving and Printing project, the

Director of the Bureau participated. At HUD, the Assistant Secretary for Administration participated, which made feasible the charrette recommendation that most surface parking be eliminated (other staff had said this was not possible). At the same time, the group should not number more than 15 or 16, to develop the necessary rapport and intimacy that allows easy communication.

Third, the agency must clearly define its goals and the issues to be addressed. The agency also must put together appropriate materials for the national team to review prior to meeting. This reduces the time it takes to familiarize the national team with the project. I have found that the national team members always have a much broader view than the narrower issues of concern to the client agency staff. The first few hours of the meeting are often free form, with the agency people wondering why they brought in these outsiders. But I can assure you, by the end of the two or three days, the national team comes up with many good recommendations about the agency concerns and has addressed a number of other issues the agency staff had not even thought about.

Fourth and finally, determining the composition of the national team is the most demanding part. The team should represent a very diverse group of people in terms of expertise, geographical base, and ethnic background. You are never sure what the dynamics of the group will be, because these people probably do not know each other. It is remarkable that landscape architects rarely talk to architects, nor architects to urban planners.

I usually select five to six people for the national team, including two who I have tried and tested in previous charrettes or awards juries. Bringing in new people, however, is what makes the group interesting. To identify these people, I rely on recommendations or select those whose work I have admired.

In closing, let me note that charrettes are really about two things: possibilities and communication. A charrette brings the two together to create a shared vision for the project that provides a framework for decision making throughout the project and for the better communication and collaboration of everyone involved.

Building Performance: Improving the Facility Lifecycle

Millard Carr
Office of the Secretary of Defense

The U.S. Department of Defense (DoD) acquisition and technology organization is undergoing the same kinds of stresses as many other organizations in government and the private sector: downsizing, right sizing, capsizing, whatever you want to call it. As a consequence, we are changing the way we buy things. To make sure everyone in the Office of the Under Secretary of Defense for Acquisition and Technology understands what is "required by recent legislative and executive actions, we recently had an "acquisition reform stand-down day." This event, really a kind of mini-charrette, should produce ideas about how to do the job better in a more business-like way.

DOD owns about 400,000 buildings, incorporating 2.4 billion square feet of space. It spends billions on construction each year. The Pentagon itself is undergoing a $1.2 billion renovation. So it is a major task to respond to the report of the Construction and Building Subcommittee of the President's National Science and Technology Council, which points out that government building projects have many opportunities to do a better job. We should, the report says, cut in half the delivery time of buildings; their operations, maintenance, and energy costs; waste and pollution; and job-related illness and accidents. We should, furthermore, increase the productivity and comfort of people in our buildings by 30 percent, and improve durability and flexibility by 50 percent.

I am particularly happy to see an emphasis on life-cycle costing in design, construction, and planning. Until recently, the pressure was to build it on time and within budget, with first cost a large consideration. We

tended to ignore operating costs, energy, cleaning, maintenance, and repair. Even more important, we ignored the inherent mission costs carried out in the buildings. Even at DOD, where the mission equals the first 8 things on our top 10 list of things to do, we had a tendency, when the crunch came—when we needed beneficial occupancy of the building or when funds started to run out—to sacrifice the usability of the building. We were not being evil or perverse. We were just being human. We need to build better incentives into the system to give higher priority to life-cycle costs.

In a typical office building housing a unit of the DOD, each person is allotted 100 square feet. Say the building costs $200 per square foot to build, including overhead, then the first cost per occupant is $20,000. The annual operating cost is about $2 per square foot including about $1.14 for energy, or about $200 per year for that occupant's space. The person in that space costs about $60,000 a year. So, over an average 40 year life, people represent 95 percent of the total cost. Therefore, a mere 3.7 percent productivity gain in the people will pay for all the facility costs over the 40 year life of the building.

In other words, we could get a free building if we paid better attention to the productivity of the endeavor in that building while we were planning, designing, building, and operating it. It is hard to convince people of that fact, especially when we are all trying to deliver projects within a decreasing budget. We are trying to develop a multimedia presentation to get this message across, with Professor Volker Hartkopf of Carnegie Mellon University and the Advanced Building Systems Integration Consortium.

In fact, very impressive gains in productivity are available. An analysis by the Carnegie Mellon team shows an expected gain in productivity of 5 to 35 percent. The source of these gains comes from giving people a good place to work, with privacy, the ability to concentrate on work, ergonomic furniture, access to windows, and personal control of lighting, heating, and cooling. We are not robots. We need to see the sun now and then or we start to get a little wacky. We should be able to provide that kind of environment to our people. If 95 percent of the cost of the building is people, we need to pay a lot more attention to their working environment.

The Army's Construction Engineering Research Laboratories, in a literature search, found 45 cases in which some of these environmental improvements were made; not one case incorporated all of the opportunities

for improvement. Demonstrated productivity improvement from these cases ranged from 5 to 35 percent. We are trying to incorporate these results in the Carnegie Mellon effort. We intend to evaluate all of the data, implement a standard, build facilities to meet the proposed standard, and continuously evaluate and improve. The charrette we held is a first step and a very good one.

THE NEED FOR COMMISSIONING BUILDINGS

I am convinced that the concept of commissioning (that is, the explicit verification of physical and operating conditions in a new or substantially renovated building) is the charrette that continues. It is a process that guides all activity throughout the acquisition life cycle. It defines the customer's needs clearly, as a charrette does, and tries to ensure that the customer's needs are achieved during planning, design, construction, turnover, and throughout the life of that building at the lowest achievable life cycle cost. Productivity of people is a vital part of that life cycle cost analysis.

The idea of commissioning was inspired by Presidential Executive Order 12902 of 1994, which was aimed at ensuring that the initial energy-efficiency of buildings was not allowed to degrade because of poor maintenance and operation. But we in the Office of Acquisition and Technology believe that all facilities should be commissioned. One study has proposed that all buildings over a certain dollar value—perhaps $5 million—should have some sort of a commissioning process. (If 95 percent of a building's costs are in the people, then there is no building outside of a guard shack that should not have some commissioning process.)

A parallel or rather complementary process can be found in the measurement and validation study that the Department of Energy (DOE) just issued on energy-efficiency projects. The commissioning process can be as sophisticated as necessary. For lighting, one can validate energy savings by counting light bulbs and multiply by the difference in energy-intensity of the light bulbs. In renovating an entire building, the validation can be done with a more sophisticated computer model of the building and its systems.

Many studies show that owners are unhappy with their buildings. In a large new building, just turned over to a defense agency that shall remain nameless, people are rather unhappy, because, for example, when

they turned the water faucets on, they got wet. A commissioning process would have prevented that problem.

The process begins with planning and design, but it should continue through at least the first year of occupancy. In fact, periodic verification of maintenance and operating standards over time would solve many problems. However, doing so requires overcoming a lack of resources, owing to the traditional focus on first cost.

The Army Corps of Engineers has issued a draft instruction documenting these concepts. It will take time to pervade the entire Department of Defense, but there is strong consensus in its favor in the Office of Acquisition and Technology. DOD is the largest construction agent in the world; the Army Corps of Engineers and the Naval Facility Engineering Command build billions of dollars worth of buildings each year. They have many professional people who want to do a better job.

CONCLUSIONS

I have tried to make the case that personnel productivity, life-cycle costs, long-term operations and maintenance, and mission support are all important considerations that must be reemphasized. The federal government, and the nation as a whole, must abandon the habit of short-term optimization. Members of Congress tend to look ahead two years or in the Senate six years. We in the Department of Defense, because of the way we move military personnel around from job to job, tend to look ahead three years, if we are lucky. Meanwhile, for lack of attention to life-cycle costs, our road systems are falling apart, we are not paying attention to energy conservation anymore, barring a crisis; and we are not getting the benefits we should from our buildings. We are all responsible as citizens for making that clear to our government. Otherwise we will continue to slide down the slope.

The bottom line is we all must continually improve or get worse. In the Department of Defense, we exist to continuously improve the defense of America and be a leader in the architect/engineering community.

Putting it all Together: Case Study of the HCFA Headquarters

The nearly complete, four-building complex housing the Health Care Financing Administration (HCFA) headquarters, located in Woodlawn, Maryland, just outside Baltimore, has been acclaimed as a model in achieving both customer satisfaction and building quality (Figure 1).

This 900,000 square foot project, sited on 57 acres, was initiated to provide a consolidated facility for HCFA's more than 3,000 employees. Source selection was used as a procurement method, resulting in the award of a design/build contract (including operations and maintenance for up to three years) in August 1992, and ultimately in full occupancy by September 1995. This award represents the General Services Administration (GSA) Public Building Service's third largest design/build project. The principal team members in this project—representing the owner (GSA), client-tenant (HCFA), developer (Boston Properties), architect (RTKL Associates), and general contractor (McDevitt Street Bovis)—report on their roles and responsibilities in this highly successful development.

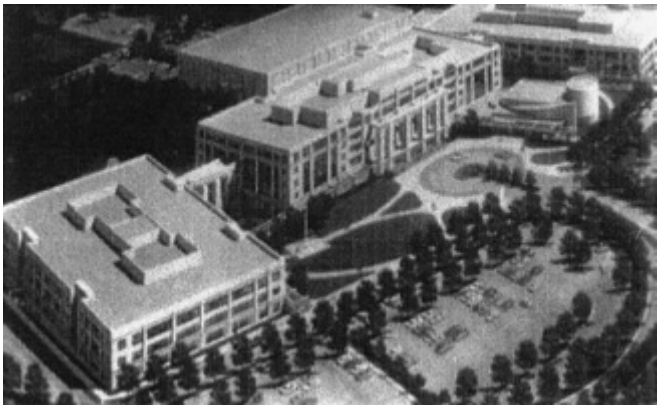

Figure 1.
The New HCFA Headquarters.

PAUL HORNEMAN HEALTH CARE FINANCING ADMINISTRATION

I was the HCFA Project Director for what we called our single-site project. The attitude driving this entire project was customer satisfaction. All those involved in the project kept HCFA's needs and desires foremost in mind from beginning to end.

Before Congress authorized our building project, HCFA was an agency suffering a true identity crisis. People did not know who we are. We run the federal Medicare and Medicaid programs. In fact, we are now the second largest federal budget item, $319 billion in fiscal year 1997, though we are a relatively young agency. We were formed in 1977 from parts of the Social Security Administration in Baltimore and the Medicaid Bureau in Washington, D.C. Until we moved into our new building, many people thought we were still part of the Social Security Administration.

We serve a huge population. There are 72 million Medicare beneficiaries and Medicaid recipients who receive benefits from our program every year. But we do this with a very small federal presence, only 4,400 HCFA staff, 2,500 of them in Woodlawn, Maryland, in our new facility. We have our small Washington staff, and 1,500 employees in 10 regions across the country.

People do not know we exist because their primary contact with our programs is with the 22,000 Medicare contractor employees and the 40,000 Medicaid state agency staff that we fund across the country.

Also, when we were formed we had no real home. The Social Security Administration gave us one of their buildings initially, so we were on their campus. Eventually HCFA occupied 12 scattered buildings in the Woodlawn area. Most were either inexpensive, speculative, suburban office buildings or converted warehouses. This converted space was very poor at handling office air, electrical, and other needs.

We experienced many building problems during that time, such as constant heating, ventilating, and air-conditioning (HVAC) and chiller failures. One of our buildings was labeled a sick building. Elevators were too small and slow, and they broke down. The cafeteria was closed for the last five years because asbestos fell through the ceiling. We had difficulty cabling for large area network (LAN) computer configurations, because of

asbestos in the walls. There were constant electrical failures when we tried to go to a personal computer environment. There were no special facilities, no meeting rooms, no auditorium, and no library. The one training center was on the second floor of a building that had no elevator, so we had difficulty complying with the Americans with Disabilities Act.

Because our people were spread through 12 buildings, we also never developed a sense of HCFA identity. We became a very fragmented organization. There were communication problems throughout the organization.

Thus HCFA's new building was intended not only to house the staff adequately, but also to bring HCFA together to function as one entity. In short, we had high expectations for this building.

In 1988, we prepared and submitted to GSA our preliminary program requirements, almost entirely focused on space needs. We did not address building quality or systems or our future technology requirements to any significant degree.

At the time, HCFA's relationship with GSA was rather poor. GSA took something of an authoritarian role, providing only what. they believed we needed. Cost was also a much greater factor than quality at that time in GSA's decision making.

In 1989, authorizing legislation was enacted for this project, much to our surprise. We already had a five-year plan for staying in place, and we were suddenly faced with trying to meet all our needs in this unknown new building. So at that time, we put ourselves on a wartime footing. We did not have expertise on site, nor people who had built facilities before. We had some space planners. We therefore immediately formed a single-site staff, consisting of six employees fully devoted to the project for its duration. This continuity proved of great benefit.

In 1990, HCFA senior staff came together and decided what they wanted the building to look like and the image they wanted to project. They also made a commitment to fund the upgrades needed so the building would be ready for the technologies envisioned through the next decade.

HCFA entered into a memorandum of understanding with the Public Health Service for architectural and mechanical engineering services from their hospital construction group. Two of their employees worked with us part-time until the contract was awarded in 1992. We thus had some of the expert input that we needed at this stage.

We then put together rather detailed program requirements,

covering more than general needs for space. This very thick document encompassed every HCFA unit's needs for space, electric power, computer support, and telephone support, and even the required humidity levels and desired finish quality for some spaces. This dynamic document changed constantly, up until three months before we moved in, as we tried to accommodate everyone's needs.

It was prepared partly for the expected battle with GSA about what we wanted to see in the Solicitation for Offers. Suddenly, however, GSA's attitude changed. In the early 1990s, government began to be reinvented, and quality and customer satisfaction became important goals. GSA was now interested in what we wanted to accomplish.

There was no battle, but the preparation for one resulted in HCFA putting in place what we needed to be a fully operational member of the project team. We were probably the least knowledgeable of the whole group originally, but we closed the gap, to play a critical central role in the completion of the project.

GSA allowed me, as Project Director, to be one of the evaluators in the source selection panel. Along with GSA, members of HCFA's single-site staff, the two Public Health Service employees and myself spent a good part of a year in Philadelphia working as a team to evaluate and award the contract. Because we evaluated by consensus rather than votes, each voice carried far more weight. We were even invited to sit in on the best and final negotiations. At that time, we began to convey to the bidders our desire for an image, as well as our practical requirements. This was the beginning of the dialogue that resulted in our final successful product.

We were also fully integrated in the team during design and construction of the design/build project. We sat in on the design meetings. Everyone was clearly aware of our needs and trying to satisfy them within budget. We hired HCFA's first engineer, a full-time mechanical engineer, as our on-site person in the GSA construction trailer. She worked alongside GSA and the contractor, doing inspections, approvals, and acceptance of space. The single-site team grew, and we added more people on site and worked with the team when changes were needed and to provide our ideas in response to requests for information.

HCFA also tightened its belt, so that there was funding available to make changes. This probably would not be possible under budget circumstances today. Even then, however, Congress gave us very little

funding, mostly for the move and for new computers. We paid for the design and finish changes by doing without elsewhere.

Also during the move, the project and move team coordinated skillfully with final construction.

We involved not only the project team in the project, but all the other HCFA staff as well. An employee newsletter was issued regularly. The developers put displays in lobbies and we briefed senior staff and employees, so they could see what the building would look like. We participated fully in community meetings and maintained progress displays in all our buildings. This process energized the whole organization, with all 2,500 HCFA employees as participants, and a building that the group took ownership of.

One critical arrangement in the development was the full decision authority that HCFA gave me. All design and construction, furniture procurement, budgeting, color selections, and so forth, through final acceptance of space was my responsibility. Even though I am not a member of HCFA's senior staff, once it was understood what they wanted to accomplish in the building, we did not have to go back for approval in making changes. Decisions could be made quickly while we were at the design table. This empowerment greatly promoted efficiency.

In sum, important elements in the project's success included obtaining input from everyone and keeping them informed throughout project development, the use of one decision point, placing staff on the project from the outset, and HCFA's commitment to provide staffing and funding for the project all the way through. HCFA's adversarial relationship with GSA in earlier years no doubt stimulated our solid preparation to be a member of the project team, in addition to HCFA's just-mentioned commitments.

The final product has been extremely well received by HCFA employees. Our image and our internal coherence have both improved enormously. The building complex provides an inviting, informal, place for staff and visitors (Figure 2). We have a great work environment, with more than 50 conference and training rooms (Figure 3), all constantly booked, a LAN network supporting excellent communications, good indoor air quality, and ergonomic desks and chairs, as well as a day care facility, cafeteria and dining terrace, fitness center, and jogging trails. Everyone is thrilled.

Figure 2.
Facade of New HCFA Building.

Figure 3.
HCFA Conference Room.

ELLEN MCCOLE GENERAL SERVICES ADMINISTRATION

Following the 1989 congressional authorization of the new HCFA building, the House Committee on Public Works and Transportation directed GSA to consider Baltimore City in selecting the site, as well as Baltimore County, where HCFA was then located. GSA Region III then named me, at that time a GS-11 realty specialist with little design and construction experience, as project manager, and eventually as contracting officer. They later confessed their choice owed partly to their feeling that the project would fail in any event, because of political fallout from the competition of Baltimore City and County, and because of HCFA's traditionally adversarial relationship with GSA. Since no one told me I wasn't expected to succeed, I set out to make the project work.

GSA has become much better lately, not only at valuing newcomers, but also at reinventing itself, to reflect past experiences such as ours. But in 1990, when we began writing the solicitation for offers (SFO), we were just learning about source selection and design/build. As a result, this 250-page solicitation document was a hodgepodge of performance and prescriptive specifications, reams of contract clauses, and references to other documents, that are sometimes unclear, even conflicting, and, or at worst, ignorant of the realities of the design/build environment.

Back in the late 1980s GSA knew design/build provided opportunities to save time by expediting or overlapping design and construction phases. We also knew it provided one point of accountability to escape the "finger pointing" between architect/engineers and general contractors on traditional jobs. Additionally, we knew it was possible to capitalize on the past experience and expertise of a developer, but we were unsure how to select a contractor on that basis, capture that advantage in the process, or reward a successful contractor with more business.

Now federal policy is being revised so that source selection procurement is based on past performance rather than simply price. Contractual environments are also more conducive to teamwork, with less emphasis on regulation.

The evolution of our project in fact often mirrored such GSA policy changes, and partially accounted for the project's success. While GSA's relationship with its customers had been primarily regulatory, the partnering

approach in this project not only allowed GSA to respond to HCFA's needs, but also to use HCFA's resources, for the betterment of the process. I hope we have also contributed to a higher regard for GSA as a service-oriented organization.

GSA and HCFA first joined forces to draft the SFO. If we were to do it again, we would have allowed much greater flexibility in requirements development. For example, we would include more performance-oriented specifications and fewer specifics on tenant fit-out. We had reams of information about what HCFA needed years down the road, but of course, such needs change with time.

The source selection evaluation factors were more in tune with where GSA is now in selecting contractors. These factors were, in descending order of importance, building quality, impact on HCFA employees, offerers qualifications, and national headquarters identity. The factors set the stage to evaluate offers and make an award based on the offerer's reputation, quality, and employee productivity.

We eliminated offers by establishing a competitive range after initial responses. However, we did require more information and thus more offerer investment and government evaluation resources than were actually necessary. Partially due to this high degree of offerer investment, we had an award protest from an unsuccessful offerer. While this delayed us for a few weeks, it did not significantly affect project schedule. The Government Accounting Office determined that we had evaluated proposals in keeping with the published SFO, and that we had the documentation proving so.

While our source selection evaluation process was resource-intensive, HCFA and GSA both escaped internal, progress-threatening bureaucracy by appointing a single point of decision making and accountability (Mr. Horneman for HCFA and me for GSA). The result was an intense sense of ownership of the project and true empowerment.

In fact, there was only one other full-time GSA person at any time on the project: the construction manager on site during the construction phase. Other in-house resources were brought in as needed throughout the project. GSA also contracted with a construction management firm for design compliance, inspection, progress monitoring, independent government estimates, and so forth.

After the award, the team's mutual respect grew, with the focus on fairness and practical win/win solutions to problematic procedures and

conflicts. Despite possible contractual risk, those involved worked to reduce procedural red tape by encouraging communication among all team members. For example, HCFA facility personnel could communicate openly with Boston Properties' interior space planners to solve user design problems. Another win/win team achievement late in construction was the negotiation of a new construction completion schedule, taking into account the urgency of numerous tenant space changes identified late in the process, along with HCFA's relocation parameters. Government thus achieved a smooth and timely progressive occupancy, and Boston Properties avoided liquidated damages.

Still, the team had some more enduring problem areas. One concerned the ownership of design drawings at any point in the process, along with the contractual right to change those drawings. This issue had implications as well for the use of value engineering incentives. The basic difficulty here was clearly distinguishing the roles of developer and owner, given the risk-versus-cost and cost-versus-quality decisions, and the tradeoffs associated with those roles. In the end, we agreed to disagree on some of the over-arching questions, but solved specific difficulties case by case.

Another trouble area was quality control. We had checkers checking checkers checking checkers. We need a different approach to quality control in this design/build situation, especially now that we have fewer and fewer resources available.

In all fairness, though, one factor that worked in our favor then, but probably no longer would, was the fiscal environment. The project did come in under budget, with a total contract cost of $142 million.

The most important principle I could offer from my experience with this project would be never to ask whether something can be done, but to ask how it can be done, and to ask persistently enough so that someone will figure it out.

JONATHAM B. KURTIS BOSTON PROPERTIES

Our story is one of real import for the private sector-government partnerships. I will tell you something about the private sector side.

Boston Properties is a national real estate developer, with offices in

Boston, New York, and Washington, D.C. Founded in 1970, we have developed and own about 13 million square feet of space on the East Coast. In the Washington D.C. area, we have developed and own about 7 million square feet.

Our earlier experience was in building speculative or build-to-suit facilities for private sector users such as law and accounting firms. In the mid-1980s, when the market began to change, we began focusing on government leases and pursued government lease requirements. It is not as glamorous, nor do you make as much money in the public sector, but the government does pay its bills, they sign long-term leases, and banks will provide financing for development.

Initially, we concentrated on public sector leases with the International Trade Commission, National Aeronautics and Space Administration Headquarters, and the Comptroller of the Currency. Toward the end of the 1980s, even these government leases were diminishing, and we decided to sell our services to other agencies on a fee-for-service basis. We were very successful in a public-private partnership with the Architect of the Capitol, developing the Thurgood Marshall Judiciary Office Building on Capitol Hill. We then competed for the HCFA facility, and we are currently working on a project for the National Institutes of Health. In short, we did shift our paradigm, from high-risk office buildings, to government leases, and then to government design/build or fee-for-services work.

The government issues requests for proposals (RFPs) all the time, and we evaluate thoughtfully whether we can bring some value to the project—and therefore be awarded the assignment and make some money carrying it out. Often the RFPs issued by the government are not structured for a developer and we do not pursue them. They may be better suited to a construction manager or architect/engineering firm.

If we decide we should pursue a project through the RFP process, we then start assembling a team. If a requirement has a very heavy engineering focus, such as a data center, we look for an architecture/engineering firm that has performed that type of work. If we feel we can bring a better product to the government by offering a suburban solution rather than an urban one, we team with an architect who has done successful suburban solutions. They may not be the least expensive, but they are good at this type of challenge. We also involve the general contractor very early in the process because we have to establish a budget.

While we do budgeting in house, we want those who buy construction services daily to work with us. Thus, we identify an architecture/engineering team and a construction team, and all are asked to study the RFP. Then we meet to decide whether to pursue the project seriously, an effort that often demands considerable sums of money. A developer can spend over half a million dollars pursuing and submitting his proposal.

Our teams' objective is to bring the most value to the end user, whether it's the Architect of the Capitol or GSA/HCFA or any user for that matter.

Because deadlines are often short, we do pro forma budgets and design development working all hours of the day and night. The requirement always needs interpretation, which under the circumstances is not always available. Yet we must commit to delivering a building for, say, $122 million. We submit, present, negotiate, negotiate again, and with luck we are awarded the project.

Once we have the award, we start with design, with input from a variety of users and contracting experts. Our core team is expanded, and we add other components so that everyone's needs will be met and the project will be successful. HCFA's need, for example, was a good community for its people, while GSA had the contractual need to make sure that we performed in accordance with their requirements.

With the design done, we then go to bid with subcontractors and budgetary issues always arise. Disputes or discussions with GSA about value engineering, about whether we could change the documents because another type of material appeared better, and about who would receive any savings and who owned the documents and when, were all issues in this process.

Building begins. We create another team for this phase, including the project superintendent from the general contractor and the subcontractors. We must work as a team to reach our common goal—to finish the facility, and have satisfied clients, both GSA and the tenant, and hopefully make some money.

Given the myriad of government inspections and inspectors, directions can get crossed, especially when trying to meet a schedule. We hope to come up with better ways to do this. There is understandable concern about the fox watching the henhouse, but if a good partnership and trust can be established among all team members, perhaps we can avoid the adversarial relationship that develops.

We completed the building and were doing the punch list quickly to meet the tenant's scheduling needs. The tenant was moving in and the furniture and cabling people were there, creating additional punch list items and complaining about existing items. These things happen. But they can be worked out fairly with good teamwork, as they were in our case.

Warranties and commissioning are other major issues at completion. We had extensive commissioning requirements because of the building automation and HVAC system. This is an ice storage facility, where ice is made at night with big chillers and is melted during the day to cool the facility.

The automation system commissioning had a relatively short scheduled time frame. But observations over four seasons were needed to make sure that the system would work in real life situations. There must be some give-and-take in the specifications and in the requirements to accommodate reality.

I offer a few concluding comments. We always assess "lessons learned" to improve the next time. Team members should be carefully picked. Source selection, with an emphasis on past performance and customer satisfaction, is a much better approach than simply choosing lowest price. All parties involved must truly be treated as stakeholders, and mission statements should be clear. People should be at risk for their performance, and they should value the other partners' circumstances and goals.

With a good team, mission statements can be satisfied with a win/win result for all. Developers, general contractors, and architects should all be able to make money; it is the incentive to do a good job. Such basic common sense should enrich our professional lives, and create projects that are successful for all involved.

GOODLUCK TEMBUNKIART RTKL ASSOCIATES

I never cease to be awed by the sheer complexity of building projects and the information that must be communicated to carry them out. From the standpoint of design, the effort is largely synthesis—combining technological knowledge, aesthetic judgment, and the client's vision into a unified form. All building projects must take into account client programs,

site issues, code requirements, government facilities requirements, budgets, construction techniques, schedules, design quality, indoor air quality, and much more. But each project has its own contingent constraints and thousands of pieces of information. The fact is, there are unlimited ways for a project to go wrong. I believe the success of the HCFA project came from an understanding of this process and mutual respect and cooperation in place of the traditional combative relationships.

The foundation is client satisfaction. A building program starts with particular client needs, which must remain the foremost consideration. The building belongs to the client and is used by the client; it is not used by the architect, and it is not a vehicle for the architect to do something other than meet the client's needs.

The client's requirements are first expressed in terms of area, functional groupings, and the aesthetic sense of spaces. Initially, the building has no form. It is simply the sum of the expectations, in many ways differing, in many people's minds.

When many paths can be followed, the only way to find the right one is through clear communication. In HCFA's case, a development competition was the response to program information. HCFA and GSA were thus able to find an initial design direction by considering various approaches, in terms of credentials, development strategy, construction cost and schedule, and design. However, this just represents the start of the process. At this point, the client and the design team have not even met. The vision exists primarily in verbal form. It must to be turned into a building somehow.

Arriving at the best and final offer (BAFO) is still more the beginning of design than the end. A good foray has simply been made in capturing the concept. But when a BAFO is turned into a building, even though the result may look good from a distance, in a monumental sort of way, it is the detail that provides the sense of enjoyment for clients and staff who work in the building, and this detail is not always achieved.

A shortcut is to simply build according to the BAFO. However, much of the enjoyment and design excellence comes in that period of design development where you come to know the clients and users well, and work with the general contractor to achieve the level of fine detail that is feasible. In developing the HCFA facility, our team cooperation in this phase was very good. In project development that is this complex, all team members are indispensable. All provided critical insights. The strategy for

cooperation during this phase was based on a quality assurance model of the general contractor, which allowed information to be easily exchanged. The fundamental question asked by team members of each other was, "How can we help you perform better?" It may sound odd, but this in fact was the spirit we had throughout the project. It was even applied in a program that McDevitt Street Bovis had for subcontractors. For exemplary performance, we congratulated the subcontractor (in this case, the precaster) by having the entire design team go down to the plant and shake hands with everyone who contributed to the process. There was a wonderful feeling all around. Reward for a job well done is extremely important, and I think often missing from this industry.

Regarding design quality, we are very proud of having provided a building of high detail within budget. We attribute this achievement to an abiding respect for the craft of building, knowledge of construction techniques, and a philosophy of designing for buildability.

To help establish HCFA's identity, we wanted to design a building that had permanence and depth and weight. We did numerous studies, using our best skills and knowledge of construction technology, to develop facades that provided this sense.

The general contractor and the developer brought in the precast subcontractor early, to advise us throughout the design process. We listened closely, and began using a master mold concept, understanding that the more forms used for precasting, the more it would cost. We tried to design simpler forms that could be variously recombined, to achieve a good amount of detailing without extra cost. We worked with the precaster to find more varied ways to sandblast the facade; everything above the cornice line is one kind of precasting, sandblasted in different ways.

For the interior of the building, the BAFO had indicated a dark wood lobby with brass trim. With a building 168 feet deep across its width, we suggested that this deep lobby be as light as possible, so that it would not feel somber (Figure 4).

In conclusion, we are now in an era of limited resources (though to some degree, we always have been). This realization should lead us to better understand and master the complete building process, to optimize design quality. It would also be wise to recognize that cooperation may be the largest factor in conserving project resources of time and energy, particularly with the many contingencies that arise.

Figure 4.
Lobby of the New HCFA Headquarters.

We made a step forward in these respects in the HCFA project. I hope our own experience can contribute to the way we all work together.

STEPHEN SKINNER MCDEVITT STREET BOVIS

I would like to continue on the theme of customer satisfaction and focus on our key processes. We had a very cooperative effort from day one, among all stake holders, a strategy that made this project work.

McDevitt Street Bovis provides quality construction services for select clients. Examples of work we are involved in includes a program management role at the 1996 Olympic Games and a general contractor role at Loudoun Hospital in Virginia.

For the HCFA project, we served as the general contractor. But we also saw our role as a facilitator to bring the team together and make the building happen. One of the tools we used is what we call Project Quality Planning. By the way, it has been acknowledged as best practice, in the Associated General Contractors' *Implementing TQM in a Construction Company* and in the McGraw Hill issue *Partnering in Design and Construction*.

Our process begins with a planning session. This is a very important activity before we begin construction. It involves all the stakeholders, as many stakeholders as we can bring together. The one-day session is the first time that many of the team members will have come together. It includes team-building exercises to get to know one another.

Following that, we develop our mission statement—a project-specific mission statement. This we also feel is a very important step. Our mission statement for this project was to deliver, "through a focused team effort, an exemplary national headquarters facility for HCFA which satisfied all customers' [I want to emphasize all customers] objectives and results in a high degree of fulfillment among project participants."

The mission statement does not go on the shelf. It is placed in our conference room, and everyone signs it to show their commitment. We then develop a win/win performance matrix. Thus, we are all tied together and committed to performance.

First, we define our roles. While roles are defined in the contracts, in this exercise we explain how we each perceive our own roles. Team

members can then understand how they will interface—a very important aspect of the project. I understand what you do, and you understand what I do. This knowledge definitely helps to facilitate communication.

Another key feature of the process is the focus on successes from the beginning. Each HCFA stakeholder group defined its own idea of a successful project. This let us understand we were all focused on the same result.

We then share more specific expectations, for example, the contractor's need for timely responses from the architect in requests for information (RFIs). The developer, GSA, and HCFA all wanted to see the project on time and within budget. Reaching this kind of understanding, while it may take a day or two to do, we feel again is extremely important.

We revisited this expectation matrix quarterly. In up to day-long sessions we exchanged information about expectations not met—and about those we did meet. We held these sessions even when pressured by the project, and made them rather formal, employing specific ratings.

After developing the win/win matrix, the next step is defining key construction processes. While these processes are generally common to all construction projects, and include such basic activities as the shop drawing process, RFIs, and scheduling, sometimes we lose sight of the most basic processes.

With the win/win agreement and key project processes defined, we follow up by means of our quality teams, the use of indicators, and training and development. For example, the quality indicator for RFIs in this and other projects has been response time. If responses were always on time, that would be great, of course, but this is not always the case. The indicators allow us to manage processes by observing any patterns or trends. We can also avoid unnecessary disputes and find solutions when we can identify the reasons for the possible negative trend.

We also had a measure for the shop drawing process. When the trend is poor, we ask, what can we do to help? This was our approach throughout. Or, if a trend is positive, we know this process is tracking fine and we can focus on other aspects of the project.

It is important not only that the architect respond on time to us, but that we are getting the submittals to them just as we committed to.

The small business concern was also a goal for the project, measured by a simple trend indicator. This aspect of the project was audited by the National Capitol Region, and GSA received an excellent

rating in this area and the same result also for minority participation.

The indicators allow us to track many processes with a simple graph, so we can evaluate efficiently, and better balance our time.

Safety was obviously important. Severity and frequency of incidents were also tracked throughout the project.

Mr. Tembunkiart touched on the issue of employee recognition. A *Harvard Business Review* study found that recognition is the second most important motivator for people, after achievement. At HCFA, we selected a quality crew of the month, and recognized them by shaking hands and telling them how great their work has been. They were amazed that we took the time to offer sincere appreciation and also very pleased. We once ordered 175 pizzas and had them delivered to the job, a very small token of appreciation for the people who are actually doing the work in the field. You can see the motivation that results from these small acts of recognition in people's faces. In fact, we once got a thank you card from the utility crew.

The HCFA project was a fast-track project with phased drawings. We established what we called the "magicians of coordination," a quality team in mechanical-electrical interfacing. Working over a lighted table, they got the parties to sign off, and kept the trades working together through the shop drawing process. We anticipate that we saved nearly half a million dollars in coordination by preventing related conflicts before they reached the field.

Another team we started several months before completion was the move team. The moving in of 3,000 people had to be coordinated with the sequence of construction. This team involved the players closest to the process.

Another example of team involvement for the fast track processes was provided by Les Horneman, who went down to the precast plant and watched them sandblast a panel to let them know exactly what he wanted. This involvement and decision making was invaluable.

Did we meet our mission? We just completed the post mortem for this project, in which we asked all of the stakeholders whether we met the mission statement from their own viewpoints. The answer was consistently, "yes!" We also had a very open and honest discussion about how we might improve in the future.

The Stewardship of Facilities

R. Admiral Robert F. Jortberg
Construction Industry Institute

I believe I have been asked to address this subject because I served on a National Research Council (NRC) committee studying advanced maintenance concepts for buildings in 1989.[1] also have some very strong personal convictions, as my colleagues know, that I developed in my years with the Navy.

From 1972 to 1974, I was Commanding Officer of the Naval Facilities Engineering Command Western Division in San Francisco. We were responsible for design and construction in the nine western states for the Navy and Marine Corps—about a third of their total construction program. It was exciting work.

However, in my extensive travels in those states, I began to see some troublesome things. I saw, for example, a fueling pier at the Naval Supply Center in San Francisco that was in such bad shape you could not bring a ship alongside. A barge had to be taken to the pier, filled with fuel, and then taken out to the ship. I saw a runway where the flying object damage to jet engines was so great every year, the cost of it exceeded the cost to pave the runway. But the monies to do these things came from different appropriations, and the needed work was not performed for years.

When I reported to the Pentagon in the summer of 1974, to plan and program resources for Navy construction and real property maintenance, I became much more concerned about why these conditions

[1] The committee's report, *Committing to the Cost of Ownership: Maintenance and Repair of Public Buildings*, was issued in 1990.

existed. After generating some statistical information, I found a startling number. In 1974, we had spent about 0.6 percent per year of current plant value of our shore establishment to maintain and repair it. In 1967, the figure had been over 1.0 percent.

It came down to the costs of fighting a war in Vietnam and meanwhile continuing all other federal activities, without any kind of tax increase. Resources were being reapplied from areas like operation and maintenance of real property, to ammunition, fighting ships, and aircraft.

I decided that we had to find a way to turn this around, or we would continue in a self-destructive spiral. We were consuming our own physical plant. This strategy might be useful in certain cases, but it does not make much sense across the board.

Many people who had been working in the Naval Facilities Engineering Command and its systems had long been arguing for increased resources for maintenance and repair, but totally without avail. I felt we had to find a different way of articulating the requirement and of convincing people that we needed to increase the allocation of resources for this purpose.

Ultimately, I came to believe, the solution depended on communicating the idea that maintenance and repair of our shore facilities was an implicit part of the cost of ownership. The decision to acquire a facility involved not only the explicit decision to buy the land needed, and to acquire the facility through either purchase or design and construction. It also implicitly involved the resources necessary to operate, maintain, update, and finally dispose of that facility. The cost of ownership is clearly a stream of costs throughout the life of a facility.

Unfortunately, paying light and air conditioning bills and performing maintenance and repair are not very exciting. They are not activities that are individually authorized or funded. No one closely examines them. They are performed almost as an afterthought. Resources are committed on the basis of a level-of-effort concept: you are likely to get the funds you spent last year, perhaps adjusted for inflation. Typically, the response to your argument is that this is not the year to catch up.

FACILITIES AS PUBLIC ASSETS

We all do recognize that our facilities are public assets. They represent a very substantial investment and they serve the public. They also enhance private sector productivity. We are all familiar with the idea that, as we permit our infrastructure in this country to deteriorate, our competitive position in world markets deteriorates as well.

Our public facilities are the primary interface between the government and public, whether in the form of post offices, schools, museums, fire houses, or any kind of public structure.

Please consider for a moment the impact of underproductive public assets, assets that do not serve their purpose well, assets that demoralize and demotivate because they are in such poor condition. What are the costs of this to our people? There are very significant costs to the public when our facilities have deteriorated and cannot serve the purpose for which they were acquired.

Facilities in poor condition not only affect our quality of life. They affect the competitiveness of our industry, as has been demonstrated many times. If we burden industries with a hidden tax of underproductive facilities and infrastructure, then industries must recover these costs in their pricing structures. As consumers, we pay for these costs in the prices of goods and services.

Moreover, the problem has a ripple effect. New York City schools today provide a perfect example. We all pay the costs of the deteriorating conditions of school facilities, and hospital and other facilities, in both our quality of life and our dollars.

VISIBILITY OF COSTS

The acquisition costs of facilities are very visible, through the appropriation process. But the costs of operations and maintenance are not. The budget structures that we are familiar with, whether federal, state, county, or community, do not spell out the implications of the funding level for maintenance and repair. But the life-cycle costs of facilities far exceed their acquisition costs.

How do we determine what level of funding ought to be allocated to maintenance and repair? When we began to address this problem in the Navy, we established a target of 1.2 percent of current plant value per year

for repair work. This funding was not to reduce backlog, but to meet the current yearly evolving requirement for maintenance and repair. Where did we get this number? It was simply two times the value we started from, which seemed to be a pretty good target. We developed some other rationale to justify this target, but developing the rationale was not hard by any means.

After hearing from many agencies for the NRC study, the committee reached a strong consensus that the maintenance and repair component of the cost-of-ownership budget should be from 2 to 4 percent of current plant value. To determine this value, some mechanism for assessing current year value of plant is needed. For a small inventory of buildings, like that of a small county, the target of 2 to 4 percent would be appropriate as an average over time, not necessarily for any given year. But for a large inventory, like that of the Department of Veterans Affairs, Public Health Service, or Department of Defense, it would be a very reasonable annual target.

People have commented that this range is quite wide in dollar terms for a large agency and asked if we could not target it more precisely. This would be a good thing to do, but at the time the NRC committee made its recommendations, we were frankly not worried about what point within this range would be ideal. Everyone was so far below, to move up to 2 percent represented a formidable challenge.

Since I retired to work in the private sector, I have learned more about what major industry does. Some of our bigger companies, like the Dupont Company, who were in fact represented on our committee, use the general calculation approach we recommended. Dupont, however, was talking about 5 percent for maintenance and repair, way above our target. In many industry situations, the cost of deteriorated facilities is much greater and brought home harder than in the public sector. Deteriorated facilities in the private sector clearly raise serious productivity, quality, and safety problems.

One root of the problem in government is the discipline involved in funding maintenance and repair. In all agencies, the money made available by one source or another for maintenance and repair is part of an appropriation package that has a good amount of flexibility associated with it. People can use maintenance and repair funds for other purposes, and they do. For example, operation and repair money may be used for minor construction projects. I call this leakage, because it is invisible.

I tried, but never succeeded, in selling the idea that appropriations and accounting structures should give specific visibility to any use of repair money for construction, no matter how small. No one liked this idea; it would impinge on freedom and flexibility. But the problem is so severe that I think this may have to happen.

We developed a solution as we wrestled with this problem in the 1970s and on the NRC study committee. First, budgets must reflect all costs of ownership, not just capital costs. They must give visibility to all costs. Second, facilities must be responsibly managed; there must be stewardship. Third, the public must be educated about the requirements and about the effects of failure to fund and manage resources appropriately.

Once, when the Navy was planning to build a large new hospital, I had to ask what sense it made to do this when we could not afford to maintain facilities we already owned. At that time, we were spending hundreds of millions of dollars on new facilities, while existing facilities were going down hill very rapidly.

We did turn the situation around. By 1979, we had reached our target figure for operations and maintenance of 1.2 percent, and we actually reached 1.3 to 1.4 percent in some years. I do not closely work with this issue today and do not know where it stands. But I have been told by some at the National Aeronautics and Space Administration, for example, that these basic concepts have been useful. At least some analysts in the Office of Management and Budget also respect the argument and use it to justify budgets.

CONCLUSION

I would summarize by saying that those serving in any public agency, at any level, should view themselves as true stewards of the facilities that are our public assets. The decision to acquire a facility implicitly involves the total cost of ownership. For this reason, I very strongly believe that the actions of public officials determine the productivity of our public assets and whether facilities are able to serve their intended purpose. These achievements, or failures, in turn, deeply affect our public well-being.

Effective Approaches to Facility Stewardship and Management

David G. Cotts
Management Consultant

As someone who has spent many years in facility management, in both public and private sectors, I would like to review briefly today the ways I believe we are falling short in our stewardship of facilities.

I see over 100 facility managers and their organizations in a year through teaching and consulting. Though most people attending the symposium are in the public sector, my observation is that the situation is not much better in the private than in the public sector. Some exceptions are seen in manufacturing areas where there is a direct connection between the success of the business and the condition of facilities.

The challenges to facility stewards are not merely questions of money. Of course, we cannot do our jobs without adequate resources. But I think there are other, perhaps deeper, problems than simply inadequate funding.

In evaluating the average public sector and average private sector facility management organization, it is useful to consider the traditional functions of management, which includes planning, organizing, staffing, directing, controlling, and evaluating.

In planning, the public sector actually may do a slightly better job than the private sector. The private sector especially does not plan strategically to the extent that it should. The Army would never plan anything major without having the engineer present, to cover facilities impacts. In most of the private sector today, however, the facilities people are kept completely in the dark. I believe we could save more money by better strategic planning with facilities in mind than in any other way.

In organizing, I would have to give us all an F—and declining. We are not organized to do the job. We too often are organized functionally when we should be working as teams. Also, we confuse staffing with organization too often. I think we really must deliberate more about how we would best be organized to do our jobs, even in today's tough economic climate.

In staffing, we do fairly well, although I believe we are overly concerned about outsourcing and out-tasking. We should be looking at how we can get the best expertise for the money, whatever that source is. If we want a function performed in house, we should be able to prove that the in-house person can do it competitively.

In directing, we get high marks. We are very good directors. We know how to work the chain of command.

In controlling, we get an A plus, because we are controllers by nature, by training, by education.

In evaluating, we do fairly, but are improving. I believe post-occupancy evaluations of major projects are critical.

The shortfalls I have described result from a profession that suffers something of an identity crisis. A major subagency of a very large government department asked me to come in and look at their facility management. The fact of the matter is they had little management at all. They had effectively no facility department, and yet they were occupying more than 200,000 square feet of space. I find this failing particularly among organizations that are being downsized. The function of managing facilities is simply disappearing.

Our problems clearly result to some degree from a lack of funding, though I will not discuss this topic here. But I will say that, as facilities managers, we do not do a very good job of presenting our case for needed resources.

Poor models and practices also cause difficulties. It is true that every agency and company is unique, as we argue all too often. But there are many best practices and good models available. The professional organizations, such as the International Facility Management Association, the Association of Higher Education Facilities Officers, and the Building Owners and Managers Association, should be publicizing them more.

TRADITIONAL FACILITY MANAGEMENT

Historically, facilities managers have been trained to fulfill a particular set of roles. They are caretakers and service providers. In the 1980s, they became employee efficiency multipliers. They are now advocates for employee welfare and controllers. Unfortunately, most facility managers also probably do not realize how much they are viewed in their organization as naysayers. They are often not viewed as people who get the job done but as people who say "no" too often. Also, they produce voluminous policies and regulations, particularly in the public sector. The time for change has come.

Traditionally, in the federal government, facilities managers have been heavily reliant on central purchasing, on procurement, and on the Federal Acquisition Regulations. These approaches must change, as they have been changing already in the private sector. Today, there are private sector procurement purchasing departments who are customer-oriented. This attitude will have to be cultivated in both public and private sectors for facilities managers to survive.

THE NEW MODEL

Facility managers in our new climate must also have the following characteristics to succeed. First, they must understand the business they are supporting and know the language of business. Last evening, I worked with a dozen facility managers on computing internal rates of return as the basis for decision making in their companies or agencies. They should also understand that the director of marketing for the company, the assistant vice president, or the assistant secretary probably obtains a bonus based on some type of business ratio, and they should understand how they influence that business ratio. In the future, government will be managed in a much more businesslike manner. Whether that is good or bad, I will not debate here, but facility managers should envision themselves as business people.

Facility managers must be articulate okespersons. I often see poor writing and speaking skills in my students when teaching facility management at the George Washington University. Facilities managers should seek out remedial training in speaking and writing much more often. Strong communication skills will be needed to carry out this work successfully in the future.

Facility managers also need to view themselves as the environmentalists for their company or agency. This role is additionally a source of visibility and recognition, to obtain support for some other programs.

Managers must be good resource obtainers. They should stop trying to run everything and get their people the resources they need to do their jobs. In "flattened" organizations, a manager cannot direct everything.

A facility manager must increasingly be an agile purchaser, lessor, and contractor. The best and smartest people should be brought to bear on the job. We have wonderful design firms, architect-engineer firms, and contractors available. In many cases, it makes no sense to try to do the work with in-house staff when that kind of talent is available in private sector firms.

A manager needs to be a strategic business planner and implementer and a good fiscal manager. This may not be as true in government as it is in the private sector, but even in the private sector there are facility managers who do not even understand their budgets. The budgets are managed by "someone in accounting." Good facility managers must understand budget patterns and trends to do their jobs.

Facility managers must be innovators and "networkers" as well. In addition, they need to be information managers, or better stated, knowledge managers. They are deluged with information. The Management Information System starts with the budget providing the basic knowledge to be a good financial manager.

And finally, a facility manager needs to be a survivor. The future will not be easy, but it will be an interesting challenge.

Techniques for Cost and Quality Control: Initiatives at The Department of Veterans Affairs

Lloyd H. Siegel
Department of Veterans Affairs

The stewardship and management of a large facilities system obviously presents its own challenges and lessons. I will address some initiatives in the Department of Veterans Affairs to better control project quality and costs.

THE DEPARTMENT OF VETERANS AFFAIRS

When people think of the Department of Veterans Affairs (VA), they think of the "Bradley hospitals" from the 1950s—the tall, thin, multi-winged brick buildings built all over the United States after World War II when General Omar Bradley was the agency's Administrator. But the VA has a highly diverse and extensive inventory of facilities. We have about 1,000 facilities, representing 4,500 buildings and 235,000 employees. We own 137 million square feet of space, and lease another 12 million.

Our inventory includes some startlingly beautiful places, such as the new Massachusetts National Cemetery in Bourne, Massachusetts, the very handsome Victorian buildings at the campus-like Veterans Affairs Medical Center (VAMC) in Levinworth, Kansas, and the ultra-modern replacement hospital in Portland, Oregon. We have some very tiny buildings, like a commitment shelter in Michigan at the VA cemetery outside Battle Creek, and enormous facilities, like the new VAMC in Houston. Our facilities include a recent $25 million clinical addition to the Westside VAMC in Chicago, nursing homes, and even vehicles that serve as mobile clinics in rural areas and which helped the VA serve Hurricane Andrew victims in

Miami, when most hospitals other than our VAMCs were out of commission.

The VA itself is relatively new, but the care of those who have served to defend us has a long history in America, as it does all over the world. The leaders of the Massachusetts Bay Colony at Plymouth used the promise of care for veterans as a recruiting tool in their wars against the Indians. Today, VA's primary clients are 27 million veterans and their families.

Our budget in 1995 was $39 billion. Construction represents $1 billion, and facilities in the pipeline add up to $5 billion, not including leases and commissioning, which we call activation. Our leased facilities and enhanced use facilities, accounting for $106 million and $10 million respectively in 1995, will become more and more important as time goes on.

QUALITY MANAGEMENT AND CONTROL

The VA has been moving on several general fronts to achieve better quality control. Our standards are evolving, more often shared today across federal government than simply departmentwide. They benchmark with comparable private sector practice, and more often take the form of guidelines rather than rigid mandated criteria. They focus more on performance, instead of being prescriptive. They are more often multidisciplinary. Finally, they are designed to be user-friendly and oriented to their particular audience.

The VA Design Guides. Our design guides prepared in this spirit include one on the hospital's surgical suite. *The Surgical Service Design Guide* was largely based on computer-aided design (CAD). In developing it, we first looked at general operating rooms from each the last 12 major facilities the VA had constructed. All of these facilities had been designed with exactly the same criteria for air changes, lighting, and other engineering requirements. Yet we had 12 examples that still differed significantly in lighting, ventilation, locations for the entry of medical gases into the room, placement of surgical lights, and so forth. Some were ideal only for left-handed surgeons working with right-handed anesthesiologists, and so on. But they all started with the same basic discipline-focused criteria that we had used in the past.

We then put together a team of surgeons, nurses, administrators, architects, and engineers, and developed a narrative statement of what needs to happen in this hospital area. Our next step was to chart the flow of the many different activities that happen in those spaces. Then we created figures, each symbolizing a person performing a different kind of activity, and together with the surgeons and others we moved them around. We got down to the precise movements necessary for the surgical procedures. This information determined where the walls and the various pieces of equipment should be placed. In turn, these decisions indicated where the utility connections should be. The surgery plan derived from all of that information was a plan that happened to be very similar to that of our Houston VAMC. This plan is something we now include as part of our design guide for surgery. It is the consensus of a very large interdisciplinary group of people about the best arrangement to support surgery "today."

But it is not a standard. It is a guide. You may choose to do things differently in your new or renovated space, but at least you, working from this knowledge base, know why you need to do it differently. The guide provides a relatively solid base, with reference to the latest technology and professional experience, compared to more arbitrarily chosen plans.

Of course, along with this, the guide includes all kinds of notes about the rationales for the decisions and the ramifications of certain choices. There is a summary of the various basic criteria for the room, and an equipment list. We used this approach to develop guides for all the different rooms within the surgical suite, as well as for a new ambulatory surgery design guide.

We have had good feedback about the use of the design guides. In fact, some of our other customers wanted the design guides so quickly, they paid the salaries of staff assigned to us, so that their guides could be prepared faster.

COST MANAGEMENT AND CONTROL

Analysis of Change Orders. As managers of a large base of facilities, we also tried to identify areas where we had the opportunity to save money. In the past, change orders were examined strictly on a project-by-project basis. If they did not exceed a certain percentage for that project, everything was fine. If they exceeded that percentage, we had a bit

of a problem. If they exceeded a still higher percentage, something more serious was afoot. We decided we ought to examine the change orders, which represent roughly 5 percent of the total project expenditures, and claims, which represent another 5 percent. We were spending $34 million a year on change orders and claims, and perhaps we did not have to spend all of it. We wanted to see whether the change orders had common features. If they did, perhaps something could be done.

We began to look systematically at change orders across projects and established a nonadversarial reporting system to analyze the change orders' rationales. We decided that the best analytical approach was to tie any problem occasioning a change order to a specific reason and also to a specification section. We used two existing financial reporting systems, tweaking them a bit, and we reassembled our data into what we refer to as the Proactive Claims Automated Tracking System (ProCATS). Table 1 shows an early analysis.

TABLE 1. Reasons for Change Orders

Issue Index	Number of Changes	Change Amount (Dollars)	Percentage of Total Dollar Value (%)[1]
A—Design Error	511	2,509,635	21
B—Design Omission	509	2,975,612	25
C—Unknown Con.	223	2,539,581	21
D—Program Change	68	748,174	6
E—Tech./Admin Dec.	227	1,009,660	6
F—Phase Design/ Con.	24	64,537	1
G—Value Engineering	1	18,000	0
H—VAMC-Requested Change	104	2,055,059	17
TOTAL	1,667	$11,920,258	

Source: Department of Veterans Affairs, Facilities Quality Office

[1] Percentages do not add to 100 due to rounding

We discovered to our surprise that the general reason for 25 percent of change orders was design omissions. Twenty-one percent were attributable to errors. Another big surprise was that 21 percent were due to unknown conditions. Seventeen percent, a lower proportion than we had previously thought, resulted from changes requested by the facility user.

In reanalyzing by specification section, we discovered that 16 percent of change orders—an unexpectedly large number—came under site work. Another 25 percent were in mechanical engineering, and 17 percent in electrical engineering.

We then analyzed the changes within each specification section, for example, heating, ventilating, and air-conditioning (HVAC), by the general reason for the change. For HVAC, we discovered that program change accounted for 17 percent of change orders, and design omissions for 31 percent.

But this was not yet enough information. We had to analyze it further. At the level of the division of the specification system we began to see some very interesting things. For example, we discovered that in one year about 1,000 change orders were associated with water coolers. The electric outlet was missing, or the plumbing connection, or the wall material behind the water cooler was not right—there were many different reasons. But 1,000 water coolers! We also discovered specifically that we were paying $1.2 million annually because in many cases no wiring was shown on the drawings between switches and motors.

Design Alerts. As one result, we began to issue design alerts for problems occurring during construction, many of which had the potential for hazardous results. These documents go out electronically to the field to all construction sites, to all medical centers, and to the architect-engineers who work for us, so that they will avoid these problems.

AE Quality Alerts. We also issue a series of documents that we call architect-engineer (AE) quality alerts. These are specifically subtitled "Avoid Errors, Omissions, and Costly Liability." These documents are prepared by discipline (architecture, electrical engineering, etc.) and by project phase, with separate AE quality alerts for schematics, design development, and construction documents. While some of these items seem to be obvious problems, these obvious problems have caused change orders time and time again (e.g., "Do not locate air intakes where trucks idle at the loading dock").

CONCLUSION

We correct our specifications and other guidelines and standards as soon as we discover dangerous or recurring problems. We also have received universal praise for our design alerts, and AE quality alerts, and have recently received a Vice Presidential Hammer Award for these efforts. A next step will be attempting to quantify savings.

As for looking down the road at long-term directions, I can only quote Yogi Berra: "I can predict anything but the future."

Facilities Managers: Communicating Your Value to Your Customers

Stormy Friday
The Friday Group

Marketing is a widely neglected aspect of facilities management. In 1979 1 was doing management consulting at the Environmental Protection Agency (EPA), when then-Administrator Ann Gorsuch called me to her office and said—nobody could get away with saying this today—"Dear, I have a problem with one of my organizational units, and I think it needs a woman's touch. I have an organization in EPA called Housekeeping, and it has given me a lot of problems over the years. How would you like to reorganize it and take it over?"

I did not know much about facility management in 1979. It did not even have a name then. There was no such profession. There was no International Facilities Management Association. So I said, "Sure." The next thing I knew, I was Director of Facilities and Real Estate.

I inherited an organization of 250 people, 275 contractors, 4 million square feet of real estate, 2 helicopters, 26 laboratories, and 10 regional offices. I was in charge of information management, design and construction, the printing plant, courier services, and the motor pool. In other words, the organization did not have much in common with what we call facility management today.

Since then I have been asking facility management organizations, "Do you tell your customers how much you contribute to their work environment?" Clearly, a primary customer of that facility organization, namely the Administrator of EPA, had few ideas about what facility management was. Obviously, then, as part of our stewardship, we need to market our services.

When I ask facility managers whether they explain their contributions, I usually hear a resounding "no" in response. Our lack of communication stems chiefly from our training as facility managers. Most of us think of marketing as involving slick sales presentations pushing products and services that we may not need. But marketing in a better sense is perhaps one of the most important things we can do.

Still, for many years, particularly in the late 1970s and early 1980s, many of us saw no need for marketing. We were in the driver's seat. We had a lot of money. We were in a controlling position because we were issuing standards and regulations, telling people how many square feet of space they could have and much about their work environment. But our customers are much smarter now, and we need to be more businesslike in presenting information on our contributions to the bottom line. Our ability to sell our concepts to senior managers or congressional appropriators depends on clear and persuasive marketing.

THREE KINDS OF MARKETING PROBLEMS

Most facility professionals have three kinds of problems in marketing: a lack of understanding of what marketing is, a lack of market definition, and a tendency to market by "SIO," or sitting in our offices.

Lack of Understanding. Few facility managers understand marketing or what it can do. Most think of it as involving sales gimmicks, which is sometimes the case. But marketing is more fundamentally the ability to sell one's strategy for delivering services—the manner in which we take those services to the various customers that constitute the market. It has two elements: marketing to familiarize customers with the services offered and marketing to decrease resistance.

The first kind of marketing, familiarizing customers with the services offered, is a battle of perception. Facility managers are evaluated by customers, who often do not understand exactly what those services are or how to judge the quality, appropriateness, and timeliness of their delivery. Focus groups with customers of facility organizations show that most are not even aware of the full menu of services that most facility organizations provide. Marketing is a plan of action to counteract those mistaken impressions by increasing customer awareness of these services. If there is no directory of services, for example, no one will know what

you provide unless they actually need a particular service enough to ask for it.

In addition, customers need to understand what some of the qualifications are for receiving particular services. I spent a large part of my federal tenure explaining to people why they were not allowed to park next to the front door unless they had worked for the agency for many years or were an undersecretary or assistant administrator.

Decreasing resistance is the second kind of marketing. Facility managers often have to say "no." We need to overcome customer resistance to policies, procedures, and regulations. Often we are the people who on Friday afternoon say "Box up all your stuff, we're coming to do cyclical painting" (or replace the carpet or pull cabling). Often we have not given people enough notice to allow them to pack up their things. By increasing knowledge and information, we can decrease resistance to many of the things that we do.

Several years ago, my company was working for the facilities engineering component of a federal government agency, consulting on process reengineering. The facility at the time had a new high-technology building coming on line. The building had plenty of open space and light, with most of the offices in the core to take advantage of the light and space. But the agency had neglected to do any commissioning. They had done no partnering with the prospective tenant, and they had failed to market the concept of the building's design. The prospective tenant said, "We aren't going into this building. We don't like its footprint. We're scientists, and we need to have private offices. We're entitled to 67 square feet per person"—and so on.

The head of this organization agreed with his people and said, "If you had included us or incorporated some of our ideas in the initial design, we might be eager and willing to go, but we're not going into a building like that." So for six or seven months the group at the agency had to play catch-up, going around and trying to market the concept by explaining to people what they had been doing.

In another example in the United Kingdom, we were working for the British Council, an organization that combines many of the functions of our State Department, U.S. Agency for International Development, and National Endowment for the Arts. The council operates in 108 different countries. Recently, we met with about 15 of the council's people from around the world, because for the first time in its history the British

Council is downsizing and reorganizing. They needed a marketing strategy to guide the central facilities organization in London so it can provide assistance to all of the facilities worldwide, from palaces donated by princes, to mobile vans carrying English teachers out in the bush. We talked about a facility marketing strategy, with press kits and best practice kits for people in all of those countries.

These cases show how marketing strategies to explain one's services are needed.

Lack of Market Definition. The second biggest marketing problem is the failure to do a good job of market definition. When I ask facility managers who their clients are, few of them can list the nine or so categories of clients most facility organizations must deal with:

- organizational units
- building units, for those who have people in more than one building or more than one organization in a building
- business units (even in the public sector)
- facility management staff
- senior management
- external customers and visitors
- partners, vendors, and others who provide services to facility organizations
- sometimes tenants, in those situations in which space is leased to outside entities, and
- the buildings themselves (which are often forgotten about by facility professionals, although it is our fiduciary responsibility to protect the investment of the government or other owner).

Unless one considers all of these customers, one has not defined the market thoroughly.

Marketing by SIO. The third marketing problem is what I call "marketing by SIO"—sitting in our offices. Many facility professionals find it easier to stay in their offices than to go out and walk around and talk with people. When I was at EPA, I believed in marketing and I walked and talked a million square feet every day. They were constructing the subway under our building in those days. In the mornings people

would give me little shoe boxes filled with dead rats and dead cockroaches because, as the subway was being dug, these animals were coming out in our building all over the place. When you encounter things like that, you appreciate why most facility managers like to stay in their offices. People don't like to receive that kind of present every day. They don't like to get nasty phone calls. They don't like to say "no." But the only way to be an effective marketer is to get out of the office and walk and talk and meet and greet.

The "three fives test" is one way to measure whether you are doing enough walking and talking. The first part of the test is to walk around the building and stop five people, and ask them to describe five services that the facilities organization provides. If four out of five of those people cannot describe these services, then you are not doing enough marketing.

The second part of the three fives test is, over a five-week period, to monitor the telephone calls that come to you personally. If half of those calls are requests for information or complaints, again, you are not doing a good job of marketing. You are not doing enough market research or arranging to get enough feedback on the services that you are providing. As a result, you do not have a very good finger on the pulse of the customers.

The third part of the three fives test is to look at meeting agendas for senior executives over a five-month period. If four out of five of those meetings do not involve discussion of facility issues, then you are not getting the attention of senior executives. The solution is to spend more time with the people who are making critical decisions, talking about the value that the facilities organization adds and how it contributes to the bottom line.

MARKETING AS INSURANCE

Marketing is like an insurance policy. We often think we do not need to do it. Yet our customers—all of those categories of people that I described—are our best allies. If those people do not tell their bosses, who then in turn talk to your bosses about the value that the facility organization adds, then senior management may find it easy, when it thinks about what to outsource, to put your organization on the line. It is vital to prepare customers to be your allies. To do that one needs to

understand what customers need, and make sure they understand what you have to offer.

MARKET ANALYSIS

Market analysis is very important. One needs to know whether the human resource organization is growing or shrinking. One needs to know whether the research and development (R&D) division is looking toward flexible working space, whether they like teaming, whether they find it important to have private offices, or whether they want to work in new modular spaces. One needs to know whether the organization is environmentally aware and whether its people and groups have any specialized needs or concerns that should concern you.

You need to know the age structure of your customers. An important trend is the aging of the baby boomers. As they age, they will present new facilities problems. Many of them will to be in the work force longer, but they may also be working from home more frequently. The ergonomic needs of senior citizens in the work force need attention.

It is necessary to understand and serve niche markets, such as the R&D staff, with their special requirements. Computer systems programmers tend to work odd hours, and some companies have installed pull-out cots next to their computers so they can sleep and work whenever they want to. Senior managers may have special service requirements.

COMPETITIVE ANALYSIS

The other thing facility managers need to spend time on is watching the competition—outsource firms. One should be aware of vendors who have spent time with senior management saying, "We can do it better, quicker, and cheaper."

CONCLUSION

Marketing in facilities management has several elements. First, stay on top of your market needs by involving yourself in the larger organization's planning process.

Second, prepare your customers for services that lie in the future.

My firm prepared a strategic facilities plan for the General Accounting Office a few years ago; they were renovating the building to remove asbestos. The marketing effort included escorting people through various corridors and observing the progress of the work.

Stimulating market interest is important, too. One of our clients, a pharmaceutical company in Chicago, recently held a "facilities day," which included a diorama in the lobby showing all of the things they had done to their buildings over a number of years, and a booth to which employees could come and ask facilities questions.

It is important to develop opportunities for showcasing. The facilities organization for the city of Barcelona, in preparation for the Euro Facilities Management Conference, showed a fascinating 12 minute time-lapse video of the development of the city for the 1992 Olympics. It showcased the infrastructure, including roads, everything that had been done for every building, and the development of the marina.

Just as we are concerned about the stewardship of our facilities, we must be concerned about what we tell people about that stewardship. We need to take all possible opportunities to explain that we add value, that we can generate productivity gains, and that we do make a contribution to the bottom line. Our customers should be telling our senior managers about all of these contributions. For this reason, as well as to provide the best services, we need to involve them in the process.

Speaker Biographies

All of the following people participated in the symposium as speakers or moderators. The Federal Facilities Council is grateful for their contributions.

MILLARD CARR is a professional engineer serving as the Director for Energy and Engineering in the Office of the Assistant Secretary of Defense for Economic Security. In this position, he is responsible for the development and implementation of Defense-wide policy and management of installations' energy use (including supply, security, fuel selection, and conservation; a $2.8 billion annual usage), facilities design specifications and construction criteria, and utility procurement. Mr. Carr is also program manager for the department's Energy Conservation Investment and Federal Energy Management programs, with centrally managed funds of about $1.1 billion. His professional experience includes 15 years of facilities energy conservation and design, construction, and engineering policy development in the Office of the Assistant Secretary of Defense; utility contracting, engineering, design, operation, maintenance and management in the Naval Facilities Engineering Command; design, research and engineering demonstration validation of prototype seawater distillation equipment with the Interior Department; and fuel applications engineering with a local gas utility. Mr. Carr holds a B.S. in mechanical engineering from George Washington University and a master's degree in public administration from American University.

DAVID G. COTTS is an internationally renowned management consultant, advising corporate and government facilities and administrative managers and their management teams. A graduate of West Point, he has an M.S. in civil engineering from Iowa State University. After serving worldwide during a 22 year career with the U.S. Army Corps of Engineers, Mr. Cotts left the Army in 1981 to help establish facility management within the World Bank headquarters in Washington, D.C. Mr. Cotts is a past president of the International Facility Management Association and a member of its first class of fellows. A certified facility manager, he helped found a facility management certificate program at George Washington University. Mr. Cotts continues to teach, lecture, and write extensively on facility management and customer-oriented services, and is the co-author with Dr. Michael Lee of the *Handbook of Facility Management*, published by the American Management Association. His latest book, published by John Wiley, is *Quality Facility Management: A Marketing and Customer Service Approach*, with co-author Stormy Friday.

TERREL M. EMMONS, AIA, is Associate Director for Design at the headquarters of the Naval Facilities Engineering Command. Since 1987, Mr. Emmons has had lead responsibility for engineering and design policy; environmental issues affecting design; design-related architect-engineer procurement; codes, standards, criteria, and guide specifications; and international issues. He also serves as a liaison to industry and federal agencies on engineering and design matters. Mr. Emmons received his B.A. in structural engineering from the University of Illinois, an M.B.A. from Loyola University, and an M.A. in urban design from the Catholic University of America. His doctoral studies at Virginia Polytechnic Institute and State University have been complemented by his participation in a variety of industry, academic, and professional endeavors, including representation of the United States as one of ten architects participating in the British Council's Architect's Study Program for Northern Ireland. As both licensed architect and licensed landscape architect, Mr. Emmons has taught numerous architecture, planning, and engineering subjects at various colleges in Virginia and has organized and chaired national and international conferences for the American Institute of Architects.

EDWARD FEINER is the Chief Architect of the Public Buildings Service at the General Services Administration (GSA). In this role, Mr.

Feiner serves as the agency design advocate and reviews all major federal buildings developed for GSA nationwide, including federal courthouses, office buildings, border stations, laboratories, and museums. Mr. Feiner's overview of the design function at GSA covers over 250 million square feet, with current work in progress of over $10 billion executed through 11 regional offices. He has written and directed the development of the design standards for GSA. In 1990, his office instituted a Design Awards Program, to raise the interest of federal managers in design excellence and encourage quality design in the public sector. Recently, Mr. Feiner implemented the first major reform of GSA's architect/engineer selection process in over 20 years. In 1995, he received the Thomas Jefferson Award for Public Architecture from the AIA. Before joining GSA in 1981, Mr. Feiner served as Director of the U.S. Navy Master Planning Program. He was also a project coordinator for Gruen Associates. Mr. Feiner holds a B.A. from the Cooper Union and an M.A. from the Catholic University of America, where he was a Graham Foundation Fellow.

STORMY FRIDAY is the founder and President of The Friday Group, a consulting firm formed to provide management, marketing, and facilities services to commercial business and government. Ms. Friday formed the firm after 20 years of diversified management and facilities experience within both corporate and governmental settings, and as a consultant. Prior to forming The Friday Group, Ms. Friday was Director of Contracts and Government Marketing for a design/build firm specializing in high-technology facilities. She served for three years as Director of Facilities and Support Services at the U.S. Environmental Protection Agency, with responsibility for over 4 million square feet of laboratory and office real estate. During her tenure, Ms. Friday developed the first civilian agency master plan and was a leader in developing and implementing one of the first client services programs within the federal government. Ms. Friday also spent many years as a management consultant specializing in employment programs, strategic planning, organization development, and social programming. She works frequently as a trainer and as a national and international speaker. In 1994, she co-authored a book with David Cotts, *Quality Facility Management: A Marketing and Customer Service Approach*, published by Wiley and Sons. Ms. Friday serves on the International Facilities Management Association

Board of Directors as the Director of Affiliate Affairs. She holds a undergraduate degree from Simmons College and a master's degree in Public Administration from Northeastern University.

THOMAS B. GROOMS is the leadership specialist in design at the National Endowment for the Arts. In June 1996, he became a Program Specialist with the Design Excellence Office at the General Services Administration. Since 1987, he has managed the Federal Design Improvement Program, a multifaceted program of design education, promotion, review and technical assistance to help federal agencies achieve design excellence. He also manages the quadrennial Presidential Design Awards and the biennial Design for Transportation National Awards programs. Prior to joining the Arts Endowment, Mr. Grooms was Director of Conventions and Tourism for the District of Columbia Chamber of Commerce, and for six years was Executive Director of the Center for Environmental Education, a national non-profit organization in Washington, D.C. His previous government experience includes that as chief designer for the renovation of the American Cultural Center and Library in Katmandu, Nepal; as writer/analyst for the Commission on Federal Paperwork, and as legislative attorney for the chief counsel of the Internal Revenue Service. Mr. Grooms received a B.A. from DePauw University, a B.F.A. in environmental design from the Parsons School of Design, and a J.D. from the Georgetown University Law Center.

GEORGE E. HARTMAN, Jr., FAIA, has been a partner in Hartman-Cox Architects since the firm was founded in 1965. The firm has received 95 awards for its work, culminating in 1988 with the AIA Architectural Firm Award. The firm's practice has been characterized by increasingly large projects, especially in the institutional and commercial areas. Much of its work has been in the Washington, D.C., metropolitan area, with a large number of notable commissions in the monumental core/Pennsylvania Avenue corridor. It has also undertaken projects throughout the United States and as far away as the United States Embassy in Malaysia. Mr. Hartman received his B.A. and M.F.A. from Princeton University. He is a fellow of the American Institute of Architects and of the American Academy in Rome. He has taught at Catholic University, North Carolina State University, and the University of Maryland, where he was the Kea Distinguished Professor in 1973–1974,

and has served on numerous juries. He has been President of the local AIA chapter and chaired and served on numerous committees and commissions of the AIA, the District of Columbia, and the federal government, including the U.S. Commission of Fine Arts and the Architectural Advisory Board of Foreign Buildings Operations, U.S. Department of State.

DANIEL L. HIGHTOWER is Associate Director for Management Controls and Policy in the Division of Engineering Services, National Institutes of Health. He has served in many positions for the U.S. Public Health Service: as a sanitary engineer for the Indian Health Service; later as Chief of Facilities Management for IHS Portland Area Office; as Deputy Director, Office of Engineering Services, for the Health Resource Services Administration (with annual projects totaling up to $6 billion); and as the Senior Technical Advisor for Architecture and Engineering for the Division of Health Facilities Planning in the Office of the Assistant Secretary for Health. Mr. Hightower has experience ranging from designing and building structures and utilities, to managing major programs for health facilities, to administration and establishing national policy. He has also served as assistant professor of Engineering Technology and as an architectural engineer for Kivett and Meyers, working on the Kansas City International Airport. He has a master's degree in architectural engineering from the University of Kansas and is a registered architect in the state of Maryland. Mr. Hightower is a member of the AIA steering committee for revisions to the AIA *Guidelines for Construction and Equipment of Hospitals and Medical Facilities*, guidelines used by most state governments as code for all health facilities and by many federal agencies.

CHARLES I. HOMAN has served as president and chief executive officer of the Michael Baker Corporation since 1994. He is a registered professional engineer in 33 states. Mr. Homan led in planning and implementation of the company's Total Quality Management, for which the organization has won several awards. In his current position, he has also implemented the reorganization of Baker's engineering, construction, and operations and maintenance groups into five market-driven business units. A graduate of West Virginia University, he also completed the Advanced Management Program at Harvard Business

School and the Management of Managers and Executive Management Training Programs at Pennsylvania State University. He was named "State Engineer of the Year" by the Pennsylvania Society of Professional Engineers in 1994, "Pittsburgh Engineer of the Year" by the American Society of Civil Engineers in 1992, and "Engineer of the Year" by the Beaver County Chapter of PSPE in 1991.

PAUL L. "Les" HORNEMAN is a facilities operations management specialist with the Health Care Financing Administration (HCFA). He has served as project director for HCFA's new 980,000 square foot headquarters complex in Woodlawn, Maryland, housing 3,000 employees on a 57.4 acre site. Mr. Horneman previously was Director of HCFA's Office of Administrative Services, where he was responsible for all aspects of facilities management, health and safety, security, printing, graphics, voice telecommunications, video conferencing, and vehicle fleet maintenance. In his 22 year federal career, he has held numerous management positions at HCFA and the U.S. Department of Agriculture. He has a B.S. in operations research from the University of Maryland and is pursuing an M.S. in information and telecommunications systems at Johns Hopkins University.

ROBERT JORTBERG is Associate Director of the Construction Industry Institute and a consultant to the engineering and construction industry. At CII, a research organization committed to improving the quality and cost-effectiveness of the U.S. engineering and construction industry, he is responsible for the support of member companies in implementing the results of CII research and serves as liaison to professional societies and business organizations. As a consultant, he works with owner and contractor organizations in strategic project planning, project management, construction, and risk management. From 1979 to 1986, Mr. Jortberg served as senior manager with Lummus Crest, an international process plant engineering and construction organization. Earlier, he served in a variety of positions involving facilities management, public works management, and design and construction of facilities, with the U.S. Navy Civil Engineer Corps. Rear Admiral Jortberg holds a B.S. from the U.S. Naval Academy, a bachelor's degree in civil engineering and an M.S. from Rensselaer Polytechnic Institute. He completed the Advanced Management Program at the Harvard Business School.

JONATHAN KURTIS is Senior Vice President-Construction for Boston Properties, a national real estate development firm with offices in Boston, New York, and Washington, D.C. Since its inception in 1970, it has developed and continues to own over 13 million square feet of space. Mr. Kurtis is responsible for all construction activities related to Boston Properties developments in the Washington metropolitan area. During his 12 years with Boston Properties, the company has developed over 7 million square feet of commercial and institutional space, in addition to hotel and multi-family housing projects. Notable projects in the Washington area include The Thurgood Marshall Judiciary Office Building, the headquarters for the National Aeronautics and Space Administration, the Comptroller of the Currency, the International Trade Commission, and the Park Hyatt Hotel. In the Baltimore area, Boston Properties recently completed the new headquarters for the Health Care Financing Administration. Prior to joining Boston Properties, Mr. Kurtis was a project manager for OMNI (now Clark) Construction. He is a graduate of the University of Florida and holds a Bachelor of Building Construction degree from the College of Architecture.

WILLIAM MAY is Assistant Deputy Director for Advanced Broadcasting Technologies at the International Broadcasting Bureau. Previously, as Assistant Deputy Director for Projects Management, Mr. May was responsible for the planning, design, and construction of overseas radio stations for the Voice of America. From 1978 to 1985, he served as project manager for Nuclear and Coal-Fired Power Plants at the Rural Electrification Administration. Mr. May holds a B.S. in mechanical engineering and a master's degree in engineering administration from Virginia Polytechnic Institute and State University.

STEPHEN V. MAGNUSSEN is Director of Operations for the Bureau of Reclamation, U.S. Department of the Interior, Washington, D.C. The bureau, the nation's largest wholesale water supplier and ninth largest electric power generator, operates and maintains water storage, water distribution, and electric power generation facilities in the 17 western states. Mr. Magnussen has 36 years of experience with the bureau, including service on the staff of the Assistant Secretary for Water and Science as bureau liaison. From 1991 to 1994, he served in the Liaison Division, as both Acting Chief and Lower Colorado Regional Office

liaison. Previously, he held several positions in regional planning. His years dedicated to Reclamation have earned him two of the highest honors given to exceptional career employees of the federal government, the Superior Service award in 1989, and the Meritorious Service award in 1993. Mr. Magnussen earned his B.S. in civil engineering at Fresno State College.

ELLEN J. McCOLE is senior project manager/contracting officer with the General Services Administration in the Philadelphia region, where she has wide-ranging management and contracting responsibilities for major construction projects. Recent projects include the newly constructed 900,000 square foot Health Care Financing Administration Headquarters in Woodlawn, Maryland; the renovation and retrofit of the 2.5 million square foot Social Security Administration Headquarters in Woodlawn, Maryland; and the new construction of the training facility/hotel for the Federal Executive Institute in Charlottesville, Virginia. Previously, Ms. McCole served as a realty market specialist with GSA and an independent marketing consultant. She holds a B.A. from Temple University.

ROBERT A. PECK is Commissioner of the Public Buildings Service in the U.S. General Services Administration. As Commissioner, Mr. Peck leads PBS, which is the federal government's real estate asset manager, and is responsible for building, leasing and operating federal workspace. PBS manages an owned and leased inventory of over 280 million square feet, accommodating over one million workers in more than 8,000 buildings. The PBS annual budget is approximately $5.5 billion, nearly 90 percent of which is contracted to the private sector. Prior to joining PBS in December 1995, Mr. Peck was Deputy Director of the Office of Legislative and Intergovernmental Affairs at the Federal Communications Commission. Before his work at the FCC, Mr. Peck was Group Vice President for External Affairs at the American Institute of Architects. He has also served on the staff of U.S. Senator Daniel Patrick Moynihan (D-NY), first as associate counsel to the U.S. Senate Committee on Environmental and Public Works, and then as Senator Moynihan's Administrative Assistant (chief of staff). Mr. Peck was Deputy Director of the Federal Council on the Arts and the Humanities at the White House during the Carter Administration and has held positions at the National Endowment for the Arts and the U.S. Office of Management and Budget.

Mr. Peck played a key role in such legislation as the Public Buildings Cooperative Use Act of 1976, which encourages historic preservation and commercial, mixed-use activities in the federal buildings program; the Public Works Improvement Act of 1984, which initiated a review of federal capital investment; legislation to restore Washington's Union Station; and the Intermodal Surface Transportation Efficiency Act of 1991. Mr. Peck received a B.A. in economics from the University of Pennsylvania and a law degree from Yale Law School. He has been a visiting lecturer in art history at Yale University and a Loeb Fellow in Advanced Environmental Studies at the Harvard University Graduate School of Design. He is a member of the District of Columbia Bar.

JON RYBURG is president of the Facility Performance Group, a strategic real estate and facilities management issues research, consulting, and education firm. He was formerly Senior Research and Consulting Associate with the Herman Miller Research Corporation and Facility Management Institute and was instrumental in the earliest organization of the International Facility Management Association. Mr. Ryburg holds an M.S. from the College of Architecture and Urban Planning, Illinois Institute of Technology. He is a regular presenter at IFMA chapters throughout the U.S. and at other forums including NEOCON, Intelligent Buildings Institute, AEC Systems, Tradelines, International Society of Facility Executives, and Office Planners and Users Group. Mr. Ryburg is the author of many articles that have appeared in trade, professional, and management publications, including the Conference Board Magazine *Across the Board*. He has also authored and contributed to several books and studies on facility management, including *Technologies for Facilities Management* in 1995, for the Building Owners and Management Institute; *Electronic Enterprises: The Future of Organizations*, for the Office of Technology Assessment, United States Congress, in 1994; current ANSI *National Ergonomic Standard for Computer Users in the Workplace* and *Best FM Practices: New US. Facility Responses to Changing Business and Organizational Objectives*.

LLOYD H. SIEGEL, FAIA, is Director of the Facilities Quality Office, U.S. Department of Veterans Affairs. In his present capacity, Mr. Siegel coordinates and maintains the standards, design guides, manuals, and specifications used by the VA personnel who design VA facility

projects or review the designs of consultants. In addition, Mr. Siegel is responsible for promoting Total Quality Management in design and construction, providing specialty technical project support to help solve facility design, maintenance, and operating problems, and selecting and evaluating architecture and engineering consultants. He also oversees Seismic programs, Historic Preservation, Barrier Free Design, the State Home Grant and Homeless Grant programs, and maintains a database for budgeting VA construction projects. Prior to joining the VA, Mr. Siegel was president of Siegel and Schroeder Developers—real estate developers in Chicago, Illinois. He also has owned and managed a consulting firm specializing in health planning, facility design, and management since 1976. He served as Deputy Executive Director of the Health and Hospitals Governing Commission of Cook County, Illinois, and as Deputy Administrator for Health Services for the City of New York, where he was responsible for planning, construction, equipment, and oversight of a capital budget of $2.2 billion. Mr. Siegel earned his B.A. in architecture from Princeton University and a master's degree in architecture from the Massachusetts Instituto of Technology. He was a Fulbright Fellow at Universita di Roma and was awarded a second Fulbright at the Institute Politecnico di Milano. He holds National Council of Architectural Registration Boards certification and has been licensed in several states.

STEPHEN H. SKINNER is Senior Vice President of McDevitt Street Bovis, a construction services firm providing program management, project management, general contracting, construction management, design/build, and construction consulting services. Mr. Skinner has oversight of the company's Washington, D.C., office. Prior to his current appointment, Mr. Skinner served as senior project manager on several of the firm's largest projects, including the Health Care Financing Administration headquarters building in Woodlawn, Maryland; the National Aeronautics and Space Administration headquarters in Washington, D.C.; and the Pentagon City mall complex in Arlington, Virginia. Mr. Skinner has also been instrumental in facilitating McDevitt Street Bovis' quality program. Having served as quality manager for the Washington office, he implemented the programs and processes that led the firm to win the 1994 United States Senate Productivity Award for the State of Maryland, a stepping stone to the prestigious Malcolm Baldrige Award. Mr. Skinner is a Qualtec trained facilitator, and received a B.S.

in building construction and an associate's degree in architectural engineering from Purdue University.

STANLEY W. SMITH is a retired corporate real estate executive now engaged in consulting, representing the construction industry to real estate executives in both public and private sectors. Earlier, he served as Assistant Postmaster General-Facilities, responsible for all asset management, leasing, and a major construction program for the U.S. Postal Service. Prior to this, he was President of AT&T Resource Management, AT&T's real estate subsidiary. In these two roles, Mr. Smith had the responsibility for approximately $10 billion of construction projects, including corporate headquarters, manufacturing plants, laboratories, office buildings, postal distribution centers, and post offices. Mr. Smith received a bachelor's degree in electrical engineering from the University of Nebraska and an M.S. in industrial management from the Massachusetts Institute of Technology.

ERIC TEICHOLZ is president of Graphic Systems Inc., a Cambridge, Massachusetts, firm specializing in facility management technology consulting and systems integration. Graphic Systems' clients have included the Environmental Protection Agency, National Aeronautics and Space Administration, and Office of the Architect of the Capitol. Mr. Teicholz is a contributing editor to several magazines and the author of nine books, including McGraw-Hill's award winning CAD/CAM Handbook, *Computer-Aided Facility Management*, and *Facility and Real Estate Management in the Information Age: Lessons from the US. and Japan* (John Wiley & Sons). Mr. Teicholz is an architect educated at Harvard University. He remained at Harvard's Graduate School of Design for a number of years as a Professor in Architecture and as Director of Harvard's largest R&D facility, the Laboratory for Computer Graphics and Spatial Analysis, which performed research and software development in the area of CAD and Geographic Information Systems. While at Harvard, Mr. Teicholz designed and helped develop the first commercial architectural CAD system.

GOODLUCK TEMBUNKIART is an associate vice president of RTKL Associates, an international architecture/engineering firm with a 500-person, multidisciplinary staff and offices throughout the world.

Projects for the federal government are an important part of the firm's design portfolio. Mr. Tembunkiart is a senior project architect/project manager, responsible for projects ranging from urban planning and historic federal government buildings to smaller special architectural projects. He served as the senior project architect for the Health Care Financing Administration Headquarters and the U.S. Capitol Visitor Center, a 450,000-square-foot underground facility that is currently awaiting funding. His projects have won awards from the Washington and Baltimore chapters of the American Institute of Architects, among others, and have been published in local, national, and International publications. He holds a bachelor of architecture degree from Cornell University and is a member of the American Institute of Architects. Mr. Tembunkiart is co-author and primary illustrator of *Why Design?: Activities and Projects from the National Building Museum*, which was published by Chicago Review Press.

RUDOLPH K. "RUDY" UMSCHEID is Vice President for Facilities of the U.S. Postal Service. He is responsible for all properties owned or controlled by the Postal Service, one of the largest civilian construction programs. Postal Service real estate holdings are valued at $10 billion, including approximately, 6,000 owned and 28,000 leased facilities, totaling 258 million interior square feet. In Mr. Umscheid's previous position as Executive Vice President for JMB/ Urban Development Company of Boston, he developed projects in the Boston area, including the $600 million Copley Place mixed-use project and the 116 Huntington Avenue project, a $70 million, 14-story office building in the Back Bay area. He also was associated with the development of City Place, a 1.2 million square foot office-retail project in Hartford, Connecticut. Earlier, for Bechtel International Corporation, headquartered in San Francisco, Mr. Umscheid managed the development of major commercial projects in Europe, the Middle East and the Far East. Mr. Umscheid received a bachelor's degree in civil engineering from Union College and a master's degree from Stanford University.

IDA M. USTAD, Deputy Associate Administrator for Acquisition Policy, is the General Services Administration's Senior Procurement Executive. As such, she is responsible for the issuance of regulations in the Federal Acquisition Regulation, as well as internal GSA acquisition

policy and regulations. Ms. Ustad recently participated in Vice President Gore's National Performance Review, as one of the team reviewing federal procurement. A career civil servant since 1971, Ms. Ustad has worked in various contracting positions within the General Services Administration.

KATHRYN WEST is Associate Dean of Operations for the Harvard Medical School. In this position, she manages 1.5 million square feet of campus real estate and 13 off-site commercial and residential properties. She oversees all facilities management, construction and renovation, environmental health and safety, energy management, and support services. Previously, as Director of Real Estate Development with the Massachusetts Bay Transportation Authority, Ms. West directed all real estate development activities of the authority, with responsibility for negotiating developer agreements, identifying new market initiatives to generate revenue, and implementing and managing more than 20 projects simultaneously with a staff of six professionals. She has also held increasingly responsible management positions with the Massachusetts Port Authority, Boston Redevelopment Authority, Massachusetts Department of Public Health, and Harvard School of Public Health. Ms. West holds a B.A. in government from Smith College and an M.B.A. from Boston University.

GEORGE WILLIAMS is Assistant Director for Special Projects in the Division of Engineering Services at the National Institutes of Health. In his career with the federal government, Mr. Williams has also served at NIH as Acting Deputy Director of the Division of Engineering Services; at the U.S. Coast Guard as Program Manager for the Support and Design Centers and as Civil/Value Engineer; and with the U.S. Department of Agriculture as Project Manager for Lab Facilities. Earlier, Mr. Williams was a senior structural engineer with the design firm RTKL and was President of Saxe Engineering. He also held engineering positions with Lamprecht Consultants and the Baltimore Gas and Electric Company. Mr. Williams holds a B.S. in civil engineering from the University of Virginia at Blacksburg.