INTERGOVERNMENTAL ACCOUNTABILITY

The Potential for Outcome-Oriented Performance Management to Improve Intergovernmental Delivery of Public Works Programs

U.S. Advisory Commission on Intergovernmental Relations
May 1996 SR-21

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Report to Vice President Al Gore

Prepared with financial assistance from the Federal Highway Administration

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May 1996 **SR-21**

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Executive Director

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HIGHLIGHTS

The *Report of the National Performance Review* (NPR) recommended that the Advisory Commission on Intergovernmental Relations (ACIR) "develop appropriate benchmarks and performance measures to improve the understanding of public service delivery effectiveness." This study was to address the need to "reinforce the outcome focus in intergovernmental collaboration . . . to rethink and redesign more effective intergovernmental program solutions" and to develop "national economic and social benchmarks [to] give all levels of government a clear framework for policy choice and priority setting" with "a focus on citizen customers."

As an initial response to NPR's assignment, this report briefly summarizes several recent surveys of state and local performance indicators and performance budgeting experiences, reviews current strategic planning and performance management programs in 13 federal public works agencies, and discusses related intergovernmental policy implications. Addressing the topic of performance-based government has become more urgent as proposals by the Congress and the Administration for new block grants and performance partnerships have multiplied and focused attention on the forms of intergovernmental accountability that might be provided in these new programs consistent with increasing the flexibility available to the state, local, and tribal governments. This topic also needs timely consideration to meet the requirements of the *Government Performance and Results Act of 1993* (GPRA).

The research for this report found that:

- Experience with performance goals and measurable indicators of progress toward those goals is increasing in many local, state, and federal government departments and agencies.
- Experience with performance goals and measures, to date, indicates that many difficulties remain to be overcome.
- Outcome-oriented performance management practices offer many potential benefits to intergovernmental service delivery programs.
- Most performance management programs are not intergovernmental.
- Therefore, using performance goals as an intergovernmental accountability mechanism in block grants and performance partnerships could introduce new dangers into intergovernmental programs if caution is not exercised.

The implications for intergovernmental service delivery suggest the need for:

- Intergovernmental processes to establish flexible and appropriate performance goals and indicators;
- Federal support for identifying and learning more about the use of good performance management practices; and
- State and local efforts to spread and strengthen the use of outcome-oriented performance management practices.

RESEARCH RESULTS

EXPERIENCE WITH PERFORMANCE-BASED GOVERNMENT IS INCREASING

- A considerable amount of performance improvement activity is occurring at each level of government—federal, state, and local—but no individual government is achieving the full range of potential benefits.
- The cases examined in this study included various combinations of strategic planning, stakeholder involvement, goal adoption, performance measurement and tracking, and program evaluation and redesign to improve goal achievement. Sometimes the goals are set to improve pre-existing conditions in the same jurisdiction; sometimes comparisons are made to other governments or geographic areas.
- Within the federal government, this activity is being reinforced by the work of the National Performance Review, enactment of the *Government Performance and Results Act of 1993* (GPRA), and the efforts of many government managers.
- Several state and local governments also have established strategic planning, performance management and budgeting, or "benchmarking" by law or ordinance. Others are proceeding less formally at the initiative of the chief executive or legislative body.
- Most of this activity has begun since 1986, and is being pursued by the initiating governments for their own purposes.
- Some performance improvement programs are stronger on the outcome-oriented approach (Oregon, U.S. Environmental Protection Agency), while others are oriented more toward internal management and program improvement purposes (Minnesota, Corps of Engineers), and still others concentrate more on budgeting and cost savings (Texas, Sunnyvale, CA). Together, these innovations illustrate most of the improvements that can be expected from performance-oriented practices.

TECHNICAL AND LOGISTICAL DIFFICULTIES REMAIN TO BE OVERCOME

- **Development Issues.** Successful performance improvement programs take significant time and effort to develop, and they cost money. Sunnyvale, CA, and the state of Oregon, two of the best known jurisdictions that have pursued such programs, both have been at it for many years, and both still have a great deal of further development work to do. Sunnyvale is moving to incorporate a greater degree of outcome-orientation, while Oregon is taking steps to encompass more of the budget process.

  A jurisdiction wishing to start a performance improvement program cannot simply choose a model and implement it quickly. These programs involve:

  (1) Changing established practices and the organizational cultures of political bodies as well as bureaucracies;

  (2) Overcoming competition and conflicts among multiple governmental and other stakeholders; and

  (3) Surmounting numerous analytical and data limitations.

  There are many challenges to be met and obstacles to be overcome in developing performance improvement programs, and the effort must be institutionalized and sustained for many years to achieve the expected results—bridging across electoral shifts and the changing assignments of key officials.

- **Analytical Limitations.** Among the analytical limitations is the need to develop credible performance measurements that reliably link the inputs and outputs of government programs to the broadest societal outcomes expected to result from those programs. Current measurement systems under development in the U.S. Environmental Protection Agency and in the departments of Transportation, Agriculture, Commerce, and Energy are still experimental. They need scientific and political validation to provide a solid basis for specifying quantifiable performance measures and national data needed to measure desired outcomes.

  Furthermore, governments may be uncomfortable being held responsible for outcome goals because such outcomes are not under their own direct control, and they may not be able to deliver the specified results. Governments are more comfortable taking responsibility for achieving results if they have a voice in assessing the risks of failure and setting the goals in light of those risks.

- **Data Limitations.** Although many outcome data series exist at the national level, they often have not been incorporated into a performance management process designed to track program impacts. These data series include a wide range of demographic, economic, environmental, and other indicators of the status of the people, the economy, and the quality of life.

  For measuring the outcomes of public programs, comparisons among local governments, neighborhoods, regions, and states often are important. To be useful as performance measures for intergovernmental service delivery programs, national data series, and even international series in some cases, need to be capable of being disaggregated and related to specific governments and programs. Different governments need different levels of detail at different times to effectively manage their responsibilities for intergovernmental service delivery.

  Some of these national data series could be built more effectively and efficiently by greater sharing of data among the federal, state, and local governments. There are too few cases where this sharing occurs.

  A potential model of data sharing to build on is the cooperative data compilation embodied in the Department of Transportation's Condition and Performance Report to Congress concerning the nation's surface transportation systems. It is based largely on data supplied by the state departments of transportation, metropolitan planning organizations, and local transit operators. The potential contributions of automated geographic information systems have barely been tapped for such purposes.

OUTCOME-ORIENTED PERFORMANCE MANAGEMENT OFFERS POTENTIAL BENEFITS

Outcome-oriented performance improvement practices potentially benefit the intergovernmental delivery of public services by:

(1) Focusing on beneficiaries;

(2) Redesigning public programs to enhance intended benefits;

(3) Using performance budgeting to redirect resources to programs that deliver the greatest benefits; and

(4) Aligning interagency and intergovernmental programs with common goals and accountability frameworks.

ACIR's research found that each of these benefits is beginning to be realized in one or more places, but their full potential has not been realized anywhere.

- **Focus on Beneficiaries.** Looking at public programs from the beneficiary's viewpoint poses the fundamental question, "Are you better off?" because of the program. This shifts assessment of the program's success from what the program does to what effect the program has on the people, the economy, the environment, or whatever the government is trying to improve. Programs that are not having the desired effect (or outcome) should be reevaluated against established outcome goals.

  Setting the desired outcome goals includes a process of developing visions of the future cooperatively with the affected parties, establishing practical targets for progress toward achieving the goals, and establishing systems to track the government's performance. Desired outcomes—such as healthy children, stable families, a competitive workforce, livable communities, and a healthy environment—illustrate the results to be achieved by outcome-oriented programs. The Oregon Benchmarks program is a leading example of this approach.

- **Program Redesign and Management Improvement.** Pressures to reduce the federal deficit are cutting federal aid to state and local governments, thereby spurring the search for efficiencies and savings that will not sacrifice program performance.

  Outcome-oriented program goals have begun to tie together related programs in several agencies and governments, helping them to achieve broadened outcomes that individual programs cannot achieve alone. Communication of these goals in some governments has begun to:

  (1) Reach from top policymakers all the way down to operating units;

  (2) Bring program evaluators together with operating personnel to determine what does and does not work; and

  (3) Reach beyond government to involve major stakeholders and the public.

  Outcome-related performance measures in Oregon, for example, provide a common language that all the parties have begun using to communicate with each other. Improved program effectiveness and customer satisfaction gradually are becoming key elements of the "bottom line" for governments that are taking this approach.

- **Performance Budgeting.** Performance management innovations are beginning to show where additional resources will do the most good, and where existing resources are not producing desired results. "Performance budgeting" is being used by some governments to produce better results while cutting costs. To be most successful, this budgeting needs to permeate the resource allocation process from top to bottom so that the smallest operating unit are aligned with the broadest goals.

- **Intergovernmental Flexibility, Alignment, and Accountability.** The potential for outcome goals to establish commonly held expectations about the achievements of intergovernmental programs has led to proposals for using these "performance" goals to hold state and local governments accountable for spending federal funds in the ways intended by federal laws and regulations. The intent is to provide greater flexibility by emphasizing the end result rather than specifying the precise process or means by which the result is achieved.

  The large number of pending proposals to devolve greater responsibility to the state and local governments through new block grants and performance partnerships has brought a new sense of urgency to the exploration of this intergovernmental account-

ability issue. Intergovernmental agreement on performance goals and reliable measures to track their achievement has been proposed to replace many of the uniform federal process requirements that have been found so restrictive and counterproductive by many state and local governments.

MOST PERFORMANCE IMPROVEMENT PROGRAMS ARE NOT INTERGOVERNMENTAL

Of all the cases examined in this study, only four have significant intergovernmental characteristics.

- The *Oregon Benchmarks* program is the most notable. The state has made significant efforts to spread its comprehensive, statewide benchmarking process to the city and county governments, and that effort has begun to get results. In addition, Oregon has initiated partnerships with the federal government in human services and transportation that are beginning to show how performance goals and measures can serve the accountability needs often linked to the enhanced flexibility being proposed with federal partnerships and block grants.
- A second notable case is the *Goals 2000* program of the U.S. Department of Education. In this program, intergovernmental goals have been developed collaboratively with the states and adopted by Congress, and annual national report cards for elementary and secondary school systems are issued. In this case, the general goals, data series, and reporting are national, but specific annual targets for improvement are set voluntarily by the states, local school systems, and individual schools, depending on their own starting points, available resources, and circumstances.
- The other two cases of intergovernmental performance management involve (1) the *six new "management systems"* required by the *Intermodal Surface Transportation Efficiency Act of 1991* (ISTEA) and (2) the 1995 Administration proposal for a *National Environmental Partnership System*. These two initiatives have started the U.S. Department of Transportation and the U.S. Environmental Protection Agency moving toward performance planning with their state and local counterparts.

However, even these intergovernmental programs need further development.

USING PERFORMANCE GOALS TO ACHIEVE INTERGOVERNMENTAL ACCOUNTABILITY MAY INTRODUCE NEW DANGERS INTO INTERGOVERNMENTAL PROGRAMS

There is great fear among state and local governments that the use of performance goals and quantitative measures of progress in federal intergovernmental programs is yet another means by which the federal government can force its will on them. The fear is that the federal government will:

(1) Unilaterally impose uniform performance standards across the nation that may be impossible to meet or inappropriate in given situations;

(2) Make invidious comparisons among state and local governments without taking into account the many historic and current factors that inevitably produce differences among jurisdictions; and

(3) Punish certain governments and unfairly reward others with inappropriate allocations of federal resources or with legal sanctions or favors.

In short, the fear is that performance standards will be used as another form of federal mandate—potentially even more difficult to comply with than the existing ones if they are based on outcomes which state and local governments have no voice in developing and over which they have no direct control.

The current lack of trust among the federal, state, and local governments makes it difficult to dismiss the fear of rigid federal requirements that hangs over the promise of enhanced flexibility. Many of the intergovernmental players remain skeptical that accountability provisions reflecting true partnership will materialize.

IMPLICATIONS

INTERGOVERNMENTAL PROCESSES TO ESTABLISH FLEXIBLE AND APPROPRIATE PERFORMANCE GOALS AND INDICATORS IN INTERGOVERNMENTAL SERVICE DELIVERY PROGRAMS

State and local fears of performance mandates as accountability mechanisms in federal aid programs probably can be reduced if the federal, state, and local governments work cooperatively and openly to create intergovernmental performance management systems. Such a process could help to:

(1) Rebuild trust and confidence in government programs;

(2) Rebuild trust among the federal, state, and local governments;

(3) Provide greater flexibility in implementing intergovernmental service delivery programs;

(4) Provide forms of accountability in intergovernmental service delivery programs that recognize the separate electoral accountability that state and local governments have to their own citizens and the separate roles that these governments play in the federal system; and

(5) Improve the effectiveness and efficiency of intergovernmental service delivery programs.

Key elements of these cooperative intergovernmental processes might include:

- Intergovernmental consensus on national goals that would: establish the outcomes expected from intergovernmental service delivery programs, limit the reach of national goals to clearly demonstrated national interests, allow flexibility to accommodate compatible state and local goals, and provide for adjusting national goals as new knowledge becomes available;
- Intergovernmentally accepted performance measurement frameworks that link the inputs and outputs of intergovernmental programs to the related outcome goals;
- Readily accessible and affordable national data series for measuring progress toward achieving national, state, and local outcome goals using information from coordinated federal, state, and local data sources; and
- Principles and guidelines for negotiating the terms of performance partnerships in intergovernmental service delivery programs, appropriately related to conditions within the implementing governmental jurisdictions.

FEDERAL SUPPORT FOR COOPERATIVE DEVELOPMENT OF FLEXIBLE AND APPROPRIATE PERFORMANCE GOALS AND MEASURES FOR INTERGOVERNMENTAL PROGRAMS

As the number of performance partnerships and block grants increases, the utility of federal efforts to increase flexibility for state and local governments becomes more apparent. Appropriate efforts might include:

- Identifying and giving visibility to federal, state, and local "best practices" for performance improvement;
- Transferring the lessons learned from the GPRA pilot projects, the Oregon Option program, and other sources to other federal agencies and their intergovernmental partners;
- Helping to establish and support an interagency federal action team, such as the one set up among human services agencies for the Oregon Option, to work with state and local governments on performance improvement issues in public works (and perhaps in other major federal program areas);
- Supporting fundamental research to link program inputs and outputs to outcomes;
- Providing federal statistical agencies with resources to support required national performance indicator data series;
- Training federal agency personnel responsible for performance improvement, and their state and local counterparts;
- Providing technical assistance to federal agencies and their state and local counterparts as they confront key performance improvement issues; and
- Avoiding unilateral mandates and preemptions whenever possible.

STATE AND LOCAL PERFORMANCE IMPROVEMENT PROGRAMS

Strong performance-based policy and management practices in state and local governments can be expected to help establish a firmer basis for (a) increased trust among the federal, state, and local governments, (b) greater flexibility for state and local governments in implementing intergovernmental programs, and (c) more appropriate provisions for intergovernmental accountability in these programs. To pursue this approach:

- State and local governments already using performance improvement programs might consider a fuller range of activities to capture more of the potential benefits of outcome-oriented goal setting and tracking, management and program improvement, performance budgeting, and cost savings.
- State and local governments that have not yet begun performance improvement activities may want to establish such programs.

Key features of the programs being pursued by state and local governments include:

- An outcome orientation;
- Executive and legislative involvement;
- Public involvement;
- A long-term statutory and institutional foundation;
- Training support;
- Program evaluation support; and
- Statistical support.

CHAPTER 1

GOVERNMENTS MUST PERFORM BETTER

This chapter addresses three points:

(1) **Why** governments must perform better;

(2) **How** governments can and are beginning to do so; and

(3) **What** this report will do to help.

WHY MUST GOVERNMENTS PERFORM BETTER?

There is a pervasive perception across America that government—especially the federal government—is not working very well and costs too much. As a result, governments at all levels are facing tax limits and pressures to hold the line or cut back on expenditures.

The National Performance Review, under the leadership of Vice President Al Gore, is pursuing a long list of recommendations designed to produce government that "works better and costs less." At its heart, this new initiative is designed to rebuild the people's confidence in government. Waste needs to be rooted out, but wise investments and essential benefits still need to be delivered.

How can governments make these changes in the best interests of the people—and regain their trust?

HOW CAN GOVERNMENTS PERFORM BETTER?

One answer to what it takes for governments to perform better—the one examined in this report—is to **manage for results**. The important results, if government wants to regain the confidence of the people, are the outcomes that the people experience in their everyday lives.

Ever since the 1980 presidential election, the key question that the voters have been focusing on is, **"Are you better off now than you were?"** Better off (1) in what sense, and (2) how much?

If governments are to be able to answer these fundamental questions, it is argued, the policymakers need to set **outcome goals**, and then find ways of measuring progress toward those goals. Outcome goals and **performance measures** would become the center of government policymaking, management, and communication. All of this should improve **governmental accountability**.

This accountability system is proposed to link (1) the bureaucracy with the political leaders, (2) the federal government with the state and local governments that deliver intergovernmental services, and (3) the governments with the people. It would create three parallel dialogues about how well the government delivers what it promises for the taxes it collects.[1] **Reliable performance data are essential if these dialogues are to be constructive.**[2]

When governments promise better outcomes in people's lives (are you better off?), the taxes they collect become **"inputs"** intended to enable them to deliver on their promises. But, this is where the rub comes; it is not always clear how government actions change people's lives. The government's inputs—in money, time, and effort—produce program **outputs**. Outputs are program products and services that are intended to make people's lives better, but they may not necessarily do so. There may be many reasons for this disconnect, some of which may be beyond the control of governments. **Outputs are not the same as outcomes!**

Traditional management systems have dealt with inputs (budgets) and outputs (program results)—things that the government can measure and control fairly well—but not with the less controllable, and sometimes less measured, outcomes (changes in the lives of real people and their environment). Managers have a natural and quite understandable aversion to being held accountable for outcomes that they cannot control directly.

Thus, outcome-oriented government must address the **linkages** between inputs, outputs, and outcomes.

Creating these linkages requires strategic planning that spells out clear governmental **missions**, **visions** of the future, **quantified outcome goals**, **performance measures** for tracking progress toward both output and outcome goals, and **program evaluation and redesign efforts** to help ensure attainment of goals. Effective management and budget justification require establishing the role of program inputs (time, money, equipment, and people) in producing the program outputs (facilities and services) needed to help create desired outcomes (healthy, happy, and productive people; livable communities; clean environments; and sustainable natural resources).

Customer satisfaction (including voter satisfaction and taxpayer satisfaction) has become part of the outcomes measurement process in many cases because that is one way of expressing the "bottom line" for governments, much as profit is a convenient indicator of the bottom line for a business.

GOVERNMENT PERFORMANCE PRACTICES ARE EMERGING

Despite the technical difficulties of developing outcome-oriented management systems, there is great interest in such systems, and they are beginning to emerge in local, state, and federal agencies. One indication of the emerging interest in the subject is the attendance of about 1,000 people at each of two major symposia on performance-oriented government organized by the LBJ School of Public Affairs at the University of Texas in the last three years.

This movement has become so popular that the International City/County Management Association recently established the Comparative Performance Measurement Consortium. The Consortium has a policy board and a series of program-specific technical advisory committees. Thirty-one cities and five counties have joined this consortium (see Box). Recent surveys of local and state governments also confirm significant use of these practices.

Local Governments

A 1994 national survey of city and county budget processes, answered by finance directors in 1,396 jurisdictions (764 municipalities and 632 counties), found that:

- The budgets developed within about half of these governments contain program descriptions, analyses and evaluations, narrative justifications, statements of program goals, and requests for program changes when being considered within the government, and about one-third still contain these types of details when released to the public.
- Service delivery levels and other activity or program output information are included in about one-third of internal budget documents, and about one-quarter of the published documents.
- Performance measures (efficiency and cost-effectiveness) and measures of goal attain-

ment appear in just under one-quarter of the internal budgets, and around one-fifth of the external budgets.

- 37 percent of the governments responding reported using program measures for management as well as for budgeting.
- 21 percent of the governments reported that performance measurement had improved their program productivity or efficiency.
- "Benchmarking"—defined as the process of setting quantified outcome goals and measuring progress toward them—was reported to have improved program productivity in 6 percent of the governments.

Local Governments Represented on ICMA Comparative Performance Measurement Consortium (July 1995)

CITIES

Anaheim, California
Arlington, Texas
Atlanta, Georgia
Austin, Texas
Baltimore, Maryland
Boston, Massachusetts
Charlotte, North Carolina
Cincinnati, Ohio
Dallas, Texas
Fresno, California
Houston, Texas
Kansas City, Missouri
Las Vegas, Nevada
Long Beach, California
Los Angeles, California
Minneapolis, Minnesota
Norfolk, Virginia
Oakland, California
Oklahoma City, Oklahoma
Phoenix, Arizona
Reno, Nevada
Richmond, Virginia
Sacramento, California
San Antonio, Texas
San Diego, California
San Jose, California
Seattle, Washington
Shreveport, Louisiana
Tucson, Arizona
Virginia Beach, Virginia
Wichita, Kansas

COUNTIES

Clark County, Nevada
Hamilton County, Ohio
Jefferson County, Colorado
Washoe County, Nevada

The conclusion of this survey is that "budget processes have changed to accommodate management improvement processes used by local governments." [3]

Another indication of local adaptation to the use of outcome measures is their rapid installation and use of geographic information systems (GIS).[4] These systems allow close tracking of customers, their needs, the delivery of services to them, costs, and benefits—for a variety of different geographic service areas.

The optimism in these two reports is tempered, however, by the current lack of maturity in using performance budgets and GIS as key decisionmaking aids in most local governments.

States

A 1992 national survey of state agencies in 20 programmatic areas also indicates that goals-oriented planning and management is evolving in state governments.[5]

Survey responses were returned from most of the states for three infrastructure-related program areas: transportation (49 states), environmental protection (41), and natural resources (41). These are program areas with long histories of planning.

Overall, the survey responses (for all 20 program areas combined) indicated that:

- Strategic planning practices are being adopted to a significant extent by state agencies.
- 90 percent of those agencies see this new practice as important in clarifying agency priorities and establishing management directions; large majorities also see it as important in guiding policy decisions (82 percent) and budget decisions (73 percent).
- Furthermore, the state agencies saw strategic planning as important to improving service delivery (71 percent) and developing a greater commitment to customer satisfaction (59 percent).

Although noting that many state agencies are not yet using strategic planning, the researchers concluded that this practice has begun to improve state government performance, and can be expected to continue growing and evolving. In particular, it is expected to be diffused downward in the organization to subunits where the employees that most directly affect the actual delivery of services are located, and to facilitate the rethinking of work processes necessary to improve the quality of services.

At about the same time as this nationwide survey was being conducted, the U.S. General Accounting Office (GAO) contacted budget officials in 12 states reported to be leaders in performance budgeting and then visited five (Connecticut, Hawaii, Iowa, Louisiana, and North Carolina) that reported:

- Regularly including performance measures in their budget documents; and

- Including measures such as effectiveness and productivity. [6]

GAO's interviews with legislative and executive officials revealed that, even in these five "best practice" states, "resource allocations continue to be driven, for the most part, by traditional budgeting practices." The reasons GAO found for this condition were:

- Difficulties in achieving consensus on meaningful performance measures;
- Dissimilarities in program and fund reporting structures; and
- Limitations of current accounting systems.

GAO also reported, however, that performance measures were providing greater benefits outside the budget process, where they aided managers to:

(1) Establish program priorities;

(2) Strengthen management improvement efforts;

(3) Deal with budget cuts; and

(4) Increase flexibility in allocating funds.

Finally, GAO reported state officials telling them that performance measures are more likely to be used and maintained if they are:

- Linked directly to agency missions and program objectives; and
- Agreed to by both the legislative and executive branches.

Another survey of state performance measures was carried out in 1995 by the Southern Growth Policies Board and the National Association of State Development Agencies. It focused on state economic development agencies, where programs frequently have an infrastructure element. Responses were received from 31 states. The report found:[7]

- All 31 states had quantified economic development goals and objectives.
- In most cases, some or all of these goals and objectives were included in both long-term and short-term plans and budgets.
- Most of the performance measures were for the services provided (quantity, quality, and timeliness)—**outputs** of the state program activities.
- However, 76.6 percent of the states also measured the impact of these services—**outcomes** such as new jobs created.
- Customer surveys were the most frequently used method of measuring performance.
- The standards of comparison for performance most often were targets set in the state's own plans (75.9 percent), followed closely by historical trends (72.4 percent) and benefit/cost estimates (69 percent). Much less frequent were comparisons with other states (37.9 percent) and with non-state organizations (17.2 percent).
- The audiences for performance reporting by state economic development agencies most often were agency managers (90 percent of the states). However, the legislatures (80 percent) and governors (73.3 percent) were not far behind. The general public (56.7 percent) and agency advisory committees (46.7 percent) lagged significantly.

The Federal Government

The National Performance Review recommended results-oriented performance planning, and linked its recommendations to the *Government Performance and Results Act of 1993* (GPRA). Within this framework, the President has begun to sign performance agreements with his department and agency heads and to start them off on a results-oriented strategic planning process with a strong customer satisfaction element.

All federal departments and agencies now have been told to move in that direction, though they are proceeding at different speeds and from different starting points. For some departments and agencies, this is just the latest round in a well established planning process—perhaps with a bit different emphasis than before. For others, it is a first-time experience.

By the early part of the next century, all the federal departments and agencies are expected to be planning and budgeting their programs on the basis of performance goals and quantified measures of progress toward meeting their goals. Meanwhile, more than 70 pilot projects are being pursued under GPRA.

One of the most noteworthy intergovernmental precedents for an outcomes-oriented planning and management process at the national level is the Department of Education's *Goals 2000*. Begun under President George Bush, that process brought the 50 governors together with the President to set goals for

educating our children to become key resources for American businesses fighting to remain highly competitive in the emerging worldwide marketplace. After several years of cooperative intergovernmental development, the goals were endorsed by the Congress to help improve state and local education programs. Each year, the federal government issues a "report card" on each school system.

This cooperatively developed, voluntary performance monitoring process is an intergovernmentally friendly alternative to arbitrarily specified federal mandates that carry penalties. Yet, it satisfies the need for governments to be accountable for results in the use of public funds. The nationally established goals and performance reporting system provides a "benchmark" against which state and local governments can measure the results of their programs. The Congress has threatened to extinguish this program.

Despite some bright spots in moving toward performance-oriented management, the federal agencies have a long way to go. Studies by GAO and the Congressional Budget Office prepared just before GPRA was enacted indicate that some program "performance" data are being collected regularly by most federal agencies, but they (1) concentrate on inputs, outputs and agency financial health rather than on outcomes for citizens, (2) are used primarily by agency technical personnel, but (3) are seldom used to support management, planning, budgeting, or other policymaking activities.[8] This led the Congress to lengthen the implementation schedule and start it with pilot projects in volunteer agencies.

What this Report is Designed to Do

Assignment to ACIR

In a specific recommendation to ACIR, the Report of the National Performance Review requested the Commission to "develop appropriate benchmarks and performance measures to improve the understanding of public service delivery effectiveness."[9] Vice President Al Gore addressed the Commission on September 26, 1994 to urge the Commission to consider helping the federal government develop these measures by surveying state and local pioneers in outcome-based government.

This report provides an initial response to NPR and the Vice President.

Accountability in Intergovernmental Service Delivery

Although the federal government and the state and local governments are urged by NPR to pursue benchmarks, performance goals, and outcome measures for their own purposes, the assignment to ACIR directly addressed the need to help "reinforce the outcome focus in intergovernmental collaboration" and "to rethink and redesign more effective intergovernmental program solutions." The NPR report calls for "development of national economic and social benchmarks [to] give all levels of government a clear framework for policy choice and priority setting," and "a focus on citizen-customers. . . ."[10]

This intergovernmental focus takes on an added sense of urgency as the Congress and the Administration engage in a "devolution revolution," which pass many responsibilities back to the state and local governments. The primary tools for this devolution may be block grants and waivers that give state and local governments significant new amounts of latitude in pursuing intergovernmental programs.

This new latitude raises concerns about the extent and certainty of accountability for results, and that is where program goals and performance measures are presumed to be of use. Therefore, this report considers how "benchmarking" can help to fill this need.

Focus on Public Works

ACIR chose to focus this report on public works programs for two reasons: (1) to take advantage of previous Commission work in that field, and (2) to avoid overlap with the more formal federal-state human services "benchmarking" effort known as the Oregon Option. The state is a leader in the use of outcome-oriented performance goals and measures to improve the delivery of public services, and it has entered into a formal intergovernmental agreement with the federal government to jointly facilitate the delivery of services that promote stable families, healthy children, and an internationally competitive workforce. Waivers of restrictive federal rules to increase state and local flexibility are the improvements sought, rather than additional federal money.

For purposes of this report, the field of public works is not defined precisely. (In general, most federal involvement with state and local infrastructure is through transportation, water, and waste management programs.) However, it also has sweeping environmental protection and natural resources interests that interact with state and local programs—often through regulations. Thus, the array of federal programs included in this report is fairly broad. It includes the departments of Agriculture, Army (Corps of Engineers), Commerce, Energy, Interior, and Transportation, as well as the Environmental Protection Agency and the Federal Emergency Management Agency.

One intent of this report is to share strategic planning and GPRA compliance experiences among these departments and agencies, and compare them with similar efforts by state and local governments to facilitate interagency and intergovernmental learning.

CONTENTS

ACIR's recently published reports on the federal infrastructure strategy, built on the work of the National Council on Public Works Improvement, are heavily oriented toward performance goals and performance measures. Chapter 2 summarizes that body of work as a framework for this study.

Chapter 3 summarizes the Oregon's pathfinding work in public sector "benchmarking." The Oregon experience provides yet another starting point for this study, because we adopted the Oregon approach and definitions for use in our field work.

Chapter 4 reports the results of a new survey of state and local benchmarking experiences prepared especially for this study.

Chapter 5 summarizes the status of strategic planning and performance reporting in the principal federal infrastructure departments and agencies.

NOTES

[1] An excellent handbook for developing performance accountability systems in state governments is Jack A. Brizius and Michael D. Campbell, *Getting Results: A Guide for Government Accountability* (Washington, DC: Council of Governors' Policy Advisors, 1991).

[2] An excellent introduction to developing performance measurement systems for governments is Michael D. Campbell, *Building Results: New Tools for an Age of Discovery in Government* (Washington, DC: Council of Governors' Policy Advisors, 1994).

[3] Glen Hahn Cope, "Budgeting for Performance in Local Government," *Municipal Year Book 1995* (Washington DC: International City/County Management Association).

[4] Stephen J. Venture, "The Use of Geographic Information Systems in Local Government," *Public Administration Review* 55 (September/October 1995): 461-467.

[5] Frances Stokes Berry and Barton Wechsler, "State Agencies' Experience with Strategic Planning: Findings from a National Survey," *Public Administration Review 55* (March/April 1995): 159-168.

[6] U.S. General Accounting Office, *Performance Budgeting: State Experiences and Implications for the Federal Government* (Washington DC, February 1993) GAO/AFMD-93-41.

[7] Linda Hoke, *A Review of Performance Measurement Activities at State Economic Development Agencies* (Research Triangle Park, NC: Southern Growth Policies Board, August 1995).

[8] U.S. General Accounting Office, *Program Performance Measures: Federal Agency Collection and Use of Performance Data* (Washington DC, May 1992); Congressional Budget Office, *Using Performance Measures in the Federal Budget Process* (Washington DC, July 1993).

[9] "Strengthening the Partnership in Intergovernmental Service Delivery," A Supplement Accompanying *Report of the National Performance Review* (Washington, DC, September 1993), p. 25.

[10] Ibid.

CHAPTER 2

FOCUSING ON PUBLIC WORKS PERFORMANCE

This chapter provides background on previous national attempts to view public works programs with a performance orientation. Substantial thought and action have been devoted to this topic.

The chapter begins with a review of the performance-oriented views of the National Council on Public Works Improvement (NCPWI), and then follows the evolution of that approach through the Federal Infrastructure Strategy studies and issuance of the Executive Order on Principles for Federal Infrastructure Investments. This information provides a basis for considering performance goals and measures as parts of an accountability mechanism for the new flexible block grants and "performance partnerships" now under discussion.

National Council on Public Works Improvement

When the National Council on Public Works Improvement made its final report to the President and the Congress in April 1988, it stressed the need to concentrate on the performance of services—not just on new construction.[1] The big national needs studies in the 1980s documented demands for new construction so far beyond realistic expectations for new investment as to be practically irrelevant to the political dialogue of those times.

By turning toward improved performance, therefore, NCPWI sought to draw attention to low-capital means of meeting service needs, such as (1) timely maintenance of existing facilities, and (2) more efficient operation of existing facilities (including peak pricing or congestion pricing to dampen or spread out demand; high occupancy vehicle requirements; smart cars and smart highways to increase the capacity of existing facilities; and the like).

NCPWI's report, *Fragile Foundations*, included a "Report Card on the Nation's Public Works" [2] and devoted two of its six chapters to performance issues. The report card gave each of eight types of public works a grade of B through D, averaging to a grade of C- (see Table 2-1). Clearly, the Council saw a need for improvement. It recommended "strengthening system performance" by:

- Renewed attention at every level of government to maintaining our current assets to optimum standards;
- Upgrading the quality and quantity of basic public works management information; and

Table 2-1
Overall Performance and Illustrative Measures of Performance for the Nation's Public Works, by Category

Types of Public Works	Grades	Physical Assets	Service Delivery	Quality of Service to Users
Highways	C+	Lane-miles Number of bridges Vehicle registration Fleet size	Passenger miles Vehicles miles Ton-miles	Congestion or travel time Pavement condition Volume/capacity ratio Accident rates Population with easy access to freeways
Airport	B-	Number of aircraft Commercial seat-miles Number and type of airports	Passenger miles Enplanements Aircraft movements	Number and length of delays Accident rates Near miss rates Population with easy access
Transit	C-	Number of buses Miles of heavy rail Subway seat-miles Bus miles	Passenger miles Percent of work trips Transit trips	Average delays Breakdown frequency Population with easy access Elderly/handicapped access Crowding: passenger miles per seat-mile
Water Supply	B-	Water production capacity Number of water facilities Miles of water main	Compliance with MCLs Reserve capacity Finished water production Fraction of population served	Water shortages Rate of water main breaks Incidence of water-borne disease Finished water purity Loss ratios
Wastewater Treatment	C	Capacity (mgd) Number of plants Miles of sewer	Compliance rate Reserve capacity Infiltration/inflow Volume treated Fraction of population served	Compliance with designated stream uses (local) Sewage treatment plant downtime Sewer moratoria
Water Resources	B	Number of ports, waterways Reservoir storage capacity Number of dams Miles of levees, dikes	Cargo ton-miles Recreation days Flood protected acreage Irrigated acreage Kwh hydropower produced	Shipping delays Dam failure rate Power loss rate Value of irrigated agricultural product Value of flood damages averted
Solid Waste	C-	Landfill capacity Incinerator capacity Number of solid waste trucks	Tons of trash collected Tons landfilled Tons incinerated	Collection service interruptions Facility downtime Rate of groundwater contamination
Hazardous Waste	D	Number of hazardous waste generators Number of treatment, storage, and disposal facilities	Tons of RCRA hazardous waste generated Tons of RCRA hazardous waste stored, treated, disposed	Levels of environmental and health risks

Sources: NCPWI, *Fragile Foundations*, pp. 49-50. See also Apogee Research, *Consolidated Performance Report*, p. 77.

- Capital planning and budgeting procedures as an integral element of the federal decisionmaking process.[3]

Chapter II of *Fragile Foundations*, published in 1986, assessed the performance of public works at that time, using a variety of existing multi-year data series that described changes in: physical assets, service delivery, the quality of services, and the cost-effectiveness of the programs. These assessments were updated in 1993 for the U.S. Army Corps of Engineers, using the same consulting firm that did the original work for the NCPWI. Table 2-1 presents an illustrative list of the performance measures.

Chapter V then identified and considered performance goals and performance measures:

- Six performance goals;
- The types of decisions required to reach those goals and the types of decisionmakers responsible for making them;
- The performance data and analytical tools needed to support performance-based decisions; and
- The means of encouraging and supporting performance-based information systems and decisionmaking processes.

Table 2-2 shows the relationships between the Council's six basic public works performance goals and the types of governmental decisions that need to be made by policymakers, managers, and technical staffs in public works agencies, community development regulation offices, and associated intergovernmental aid offices. The Council's report makes it clear how vital it is to establish firm links between program inputs, outputs, and outcomes.

At least as long ago as the first Hoover Commission report, this point has been made, and still there is little progress toward achieving it. The reason for this lack of progress is that program performance and program impacts are not being measured very much. Mostly what is being measured is the financing of programs (the budget inputs)—and that is not enough to help public officials make wise decisions about the results they want and the results they are getting from the programs they fund. This is equivalent to considering only the costs and ignoring the benefits.

The NCPWI report proposed a greatly increased emphasis on measuring results. And the six types of results focused on are the six shown in Table 2-2. The following list restates and expands on these six goals:

Table 2-2
Public Works Performance Goals and Related Decisions

	PERFORMANCE GOALS					
Necessary Decisions	**Synchronize Public Works w/ Development**	**Attain Established Levels of Service**	**Support Economic Development & Fiscal Policies**	**Distribute Services Equitably**	**Limit Deferred Maintenance Liabilities**	**Enhance Economic Return on Investment**
1. Adopt Development Plans and Fiscal Policies	X		X			X
2. Adopt Service Standards	X		X			
3. Administer Development Regulations	X		X			X
4. Adopt Capital and Operating Budgets	X	X	X	X	X	X
5. Administer Development Exactions	X	X				
6. Set User Fees	X	X		X		X
7. Regulate the Use of Public Facilities	X	X		X	X	X
8. Design, Construct, Operate and Maintain Public Facilities				X	X	X
9. Collect and Analyze Data	X	X	X	X	X	X

Source: NCPWI, *Fragile Foundations*, p. 111.

- Synchronizing the pace of community development with the schedule of providing essential and desired public facilities;
- Managing those facilities so as to provide the community with the level of services it wants, is willing to pay for, and has agreed to;
- Reflecting current public policies about the pace and type of economic development desired in the consequent taxing and budgeting policies of the community;
- Distributing the services provided by public facilities fairly and equitably among the various neighborhoods of the community to achieve social justice and to improve the functioning and productivity of the whole community;
- Maintaining public facilities in good working order so that they will contribute to uninterrupted productivity in the community for a low long-term cost; and
- Prioritizing capital, operating, and maintenance expenditures on public facilities to get the greatest economic return on these investments over the long term.

As Table 2-2 shows, the process of achieving these results rests in the hands of many different types of decisionmakers who need to work together if the desired results are to be achieved. But, working together is neither easy nor common. It requires that significant time and effort be devoted to agreeing on performance goals, agreeing on the roles of the various decisions and decisionmakers in achieving the goals, and agreeing to coordinate the relevant activities. These agreements need to be established not just across agencies but also across governments. The process of reaching agreement is too complex to summarize adequately here, so Chapter V of *Fragile Foundations* is reprinted in Appendix 1 of this report for easy reference by persons needing further information to help establish public works performance management systems.

For national policymaking about public works, there are a few well established examples of performance measures, such as the Highway Performance Monitoring System which dates back to 1968, and the Section 15 transit performance reports that date back to 1984. However, these reports remained separate and largely output oriented until 1993. They are only now being combined into a comprehensive report on the status of the nation's whole surface transportation system that is beginning to address the economic and social significance of those programs for the nation.[4]

National reporting on the environment has been outcome oriented from the first annual report of the Council on Environmental Quality in 1970. However, those reports have focused narrowly on protecting the physical environment. Little attention was given to relationships with the economy until the last two or three years when the "sustainable development" movement began rising to prominence.[5]

A larger framework of "social indicators" began developing within the federal government in the 1930s, however. That movement—which peaked in the 1970s with a great deal of research and several attempts at practical application—offers significant lessons for pulling together national indicators of outcome-oriented program performance now that the *Government Performance and Results Act of 1993* is drawing the nation's attention back to this important topic.

Joseph W. Duncan, a former top official in the U.S. Office of Management and Budget who was heavily involved in the social indicators work of the 1970s, has drawn lessons from that experience for reviving the indicators movement "within an 'anticipatory framework' that can provide insight into tomorrow's problems within a 'decision framework' for guiding future policies." His reason for urging that the nation push ahead with this work is that:

> Social policy should be based on a good understanding about what is happening in society. Programs should be undertaken in response to clearly defined problems, and the problems should be adjusted as social conditions change. A sound statistical base is an important ingredient in the information base required for making and achieving effective social policy.[6]

In Duncan's view, care needs to be taken to ensure that the statistical indicators of social outcomes are the product of a deliberate process of establishing goals and then seeking measurements to evaluate those areas of concern as they change in the future. Just any data that happen to be available will not do.

The measures, he writes, must "establish the background and description for those issues that will become future public policy concerns" and "must be robust enough to describe both current conditions, and the progress that has resulted from prior policy decisions."[7]

Persons responsible for incorporating national indicators into outcome-oriented performance monitoring systems would benefit from building on the experiences of the social indicator movement of earlier decades and the lessons they offer.

Federal Infrastructure Strategy

Following completion of NCPWI's report, the U.S. Army Corps of Engineers was assigned the multiyear task of developing a federal interagency infrastructure strategy. The Corps engaged ACIR to help it undertake the required interagency and intergovernmental consultations.

The final statement by Federal Infrastructure Task Force I (one of six task forces convened by ACIR) was entitled "Improving the Quality of Infrastructure Investments."[8] It laid heavy emphasis on:

- Developing performance goals collaboratively with program customers as part of a strategic planning process;
- Including such outcome-oriented goals as direct economic benefits, improved economic productivity, public health and safety, social well-being, quality of life, environmental protection, and national security;
- Measuring and analyzing program performance; and
- Using performance concepts in establishing federal investment strategies designed to raise the government's "return on investment."

Exhibit 2-1, at the end of this chapter, excerpts relevant portions of the Task Force Statement.

While the ACIR consultations on strategy development were going on, the Corps commissioned two other major efforts on the performance front:

- Apogee Research, *Consolidated Performance Report on the Nation's Public Works: An Update* (Washington, DC: U.S. Army Corps of Engineers, Institute for Water Resources, 1995); and
- Board on Infrastructure and the Constructed Environment (BICE), *Measuring and Improving Infrastructure Performance* (Washington, DC: National Academy Press, 1995).

As mentioned before, the *Consolidated Performance Report* is an update of the earlier report by the same title prepared for NCPWI in 1987. The update carefully reviews, documents, and summarizes existing data series that describe the physical assets, product delivery, quality of service, and cost-effectiveness of aviation, highways, mass transit, water resources, wastewater treatment, water supply, solid waste management, and hazardous waste management.

The BICE report considers performance measurement systems and makes recommendations for some much needed improvements. In summary, it recommends that:

- Each level of government responsible for infrastructure explicitly define and collect an adequate set of performance measures responsive to its own policymaking and management needs—to facilitate benchmarking;
- Governments include data on effectiveness, reliability, and cost in these data sets;
- Governments work together to coordinate data collection and ensure compatible national data sets;
- Governments direct their priorities for new data sets toward functional areas where data currently are sparse;
- Governments make the institutional changes needed to enable a systemwide approach to managing infrastructure performance; and
- Federal government infrastructure policies and regulations accommodate local decisionmaking processes and measurement frameworks within the context of valid national interests.

Exhibit 2-2 presents the full text of the BICE findings, conclusions, and recommendations. The report also lists examples of effectiveness, reliability, and cost measures.[9]

Exhibit 2-1

Excerpts from Statement of Principles and Guidelines, Federal Infrastructure Task Force I

IMPROVING THE QUALITY OF INFRASTRUCTURE INVESTMENTS

IV. GUIDELINES FOR EVALUATING INFRASTRUCTURE INVESTMENTS

Define Performance Goals. Defining performance goals is an essential first step in evaluating any program and set of related investment options (public or private). An important part of this effort is to identify the customers of the program, consult with them, and assess their needs. Customers (or stakeholders) should be defined broadly, including direct users (trucking firms for highways, for example) as well as indirect clients (manufacturers and service firms that need on-time shipments). The goals of customers should not be assumed, but rather should be assessed as directly as possible, perhaps using market research and public involvement.

In most cases, negotiating and setting goals will help define a meaningful set of performance measures. While the specific goals for each program will vary according to the category of infrastructure and the government responsible for making decisions, they are likely to include direct economic benefits, general economic productivity, public health and safety, social well-being, quality of life, environmental protection, and national security.

Typically, this goal-setting should be undertaken as part of an agencywide strategic planning process that reexamines agency missions, legislative requirements, and underlying trends. The recently completed strategic planning exercises at the Department of Transportation and the Department of Energy are examples worth examining for lessons learned in crossing program boundaries, reconceptualizing issues, and reformulating goals in light of changing realities.

Measure and Analyze Performance. Achieving these goals requires, in turn, better measurement and analysis. In addition to the analytic techniques highlighted below, these efforts should include descriptions of current physical conditions, level of demand, and service quality. Care should be taken to formulate performance indicators that go beyond simple averages and work toward program-specific indicators. Demand forecasts, along with high-capital and low-capital options for meeting and managing this demand, should be developed. The appropriate government to undertake this work will vary. . . .

Establish an Investment Strategy. This improved measurement and analysis should be conducted within an overall framework that incorporates a strategic perspective. Infrastructure programs are only one of the ways available to each agency in carrying out its overall mission. As such, the capital investment program should be coordinated with other agency activities and with the activities of agencies that have complementary roles and goals. Frequent and full communication within the agency and with other agencies to develop a shared understanding of these roles is important.

V. MENU OF DECISION-SUPPORT TOOLS

Performance Measures. Relevant and internally consistent measures of performance provide the key raw material for internal evaluations of the expected effectiveness of infrastructure investments while also helping to make the results more understandable to decisionmakers and the public.

Different programs have different goals or provide a different emphasis to similar groups of goals. (For example, urban mobility is important for both transit and highways, but each may emphasize different aspects of mobility.) Some programs provide services; others emphasize risk reduction (better health or safety); while others aim to stimulate productive private investments. Most will serve a combination of goals. Program performance should be defined not by inputs, but in terms of program outputs and by the social, economic, and environmental outcomes that will result (such as a specific threshold or improved performance compared to the past).

Efforts to evaluate investments need improved measures of performance. The SEA reporting concepts being considered by GASB and FASAB should be pursued to help meet the need for better measures of conditions and performance. Such measures should be reported regularly, both to track specific programs (thus helping to hold their sponsors accountable) and to establish longitudinal data bases to aid in projecting future outcomes under new or changed programs.

One of the few existing performance efforts in the federal government is DOT's biennial report to Congress, *The Status and Condition of the Nation's Highways, Bridges, and Transit.* The 1993 volume is the latest to report on the characteristics, condition, and performance of these systems. Future federal and nonfederal investment requirements for all highways and bridges are estimated based on the costs to meet different performance levels in pavement condition and traffic service.

The report has not been static; regular efforts have been made to expand the scope and type of analyses, and to improve underlying data and analysis. Transit and highways are now combined, and changes are under way that should provide a more comprehensive assessment of alternative investments. A new Highway Economic Reporting System (HERS) using a benefit-cost framework is being developed to complement the long-standing Highway Performance Monitoring System (HPMS), which uses an engineering-based analytic process. Improvements also are needed to incorporate operational options for improving "level-of-service" performance, focusing on outcomes, and tracking program performance and outcome trends over time.

Although each infrastructure program has its own unique needs, other departments and agencies should consider adopting analytic and reporting systems similar to those developing in DOT.

Benefit-Cost Analysis. This form of analysis incorporates a range of traditional evaluation techniques developed by economists, including rate of return analysis, net present value of benefits, and various timing measures. As practiced by water resource agencies, benefit-cost analyses typically estimate how much better off the nation's economy would be if the project were to be built. Other applications frequently have less expansive horizons, focusing on more narrowly defined geographic regions and on more direct project benefits and costs.

Exhibit 2-1 (cont.)

IMPROVING THE QUALITY OF INFRASTRUCTURE INVESTMENTS

A minimum threshold for this type of analysis is usually whether or not benefits exceed costs (after discounting future streams), but the methods can be used to rank projects according to the highest returns, thereby helping to select a program of projects that provides the greatest overall return within a limited budget. If applied consistently across programs, the techniques of benefit-cost analysis can provide information (however imperfect) that can help set cross-program priorities. This advantage should be cultivated. As mentioned below, the costs of externalities should be included in the benefit-cost analysis whenever possible.

Timing measures such as pay-back period (how long before the benefits exceed costs) and first-year benefits (does the rate of return exceed a hurdle rate in the first year of operation) are important outputs from this analysis.

Cost-Effectiveness Analysis. Once performance measures have been developed, they can be used to assess individual investments and programs in terms of their ability to improve performance and their cost-effectiveness in doing so. They can be particularly valuable when used as part of a strategic planning effort that assesses the relative merits of alternative program structures, including qualitative factors that can complement a comprehensive benefit-cost analysis.

Analysis of Externalities and Unintended Consequences. In addition to their planned economic and environmental benefits, infrastructure investments often have unexpected positive and negative impacts on the environment, health and safety, the financial condition of governments and private parties, and established patterns of daily behavior. Some of these impacts become apparent only over long time periods, such as the role of Interstate highways and other road improvements in encouraging suburbanization. The net effect is often difficult to calculate, but the potential scenarios should be searched out as much as possible.

Quality of Life, including long-term environmental implications and possible effects on where people live and work. These issues are particularly difficult to assess, since they require speculation about changes in individual values and behaviors. Nevertheless, they can have profound effects.

Analysis of Risks. Inadequate, insensitively designed, and poorly maintained infrastructure puts environments at risk, raises health and safety risks, and creates potential financial liabilities. Prioritization of infrastructure investments should take these factors into account. Formal risk analysis procedures should be used for major investments that have high-risk features.

VI. IMPLEMENTATION STEPS

Encourage Continued Interagency Cooperation. Interagency cooperation should continue and expand to include efforts to build an active dialogue on how best to implement the principles and guidelines described here, efforts to identify successful applications and areas for improvement, communication of successes and problems, and efforts to tie in with other performance-related studies or mandates (such as White House National Performance Review and activities designed to respond to the *Government Performance and Results Act of 1993*).

Pursue Pilot Projects. The *Government Performance and Results Act of 1993* calls for agencies to volunteer to develop and implement appropriate performance measurements. Infrastructure agencies have an advantage in that it is relatively easy to quantify many benefits and costs of their programs. Also, most infrastructure agencies already have some form of performance assessment under way. Coordinated pilot study reports by several infrastructure agencies would provide an early test of the new opportunities provided by this legislation. Federal infrastructure agencies should participate actively with OMB in the administration of the act.

Convene a National Conference on Infrastructure Performance. An annual conference offers one way to speed up communication across agencies and governments, among different levels of managers, and between managers and decisionmakers. To add prestige and to encourage attendance by senior managers, this should be sponsored by the White House, perhaps as a follow-up to the National Performance Review efforts. The conference should be scheduled for more than one day, and should include sessions devoted to techniques and case studies, interaction with private-sector consumers of infrastructure services, and feedback from public decisionmakers.

Source: Advisory Commission on Intergovernmental Relations, *High Performance Public Works* (Washington DC, November 1993), pp. 15-21.

Exhibit 2-2

Findings, Conclusions, and Recommendations for Measuring and Improving Infrastructure Performance
Board on Infrastructure and the Constructed Environment

Summary of Principal Findings and Conclusions

Infrastructure Performance and its Measurement

1. Infrastructure constitutes valuable assets that provide a broad range of services at national, state, and local levels. Its performance is defined by the degree to which the system serves multilevel community objectives. Identifying these objectives and assessing and improving infrastructure performance occur through an essentially political process involving multiple stakeholders.
2. Performance measurement, a technical component of the broader task of performance assessment, is an essential step in effective decisionmaking aimed at achieving improved performance of these valuable assets.
3. Despite the importance of measurement, current practices of measuring comprehensive system performance are generally inadequate. Most current efforts are undertaken because they are mandated by federal or state governments or as an ad hoc response to a perceived problem or the demands of an impending short-term project.
4. No adequate, single measure of performance has been identified, nor should there be an expectation that one will emerge. Infrastructure systems are built and operated to meet basic but varied and complex social needs. Their performance must therefore be measured in the context of social objectives and the multiplicity of stakeholders who use and are affected by infrastructure systems.
5. Performance should be assessed on the basis of multiple measures chosen to reflect community objectives, which may conflict. Some performance measures are likely to be location- and situation-specific, but others have broad relevance. Performance benchmarks based on broad experience can be developed as helpful guides for decisionmakers.
6. The specific measures that communities use to characterize infrastructure performance may often be grouped into three broad categories: effectiveness, reliability, and cost. Each of these categories is itself multidimensional, and the specific measures used will depend on the location and nature of the problem to be decided.

Assessment Process

7. The performance assessment process by which objectives are defined, specific measures specified and conflicts among criteria reconciled is crucial. It is through this process that community values are articulated and decisions made about infrastructure development and management.
8. Methodologies do exist for structuring decisionmaking that involve multiple stakeholders and criteria, but experience is limited in applying these methodologies to infrastructure.
9. Performance assessment requires good data. Continuing, coordinated data collection and monitoring are needed to establish benchmarking and performance assessment.
10. The subsystems of infrastructure—transportation, water, wastewater, hazardous and solid waste management, and others—exhibit both important physical interactions and relationships in budgeting and management. Effective performance management requires a broad systems perspective that encompasses these interactions and relationships. Most infrastructure institutions and analytical methodologies currently do not reflect this broad systems perspective.
11. The long-term and sometimes unintended consequences of infrastructure systems, whether beneficial or detrimental, frequently go far beyond the physical installations themselves. Community views of these consequences become a part of the assessment and decisionmaking process.

Summary of Recommendations

1. Local agencies with responsibilities for infrastructure management should explicitly define a comprehensive set of performance measurement processes. The measures selected should reflect the concerns of stakeholders about the important consequences of infrastructure systems and recognize interrelationships across infrastructure modes and jurisdictions. The committee's framework of effectiveness, reliability, and cost is a useful basis for establishing these measures.
2. While not every aspect of performance is quantifiable, attempts should be made to devise quantitative indicators of qualitative aspects of performance. Quantitative measures should then be used to develop benchmarks that policymakers responsible for assessing infrastructure performance can use for setting goals and comparing performance among systems, considering effectiveness, reliability, and costs (including actual expenditures as compared to budgets).
3. Recognizing that infrastructure performance cannot be managed if it cannot be measured, data should be collected on a continuing basis to enable long-term performance measurement and assessment.
   a. Each region with infrastructure decisionmaking authority should establish a system for continuing data collection to give performance assessment a more quantitative basis and enable longer term performance monitoring. Metropolitan areas with basic databases and modeling tools already in place should seek to integrate information on separate infrastructure modes into a uniform and accessible system, so that existing data sets are documented in consistent ways, within the context of relevant national data collection activities (e.g., federal Department of Transportation or Environmental Protection Agency statistics).
   b. Federal agencies should assure that national data sets (that is, those collected by or under the requirements of federal programs), are compatible (e.g., in geographic detail, time periods, and indexing), computerized, and made electronically accessible.
   c. All such performance data collection should be designed to facilitate benchmarking.
   d. New data collection activities should give priority to those functional areas where data currently are sparse (e.g., highway stormwater runoff characteristics, solid waste recycling reliability).
4. Responsible agencies should adopt infrastructure performance measurement and assessment as an ongoing process essential to effective decisionmaking. The selected set of performance measures should be periodically reviewed and revised as needed to respond to changing objectives, budgetary constraints, and regulations.
5. Responsible agencies should undertake a critical self-assessment to determine the nature and extent of specific regulations, organizational relationships, jurisdictional limitations, customary practices, or other factors that may constitute impediments to adoption of the proposed infrastructure performance measurement framework and assessment process. Such a self-assessment could be conducted within the context of a specific infrastructure management problem or as a generic review, but it necessarily will involve time, money, and a concerted effort to motivate active community involvement with open, candid discussion. The assessment should conclude with explicit recommendations of institutional change that may be needed to enable a systemwide approach to management of infrastructure performance.
6. Federal infrastructure policy and regulations should be revised as needed to accommodate local decisionmaking processes and performance measurement frameworks within the context of valid national interests in local infrastructure performance. Federal policy effectiveness should be evaluated on the basis of its sensitivity to local variations in performance assessment.

Source: Board on Infrastructure and the Constructed Environment, *Measuring and Improving Infrastructure Performance* (Washington, DC: National Academy Press, 1995), pp. 3-

FEDERAL INFRASTRUCTURE INVESTMENT PRINCIPLES

Executive Order 12893, *Principles for Federal Infrastructure Investments*, signed by President Bill Clinton on January 27, 1994, requires federal agencies to justify their budget and legislative proposals for infrastructure programs with analyses designed to "improve the quality and **performance**" of those programs, including improved returns on investments. The **outcomes** specified in the Order are "sustained economic growth, the quality of life in our communities, and the protection of our environment and natural resources." The order took effect with Fiscal Year 1996.

The Executive Order requires consideration of:

- Benefits and costs (including both quantitative and qualitative estimates);
- Physical design features, operational practices, and maintenance programs; and
- Demands for services, including the effects of "properly pricing infrastructure."

The Executive Order encourages:

- State and local recipients of federal grants to implement planning and information management systems that support the principles set forth in the order; and
- The federal government to use the information from state and local recipients' management systems to conduct the system-level reviews of federal infrastructure programs required by the order.

This Executive Order closely tracks the performance thrust of the Federal Infrastructure Strategy recommendations and establishes a strong basis for federal infrastructure agencies (including the environmental and natural resources agencies) to pursue outcome-oriented performance management goals.

NOTES

1 National Council on Public Works Improvement, *Fragile Foundations: A Report on America's Public Works*, Final Report to the President and Congress (Washington, DC, February 1988).

2 Ibid., p. 6

3 Ibid., pp. 21-24.

4 U.S. Department of Transportation, *1995 Status of the Nation's Surface Transportation System: Condition and Performance*, Report to the Congress (Washington DC, October 1995).

5 President's Council on Sustainable Development, *Sustainable America: A New Consensus for Prosperity, Opportunity, and a Healthy Environment for the Future* (Washington DC, 1996).

6 Joseph W. Duncan, "The History and Future of Social Indicators," A Paper Presented at the 1989 National Planning Conference of the American Planning Association in Atlanta, Georgia, unpublished, p. 15.

7 Ibid., p. 17.

8 U.S. Advisory Commission on Intergovernmental Relations, *High Performance Public Works: A New Federal Infrastructure Investment Strategy for America* (Washington DC, November 1993), pp. 15-21.

9 Board on Infrastructure and the Constructed Environment, *Measuring and Improving Infrastructure Performance* (Washington, DC: National Academy Press, 1995), pp. 68-73.

CHAPTER 3

APPLYING THE OREGON BENCHMARKS APPROACH

The state of Oregon helped popularize the term "benchmarking" in the public sector over the past decade by developing a series of more than 250 "outcomes" of state programs that are (1) officially adopted as goals to be attained, and (2) tracked statistically to see whether they are being attained.[1] These outcomes cover virtually all the responsibilities of the state government under the following three major headings:

- Benchmarks for People
- Benchmarks for Quality of Life
- Benchmarks for the Economy

All state agencies are expected to align their programs with these goals, and the state's local governments are encouraged to take a similar approach to addressing their responsibilities. All of the counties, in fact, are doing so, as are some of the cities. The private sector was in on developing the benchmarks and plays important roles in achieving the adopted public policy goals.

This chapter (1) describes the Oregon benchmarking concept, (2) traces how Oregon developed and is using its benchmarks, (3) summarizes Oregon's influence on federal performance improvement efforts, and (4) establishes the framework ACIR used for the field work reported in later chapters of this report.

Oregon's Benchmarking Concept

As practiced traditionally in corporate America, and less frequently by governments, benchmarking has been conceived as the process of seeking the best examples of good practice—often the most profitable companies—and setting a goal to meet or exceed that standard. The urge is to become "the best in the business," not just in profitability but in the key practices (such as flexible manufacturing or some other feature) associated with long-term improvements in efficiency and adaptability to the marketplace—hence, future profitability.

The Oregon concept of benchmarks broadens this traditional idea. Although some of Oregon's benchmarks are stated in terms of moving the state up in a particular ranking of the states, more often an Oregon benchmark calls for improving the lives of people in the state relative to their present situation or compared to some objective standard of health, safety, or the like. This "out-

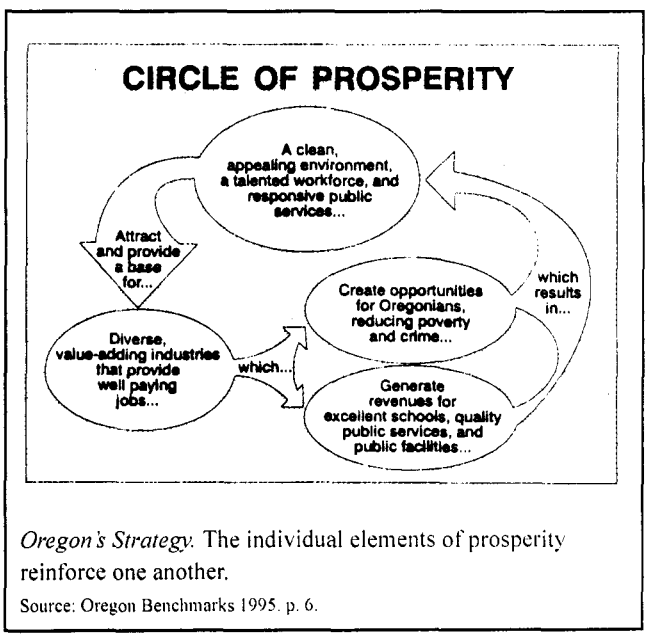
come" orientation essentially specifies the well-being of the state's population (and, consequently, the state's economy and public finances) as the "bottom line" for the government, just as the bottom line for a private company is financial profit for the owners or shareholders.

In its most recent report to the legislature and people of Oregon, the Oregon Progress Board summarized its benchmarking concept as follows:

> Benchmarks, the individual measures that collectively make up Oregon Benchmarks, are indicators of the progress that Oregon has set out to achieve in its strategic vision. Oregon wants to be a state of well-educated, competent people living in thriving communities, working in a well-paying, competitive economy, and enjoying a pristine environment. Just as blood pressure, cholesterol levels, and other such indicators serve as signs of a patient's health, benchmarks serve as signs of Oregon's social, economic, and environmental well-being. Benchmarks measure progress toward Oregon's vision of well-being in such terms as family stability, early childhood development, K-12 student achievement, air and water quality, housing affordability, crime, employment, and per capita income. Benchmarks keep Oregon's leaders, state and local government agencies, service institutions, and citizens focused on achieving those results. By staying focused on outcomes, and by keeping track of results, leaders in Oregon life can reset priorities and adapt and modify programs as they learn what works.
>
> Historical data is used to establish a baseline for various target benchmark measures. In response to each benchmark, Oregon's institutions—public, nonprofit, and private—take periodic data measures that are then collected and compiled by the Progress Board in biennial reports such as this one. This compilation of benchmarks attainment forms a foundation for determining Oregon's progress and for making policy recommendations.[2]

The motivation for Oregon's benchmarking program was the state's sharp economic downturn in the mid-1980s, and the realization that the long-term prospects for the state's traditional leading industry—forest products—was not good. Thus, it became critical to find out what it would take to diversify the state's economy and position it to compete successfully in the growing international marketplaces.

The strategy that Oregon decided on is shown on the following chart (see Box). This strategy links better lives for people and better living environments to an improved economy and to government programs that can help make people's lives and living environments still better—and so forth.



Oregon's Strategy. The individual elements of prosperity reinforce one another.

Source: Oregon Benchmarks 1995. p. 6.

With well over 200 benchmarks to be measured and tended to, not all are considered equal. Table 3-1 shows the 15 that are most indicative of progress toward achieving Oregon's vision of the future. About half of them deal with stable families and capable people. The other half are split between livable environments and the economy itself.

Table 3-2 shows Oregon's 16 most urgent benchmarks, where problems are most pressing, and action needs to be focused first to avoid even more serious problems in the future.

Although public works are not explicitly mentioned in these lists of "core" and "urgent" benchmarks, they are implicit to housing affordability and air and water quality, and they make important contributions to the well-being of people, community livability, and a strengthened economy—as shown later in this chapter.

Table 3-1
Core Benchmarks Summary

Promote Family Stability, Capable People

- Reduce the percentage of children living in poverty
- Reduce the incidence of child abuse
- Reduce the incidence of teen pregnancy
- Reduce years of potential life lost
- Raise student skill achievement (11th grade reading, math, writing)
- Increase the percentage of high school graduates among the adult population
- Increase the percentage of those with baccalaureate degrees (25 years and older)
- Raise the literacy rate of adults

Enhance Quality of Life and the Environment

- Reduce crime rates
- Keep housing affordable
- Improve air and groundwater quality
- Preserve agricultural and forest lands, and wetlands

Promote a Strong, Diverse Economy

- Raise per capita income relative to U.S. per capita income
- Raise per capita income by racial and ethnic group
- Maintain or increase employment outside the Portland area

Source: Oregon Benchmarks 1995, p. 6.

Table 3-2
Urgent Benchmarks Summary

Nurture Children, Strengthen Families

- Reduce teen pregnancy rates
- Improve early childhood development
- Reduce teen drug use

Improve Public Safety

- Reduce juvenile crime
- Increase the number of communities involved in community-based law enforcement planning

Give high school graduates the essential skills needed for success in life

- Increase the number of high school students who meet the standards for a certificate of initial mastery (CIM)

Leave No One Behind in Oregon Life

- Reduce the percentage of Oregonians who live in poverty
- Increase the percentage of our high school graduates going on to college
- Maintain or increase the share of employment among Oregonians who live outside the Willamette Valley

Increase Health Care Access, Effectiveness

- Improve the economic access of Oregonians to health care
- Stabilize and reduce HIV cases

Manage Community Livability

- Improve air quality
- Reduce housing costs

Protect Natural Resources

- Increase wild salmon runs
- Protect water quality

Improve Public Service Delivery

- Increase agencies who use performance measures

Source: Oregon Benchmarks 1995 p. 19.

How Oregon Developed and Uses Its Benchmarks

The key to developing and using Oregon's benchmarks has been strong and steady political support from three governors (both parties) and the state legislature over the past decade. The process of developing goals and strategies is long, and the process of developing and tracking valid quantitative performance measures is even longer. The presence of a serious statewide economic crisis got the process started, but the government's steady commitment has outlasted the immediate sense of crisis and has become a new way of doing business.

The goals process began in 1986 with the state sponsoring the Oregon Futures Commission. This kicked off a statewide strategic planning effort that involved thousands of private citizens, organizations, and government officials; it resulted in a 1989 report entitled *Oregon Shines*. The report reflected a strong statewide consensus, enabling the state legislature to adopt the recommended goals, create the Oregon Progress Board to keep the state focused on the adopted goals, and direct all state agencies to align their own strategic plans with the statewide goals.

In December 1994, the Progress Board published and sent to the legislature its third biennial report on the progress being made toward the state's strategic goals. The board's conclusion was that, "We're making progress on many fronts, but we still face tough problems and choices."[3]

Oregon's outcome-oriented goals have changed the thinking in the government in three fundamental ways:

1. **Jointness.** Outcomes for people, the economy, and the environment cannot be achieved by any single program, agency, or government. In fact, they cannot even be achieved by the whole public sector; it takes the private sector as well. So, Oregon Benchmarks has brought a greater recognition of the needs for such activities as interagency collaboration, program redesign, intergovernmental coordination, and public/private partnerships. Many outcome-oriented indicators measure the results of multiple programs.
2. **Flexibility.** The new focus on results puts traditional procedures and old ways of doing things into perspective. If they do not get results, they are rethought.
3. **Lowering Barriers.** Lack of progress toward results for citizens turns the spotlight on the reasons why. Programs may be designed incorrectly; intergovernmental requirements may be getting in the way; red tape may be wasting scarce program resources. Whatever the reasons for them, these barriers to progress, once identified, can be addressed persuasively, and eliminated or lowered.

One of the most important reasons for the success of Oregon Benchmarks is the Oregon Progress Board. This independent institution, chaired by the governor, but having a diverse public/private membership and an independent staff, is the institutional memory and constant gadfly looked to by state agencies, the legislature, local governments, and the public to keep the process on track. The Progress Board tracks available data from administrative records and other regular statistical sources, and also surveys the state's population and employers.

Nevertheless, Oregon Benchmarks is not perfect. For example, an independent evaluation by two Fellows of the National Academy of Public Administration in June 1994 pointed out several ways in which the process needs to be strengthened.[4]

In general, their recommendations stressed the need to "more fully integrate the outcome-focus inherent in the Benchmarks into the daily affairs of legislators, state managerial personnel, local government and civic leadership, and Oregon citizens."[5] A few of the specific recommendations (paraphrased) are:

- Retain close links to the main strategic goals of *Oregon Shines.*
- Make the regular performance reports easier to read and understand—and more graphic.
- Spread the report around much more in legislative orientation sessions, on billboards, at conferences, in libraries, for example.
- Link broad benchmarks to specific activities and performance measures that can be used as managerial tools.
- Evaluate reasons for progress made or not made, and develop effective strategies for achieving benchmarks.
- Identify responsibilities for activities related to each benchmark—especially when multiple agencies and governments are responsible.
- Convene multiple parties to work together toward shared goals.

Clearly, a lot of work remains to be done.

Oregon's Public Works Benchmarks

Public works benchmarks are important to achieving Oregon's outcomes goals in all three areas—people, quality of life, and economy. Exhibit 3-1 (at the end of this chapter) lists 28 such benchmarks extracted from *Oregon Benchmarks: Report to the 1995 Legislature*. They are shown in the context of the larger goals they serve. Each Oregon benchmark has an "explanation," a "rationale," and a "data source." These are presented in Exhibit 3-2.

It is clear from a review of these Oregon benchmarks that public works are not ends in themselves, but are essential and very vital means to the prosperity and quality of life the state is seeking for all its people.

Three of Oregon's "Urgent Benchmarks" (air quality, water quality, and housing affordability) are infrastructure-related, and the rationale for them follows:

> **Managing community livability and growth.** Oregon's livability is one of its greatest assets. As our population grows, we need to make smart decisions on infrastructure, land use, and transportation to protect the qualities that make Oregon so special. The Progress Board has been studying this issue over the past several months, and, in fact, has conducted three community meetings specifically on the topic of how to pro-

tect quality of life in the face of growth. Oregon communities and regions are considering how to build on existing community centers and how to design new developments that provide a mix of housing, a variety of transportation choices, and access to parks and open space. The air and housing affordability benchmarks represent a cluster of quality of life benchmarks that need to be addressed as we design our communities to accommodate a growing population. . . . The public is demanding leaner government that is better focused on outcomes.[6]

Oregon's Influence on Federal Performance Improvement Efforts

Vice President Al Gore's National Performance Review (NPR) picked up much of its **intergovernmental service delivery** philosophy from the Oregon Benchmarks experience, and the federal government has proceeded to partner with Oregon to demonstrate how benchmarking can be applied all across the federal-state-local spectrum. This philosophy was stated as follows in the NPR report:[7]

> Federal, state, and local government attention should focus on mutually agreed upon, measurable outcomes for public service delivery. The intergovernmental relationship should be a partnership, not an adversarial or competitive system. Federal financial support should be provided to achieve broad goals, but also should provide latitude and flexibility in how to accomplish them and be tailored to real local needs. Rather than defining accountability by inputs, transactions, error rates, and failure to progress, the federal government should hold state and local governments accountable for performance. The system should support and reward what works, rather than imposing rules and sanctions on the majority because of errors or omissions by the minority.

The idea is to substitute performance goals for procedural regulations as the accountability mechanism of preference in intergovernmental programs. The expectation is that this approach will reduce or eliminate many of the artificial barriers to achieving better outcomes for the people, their environments, and the economy.

The Oregon Option

In 1994, Oregon Governor Barbara Roberts proposed to the federal government a performance partnership that has become known as the Oregon Option. It focuses on three of the state's highest priority program areas—healthy children, stable families, and a world class competitive workforce—and asks not for more federal money but for greater flexibility and fewer regulations in the use of existing federal funds. The Vice President, Governor Roberts, and other federal, state, and local officials signed a cooperative agreement on December 5, 1994, to work toward this objective.

Immediately, an Intergovernmental/Interagency Action Team began meeting to pursue the partnership. At first, it met weekly, with the Oregon members usually connected by phone. As the effort began to mature, separate working groups—one for each of the three goal areas, plus one concentrating on data issues—were spun off to meet and work between the larger meetings, which became monthly. The tasks undertaken were to:

- Agree on operationalized and measurable goals in each broad program area;
- Develop reliable data sources for the indicators of progress toward achieving those goals; and
- Seek appropriate federal waivers (or statutory changes) that would allow easier use of available federal funds from multiple programs to address Oregon's needs.

Progress is being made on each of these tasks, but much remains to be done. The Action Team and the four work groups are continuing to meet, although less frequently.

Lessons Learned

A recent informal "taking stock" discussion by the Action Team suggested the following "lessons learned" (which are presented for illustrative purposes only, since they were neither developed fully nor formally agreed to by the group):

- **The level of effort** for this kind of partnering is very high for all sides. Federal agency members of the team felt that not many states could be given this much time and attention without overloading headquarters staff and political channels.

- **Transferability.** There were some doubts that the Oregon experience could be readily transferred to other states where political cultures, administrative and technical expertise, and other factors might be substantially different. In addition, routine replication of the process in other states, without the special attention that Oregon is getting, may not yield the same excitement, effort, and success.
- **The intergovernmental consensus on goals** is well worth the large investment in time and effort. Being more inclusive in the goals process is worth the extra time it takes. It builds **commitment.**
- **The need for accountability** should be repeated often. Reminders that responsibilities are being shared are necessary to maintain the joint effort. All the partners should feel accountable for results.
- **Trust** among the partners is essential. The only way to build it is to work together openly through personal contact; "demystify" the people, process, and organizational cultures; and build understanding. A willingness to admit that none of the partners has all the answers helps to build trust.
- **High tolerance** for procedural messiness is essential. Intergovernmental partnerships involve trial and error. It takes time to communicate and learn each others' ways.
- **Data issues** can be addressed best when technical competence is represented on the team, and when the parties agree to stick to actually "measurable" benchmarks.
- **Continuity** through political transitions is essential. The benchmarking process is long, and it cannot be successful without a long-term commitment.

As the process proceeded, the Oregon partners expressed needs for greater technical assistance, especially on data issues; demonstrations of success to maintain support; greater buy-in by federal regional officials; and memorandums of understanding to establish mutual responsibilities and expectations for programs and data collection and sharing.

Public Works Initiatives

Oregon also has brought its benchmarking experience to bear on the Army Corps of Engineers and the Department of Transportation.

With the Corps of Engineers, an Oregon Department of Transportation staff member assisted in developing a series of goals and performance measures for the Corps' Operations and Maintenance program and then for the whole Civil Works program. (See Appendix 3).

With the U.S. Department of Transportation, a team from Oregon's DOT met with Washington headquarters and regional highway, transit, and intermodal officials to begin an "Oregon Options"-style partnership with the federal government to:

- Cut costs in the New Project Selection and Development Process by 50 percent.
- Cut the time consumed in this process by 50 percent.
- Increase meaningful stakeholder involvement by 100 percent.
- Provide projects that meet Oregon's needs.
- Improve project quality by 100 percent.

Discussions are under way to identify and agree on specific changes in the federal process and/or changes by ODOT that can be made to help Oregon meet these goals.

ACIR's "Benchmarking" Framework

ACIR used Oregon's benchmarking approach as the framework for its research and field work among federal agencies and state and local public works agencies (see Box). ACIR looked for specific examples of federal, state, and local public works benchmarks and attempted to assess the extent to which these agencies:

- Were benchmarking against outcome-oriented public policy goals established by their governments to gauge program performance;
- Were aligning outcome goals with related inputs (resources and activities) and outputs (direct program results);
- Were aligning outcome goals across programs, agencies, and other governments; and
- Had implemented well established and useful benchmarking practices (goals adopted, data available, and impacts on policy, budgeting, and management).

Results of ACIR's field work are presented in the next two chapters.

"BENCHMARKING" DEFINED

In this report, ACIR uses the term "benchmarking" the way it is used in Oregon. In that sense, benchmarking is a long-term, comprehensive, outcome-oriented performance improvement effort that includes:

- Visions of the future developed in an open public process involving members of the general public, the business community, key interest groups, the legislature, and the executive branch of the government.
- Strategic planning by public agencies to realign their programs to these visions of the future.
- Performance goals adopted by the legislature; reevaluated and readopted every two years in light of progress made.
- Targets for progress, expressed as the annual amounts of change in performance measures needed to achieve the goals when expected.
- A representative public/private body, with a small staff, assigned the task of promoting, perpetuating, monitoring, and reporting back publicly to the government and the people on the progress being made toward adopted goals.

This benchmarking concept is broader than the traditional one used in industry. Corporate benchmarking simply identifies practices and performance standards that are "the best in the business," and then strives to meet or exceed them.

NOTES

1 Other states, including Utah, Minnesota, and Florida, have followed the Oregon lead. Florida, for example, established the 15-member Florida Commission on Government Accountability to the People (known as the GAP Commission) in 1995 to see whether Oregon-style benchmarking could work in a much larger state. The GAP Commission has identified about 225 benchmarks, collected data for most of them, and prepared *The Florida Benchmarks Report* released in February 1996. See Ed Finkel, "Measuring Performance: Benchmarking Goes Big-State," *The Public Innovator* (December 14, 1995) pp. 1-3.

2 Oregon Progress Board, *Oregon Benchmarks: Standards for Measuring Statewide Progress and Institutional Performance*, Report to the 1995 Legislature (Salem, December 1994), p. 2.

3 Ibid., p. 5.

4 Harry P. Hatry and John J. Kirlin, *An Assessment of the Oregon Benchmarks: A Report to the Oregon Progress Board* (Eugene: University of Oregon, June 1994).

5 Ibid., p. 3

6 *Oregon Benchmarks 1995*, pp. 21-22.

7 National Performance Review, *Strengthening the Partnership in Intergovernmental Service Delivery, Report Accompanying the Report of the National Performance Review* (Washington DC, September 1993), p. 4.

Exhibit 3-1

Oregon Benchmarks for Public Works

BENCHMARKS FOR PEOPLE	HISTORICAL							TARGETS		
Ground Transportation	1980	1989	1990	1991	1992	1993	1994	1995	2000	2010
67. Percentage of adults who use vehicle safety restraints consistently		41%	48%	75%	76%			80%	90%	95%

BENCHMARKS FOR QUALITY OF LIFE	HISTORICAL							TARGETS		
Water	1980	1989	1990	1991	1992	1993	1994	1995	2000	2010
110. Miles of assessed Oregon rivers and streams not meeting state and federal government in-stream water quality standards •			1,100		1,100			723	75	0
131. Number of Oregonians (in thousands) with drinking water that does not meet EPA safe drinking water standards										
a. 1974 Standards	133	67	63	20	17	0	0	0	0	0
b. 1986 Standards (Phase 1 VOCS)		22	3	0	0	0	0	0	0	0
c. 1986 Standards (Surface Water Treatment)				129	124	70	65	<1994	<1995	<2000
d. 1986 Standards (Coliform)				11	0	1	0	0	0	0
e. 1986 Standards (Lead/Copper)					523	818	842	<1994	<1995	<2000
f. 1986 Standards (Phase 2)					5	0	0	0	0	0
Waste Water	1980	1989	1990	1991	1992	1993	1994	1995	2000	2010
132. Number of Oregonians (in thousands) with sewage disposal that does not meet government standards		200		143		82		134	67	0
Ground Transportation	1980	1989	1990	1991	1992	1993	1994	1995	2000	2010
108. Percentage of Oregonians living where the air meets government ambient air quality standards • o	30%	90%	54%	51%	58%	100%		100%	100%	100%
109. Carbon dioxide emissions as a percentage of 1990 emissions			100%	106%	108%			100%	100%	100%
128. Percentage of new residential development, as measured in housing units within the Portland Urban Growth Boundary, where occupants are within ¼ mile of:										
a. Commercial services							48%			
b. Parks							39%			
c. Schools							20%			
d. Existing public transit							56%			
e. All of the above							7%			

- • Benchmarks that are identified as urgent, which need to be addressed immediately.
- o Identified as core benchmarks, that define the qualities Oregonians seek in Oregon life.

Exhibit 3-1
Oregon Benchmarks for Public Works *(cont.)*

BENCHMARKS FOR QUALITY OF LIFE *(cont.)*	HISTORICAL							TARGETS		
Ground Transportation *(cont.)*	1980	1989	1990	1991	1992	1993	1994	1995	2000	2010
129. Percentage of existing residential development, as measured in housing units within the Portland Urban Growth Boundary, where occupants are within ¼ mile of:										
a. Commercial Services							78%			
b. Parks							51%			
c. Schools							28%			
d. Existing public transit							80%			
e. All of the above							14%			
136. Percentage of Oregonians who commute (one-way) within 30 minutes between where they live and where they work			88%		88%		84%	88%	88%	88%
137. Percentage of miles of limited access highways in Oregon metropolitan areas that are not heavily congested during peak hours	81% (1983)	52%	57%	44%	42%			60%	60%	60%
138. Access to alternative transportation modes:										
a. Transit hours per capita per year in Oregon metropolitan areas	1.03		0.95	0.96	0.96	0.97	.99	1.3	1.5	1.7
b. Percentage of arterial and collector street miles in urban areas that have adequate pedestrian and bicycle facilities										
139. Percentage of Oregonians who commute to and from work during peak hours by means other than a single occupancy vehicle					24%		25%	29%	33%	38%
140. Vehicle miles traveled per capita in Oregon metropolitan areas (per year)	5,782	7,738	7,733	7,824	7,710	7,727		7,864	7,942	7,443
149. Percentage of Access Oregon Highways built to handle traffic at a steady 55 mile-per-hour rate							82%	82%	83%	85%
150. Percentage of Oregonians living in communities with daily scheduled inter-city passenger bus, van, or rail service			92%		92%	99%		99%	99%	99%
Air Transportation	1980	1989	1990	1991	1992	1993	1994	1995	2000	2010
151. Percentage of Oregonians living within 50 miles of an airport with daily scheduled air passenger service			90%					90%	92%	95%
Public Access	1980	1989	1990	1991	1992	1993	1994	1995	2000	2010
147. Percentage of the following accessible to Oregonians with disabilities.										
a. Public use buildings										
b. Public transportation										
c. Recreational facilities										
148. Percentage of streets in urban and suburban areas with adequate sidewalk access for persons with mobility disabilities										

Exhibit 3-1
Oregon Benchmarks for Public Works *(cont.)*

BENCHMARKS FOR QUALITY OF LIFE *(cont.)*	HISTORICAL							TARGETS		
Refuse	1980	1989	1990	1991	1992	1993	1994	1995	2000	2010
121. Pounds of Oregon municipal solid waste landfilled or incinerated per capita per year					1.519	1.508		1.500	1.250	1.000

BENCHMARKS FOR THE ECONOMY	HISTORICAL							TARGET		
Ground Transportation	1980	1989	1990	1991	1992	1993	1994	1995	2000	2010
240. Backlog of city, county, and state roads and bridges in need of repair and preservation		20% (1986)			23%			15%	10%	5%
Air Transportation	1980	1989	1990	1991	1992	1993	1994	1995	2000	2010
238. Number of U.S., Canadian, and Mexican metropolitan areas over 1 million population served by non-stop flights to and from any Oregon commercial airport			18		18	19		20	23	26
239. Number of international cities of over 1 million population (outside Canada and Mexico) served by non-stop flights to and from any Oregon commercial airport	1		4		5	5		6	8	11
Marine Transportation	1980	1989	1990	1991	1992	1993	1994	1995	2000	2010
241. Portland transpacific container export rates compared to those in Seattle and Tacoma (percentage greater or less than)			4%			1%		<5%	<5%	<5%
General	1980	1989	1990	1991	1992	1993	1994	1995	2000	2010
237. Percentage of permits issued within the target time period or less:										
a. Air contaminant discharge										
b. Wastewater discharge		66%		57%	57%	68%		100%	100%	100%
c. Building		50%		77%		58%		100%	100%	100%
255. Real per capita capital outlays for facilities (1990 constant dollars)	$522	$412	$453	$465				$597	$651	$758
256. Percentage of public agencies which are high performance work organizations							36%			
257. Percentage of agencies that employ results-oriented performance measures •										
a. State government					25%		39%	100%	100%	100%
b. Schools										
c. Local government										

• Benchmarks that are identified as urgent, which need to be addressed immediately

Source: Excerpted from Oregon Progress Board. *Oregon Benchmarks: Standards for Measuring Statewide Progress and Institutional Performance. Report to the 1995 Legislature* (Salem, December 1994).

Exhibit 3-2
Explanation, Rationale, and Data Sources for Oregon's Public Works Benchmarks

67. Percentage of adults who use vehicle safety restraints (seat belts) consistently

Explanation: The number of adults (18 years of age and older) who report that they always use seat belts divided by the total number of survey respondents. ***Rationale:*** Seat belt use reduces morbidity and mortality from automobile accidents. ***Data source:*** Behavioral Risk Factor Surveillance System (BRFSS), Center for Health Statistics, Oregon Health Division, Oregon Department of Human Resources.

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108. Percentage of Oregonians living where the air meets government ambient air quality standards
1995 target met in 1993

Explanation: This benchmark measures the percentage of the population living in areas that exceed the criteria for healthy air for some portions of the year. The data are based on monitoring of Oregon air sheds for carbon monoxide, ozone, fine particulates, and other pollutants. New air quality standards and monitoring data in the future will likely require adjustment of the benchmark data. The current data reflect a three-year average. ***Rationale:*** Good air quality is fundamental to the health of Oregonians. ***Data source:*** Oregon Department of Environmental Quality, Air Quality Division.

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109. Carbon dioxide emissions as a percentage of 1990 emissions

Explanation: This benchmark measures carbon dioxide (CO_2) emissions in the state relative to 1990 emissions. The goal is to stabilize emissions at the 1990 level of 35.5 million metric tons. ***Rationale:*** Most leading atmospheric scientists predict that increasing emissions of greenhouse gases will raise the earth's average temperature by 2°F to 5°F before the end of the next century. There is uncertainty about the rate of change and the consequence of such change. Nevertheless, prudent policy supports the need to buy insurance against the potentially large costs of global warming. Many of the actions that will have to be taken to reduce greenhouse gas emissions are the responsibility of individuals, businesses, local governments, and states. ***Data Source:*** Oregon Department of Energy.

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110. Miles of assessed Oregon rivers and streams not meeting state and federal government in-stream water quality standards

Explanation: This benchmark measures the extent to which the water in Oregon's rivers and streams fails to meet government in-stream water quality standards. The data include the miles of streams which have total maximum daily loads established. These include the Willamette River, Pudding River, Yamhill River, Bear Creek, Rickreal Creek, and the Coquille River. The Department of Environmental Quality (DEQ) anticipates establishment of additional total maximum daily loads on the Klamath River, Coast Fork of the Willamette, Columbia Slough and Grand Ronde Rivers by 1995. There are about 112,000 total miles of rivers and streams in Oregon. Today, about 3,500 miles of in-stream flows are monitored. New in-stream water quality standards, monitoring data, and assessment of information will probably require adjustment of the benchmark sums, both retroactively and prospectively. ***Rationale:*** Clean rivers and lakes are essential to providing water that is safe for drinking, recreation, and fish and wildlife. ***Data source:*** Oregon Department of Environmental Quality, Water Quality Control Division.

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121. Pounds of Oregon municipal solid waste landfilled or incinerated per capita per year

Explanation: This benchmark measures the extent to which Oregon reduces municipal solid waste through recycling, product packaging requirements, or other means. ***Rationale:*** Recycling and reuse saves resources, landfill space, and reduces air and water pollution. ***Data source:*** Oregon Department of Environmental Quality, Waste Management and Clean-Up Division.

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128. Percentage of new development, as measured in housing units within the Portland Urban Growth Boundary, where occupants are within 1/4 mile of : (a) Commercial services; (b) Parks; (c) Schools; (d) Existing public transit; (e) All of the above

Explanation: This measures the ability of people to meet many of their needs for shopping, services, and mobility without having to rely on their automobiles. This benchmark applies to new development. In this case, new development is measured by building permits issued between January 1990 and August 1994. The one quarter mile distance refers to access by walking or by bicycle. ***Rationale:*** This pattern of development provides places for people to live that are inviting, reduce the need for driving, and preserve open spaces. ***Data source:*** Portland METRO, Planning and Development Section.

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129. Percentage of existing development, as measured in housing units within the Portland Urban Growth Boundary, where occupants are within 1/4 mile of : (a) Commercial services; (b) Parks; (c) Schools; (d) Existing public transit; (e) All of the above

Explanation: This measures the ability of people to meet many of their needs for shopping, services, and mobility without having to rely on their automobiles. This benchmark applies to new development. In this case, existing development is measured by the 1990 Census. The one-quarter mile distance refers to access by walking or by bicycle. ***Rationale:*** This pattern of development provides places for people to live that are inviting, reduce the need for driving, and preserve open spaces. ***Data source:*** Portland METRO, Planning and Development Section.

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131. Number of Oregonians (in thousands) with drinking water that does not meet EPA drinking water standards

a. 1974 Standards

1995 target met in 1994

b. 1986 Standards (Phase 1 VOCS)
1995 target met in 1994

c. 1986 Standards (Surface Water Treatment)

d. 1986 Standards (Coliform)
1995 target met in 1994

e. 1986 Standards (Lead/Copper)

f. 1986 Standards (Phase 2)
1995 target met in 1994

Explanation: This benchmark measures the extent to which Oregonians' drinking water does not meet government drinking water standards. For purposes of this benchmark, we measure drinking water systems serving 25 or more people. There are about 1,200 community and non-transient, non-community water systems in Oregon serving approximately 2.3 million people. This benchmark does not measure the quality of drinking water supplied by water systems serving fewer than 25 persons, primarily small wells and other supplies serving one or a small number of households. There are 100,000 to 150,000 such smaller drinking water systems in Oregon, serving approximately 500,000 people. To the extent new standards are put in place and new water quality data are collected, the benchmark data will be adjusted both retroactively and prospectively. The following definitions may be useful: Phase 1 VOCs, standards for eight industrial solvent chemicals; Surface Water Treatment, standards for filtration and disinfection for surface water supplies; Coliform, standards for bacteria in all water systems; Phase 2, standards for 38 chemicals, including: industrial solvents, pesticides, inorganic chemicals; Lead/Copper, standards for lead and copper concentrations at the customer tap. ***Rationale:*** Healthy drinking water is crucial to the well being of citizens of a community. ***Data source:*** Oregon Health Division, Drinking Water Section. Data for community and non-transient, non-community water systems are currently reported. Data for smaller water systems (serving fewer than 25 persons) are not currently reported.

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132. Number of Oregonians (in thousands) with sewage disposal that does not meet government standards
1995 target met in 1993

Explanation: This benchmark measures the extent to which Oregonians' means of sewage disposal do not meet government standards. ***Rationale:*** Inability to provide proper sewage disposal results in a threat to the health of those affected and a barrier to further development in the area. ***Data source:*** Oregon Department of Environmental Quality, *Sewage Need Survey*.

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136. Percentage of Oregonians who commute (one way) within 30 minutes between where they live and where they work

Explanation: For purposes of this benchmark, "commute" means traveling to and from work by single-occupancy automobile, car pool, transit, taxi, bicycle, foot, or other means, as well as working in one's home. ***Rationale:*** Thirty minutes is an almost universal average for commutes. A longer commute suggests more vehicles on the highway for a longer time, which will affect congestion and air quality. The average commute in Oregon in 1990 was 20 minutes. The target is to maintain that average commute. ***Data source:*** *Oregon Population Survey*, a random survey telephone survey of Oregon households conducted in even numbered years.

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137. Percentage of miles of limited-access highways in Oregon metropolitan areas that are not heavily congested during peak hours

Explanation: This benchmark measures the extent to which the interstate highways and freeways in Oregon's urban areas are not heavily congested during rush hours. Data indicate the percentage of urban freeways having a volume service flow ratio of less than 0.17. ***Rationale:*** Congestion exacts a toll in terms of driver frustration, lost work time, more air pollution, more gasoline use, and higher cost of goods and services. ***Data source:*** Oregon Department of Transportation, FHWA, Highway Statistics.

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138. Access to alternative transportation modes:

138a. Transit hours per capita per year in Oregon metropolitan areas

Explanation: This benchmark measures the extent to which transit service is offered in Oregon's metropolitan areas measured by revenue service hours in Portland, Salem, Eugene-Springfield, and Medford. ***Rationale:*** This benchmark is a standard measure of access to transit. ***Data source:*** Oregon Department of Transportation.

138b. Percentage of arterial and collector street miles in urban areas that have adequate pedestrian and bicycle facilities

Explanation: This will measure the percentage of non-residential streets in urban areas that have adequate bicycle and pedestrian facilities. Appropriate facilities will vary, but they include marked bike lanes, direct routes, sufficient width for safe travel in traffic, sidewalks and bike paths, and safe street crossings. ***Rationale:*** The focus of this benchmark is streets to work and shopping destinations. Citizens are more likely to use bicycles or walk as alternatives to using a vehicle if the streets to their destinations are safe for walking or bicycling. ***Data source:*** ODOT Bicycle and Pedestrian Program will provide data for the next edition.

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139. Percentage of Oregonians who commute to and from work during peak hours by means other than a single occupancy vehicle.

Explanation: This benchmark measures the extent to which Oregonians get to work during peak hours by means other than driving alone. For purposes of this benchmark, "traveling to and from work" means commuting by car pool, transit, taxi, bicycle, foot, or other means, as well as working in one's home. ***Rationale:*** A major source of congestion and air pollution is people who drive alone to work. ***Data source:*** *Oregon Population Survey*, a random

sample telephone survey of Oregon households conducted in even-numbered years.

140. Vehicle miles traveled per capita in Oregon metropolitan areas (per year)
1995 target met in 1993

Explanation: This benchmark measures the per capita vehicle miles traveled annually in Clackamas, Multnomah, Washington, Marion, Polk, Lane, and Jackson counties. ***Rationale:*** The State Transportation Planning Rule requires metropolitan areas—Portland, Salem, Eugene, and Medford—to adopt plans to reduce vehicle miles traveled over the next thirty years. Benchmark targets reflect implementation of the rule. These targets may be achieved through increased car pooling, increased use of mass transit, and pedestrian-friendly urban design. ***Data source:*** Oregon Department of Transportation.

147. Percentage of the following accessible to Oregonians with disabilities: (a) Public use buildings; (b) Public transportation; (c) Recreational facilities

Explanation: This benchmark is intended to measure the number of public buildings, public transportation, and public recreational facilities which are accessible to those with physical disabilities. ***Data Source:*** Currently, there is no available measure. An ongoing Process Board committee will make recommendations of suitable measurements, which will probably be collected through a survey. All public buildings built after January 1992 must comply with accessibility standards set out in the Americans with Disabilities Act.

148. Percentage of streets in urban and suburban areas with adequate sidewalk access (e.g., curb cuts) for persons with mobility disabilities

Explanation: This benchmark will provide an indication of how well pedestrian facilities accommodate those with mobility impairments. Curb cuts are an example of adequate sidewalk access. ***Data Source:*** This data will be collected through survey.

149. Percentage of Access Oregon Highways built to handle traffic at a steady 55 mile-per-hour rate

Explanation: This benchmark measures the extent to which the Access Oregon Highway system has been completed in accordance with the target design and operational standards for that system. ***Rationale:*** Approximately 92 percent of Oregon's population lives within 10 miles of Access Oregon Highways. This benchmark illustrates how well those highways are able to handle large amounts of traffic and use. ***Data source:*** Oregon Department of Transportation, Transportation System Monitoring.

150. Percentage of Oregonians living in communities with daily scheduled inter-city passenger bus, van, or rail service
1995 target met in 1993

Explanation: This benchmark measures the extent to which inter-city public transportation services are provided to Oregonians. ***Rationale:*** Inter-city bus, van, or rail service provides transportation alternatives for those who cannot or do not wish to drive. It also promotes more efficient use of highways and reduces the need to expand highways or build new ones. ***Data source:*** Oregon Department of Transportation, Transportation Development Branch.

151. Percentage of Oregonians living within 50 miles of an airport with daily scheduled air passenger service

Explanation: Daily scheduled air passenger service currently is available at the following Oregon airports: Portland International, Bend/Redmond, Pendleton, Salem, Eugene, Coos Bay/North Bend, Medford/Jackson county, and Klamath Falls. ***Rationale:*** Access to air passenger service is fundamental to the economic health of an area. ***Data source:*** Oregon Department of Transportation, Transportation Development Branch.

237. Percentage of permits issued within the target time period or less

Explanation: This benchmark is aimed at providing the quickest possible processing of permit applications. Current rules establish target time periods for completing this process. The three components of this benchmark are air containment, waste water discharge, and building permits. ***Rationale:*** New industrial sitings or expansions are often planned on a quick time frame. Anything that might slow the process down may add extra expense, force alterations of plans or table a project. In order to accommodate companies as they wish to locate or expand, Oregon needs to ensure that the application review process involves enough time for adequate consideration and public input, but yet is also quick enough to facilitate fast-track development as required by individual companies. These measures may not fully capture the permitting issues, however, and the Economic Development Department is looking for a broader measure for future reports. ***Data source:*** Oregon Department of Environmental Quality (air and waste water permits). Building permit data will have to be collected via survey, due to the complex structure of the building permits system.

238. Number of U.S., Canadian, and Mexican metropolitan areas of over 1 million population served by non-stop flights to and from any Oregon commercial airport

Explanation: The focus of this benchmark is on quick and convenient access from Oregon to North America's major centers of commerce. It measures passenger access to interstate air transportation. The measure also serves as a surrogate measure of access of Oregon business to air cargo services, which we are unable to measure directly. ***Rationale:*** In this age of increasingly global markets and competition, many companies require air passenger and cargo service to conduct their business in a competitive manner. Business location decisions often include consideration of convenient air transportation services. The ability of Oregon's

Exhibit 3-2 (cont.)
Explanation, Rationale, and Data Sources for Oregon's Public Works Benchmarks

companies to compete in regional, national, and global markets will depend in part on their access to affordable air transportation services. ***Data source:*** Port of Portland, Policy and Research Section.

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239. Number of international cities of over 1 million population (outside of Canada and Mexico) served by direct or non-stop air service to and from any Oregon commercial airport

Explanation: The difference between direct and non-stop flights is that direct flights include stops. Otherwise, it is the same plane service. ***Rationale:*** Unlike the previous benchmark, direct air service in included in this measure due to the importance of direct service to international destinations. International air service is of great importance as the state builds an image of international location. In addition to measuring passenger access to interstate air transportation, this also serves to indicate, though to a lesser extent, access of Oregon business to air cargo services, which cannot be measured directly. ***Data source:*** Port of Portland, Policy and Research Section.

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240. Backlog of city, county, and state roads and bridges in need of repair and preservation

Explanation: This measures the percentage of roads and bridges which are in need or repair or preservation but which have not been serviced. ***Rationale:*** The transportation system has the capacity and quality necessary to provide Oregon businesses access to various points within Oregon and access to markets both within and beyond Oregon's borders. This benchmark focuses on the state's network of roads and bridges which are vital to the distribution system in Oregon. ***Data source:*** Oregon Department of Transportation, *1993 Oregon Roads Finance Study.*

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241. Portland transpacific container export rates compared to Seattle and Tacoma (percentage greater or less than)

1995 target met in 1993

Explanation: This benchmark compares transpacific container export rates from Portland with those in Seattle and Tacoma. A representative group of commodities were compared. Rates for each commodity were obtained from the conference tariff as set by the Transpacific Westbound Rate Agreement. **Rationale:** Container shipping is an important method for exporting Oregon goods to world markets. An estimated 80 to 90 percent of Oregon's container exports to the Pacific Rim. **Data source:** Port of Portland, Policy and Research Section.

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255. Real per capita capital outlays for public facilities (1990 constant dollars)

Explanation: Public facilities include, for example, equipment, land, schools, roads, hospitals, libraries, police, parks, and sewers constructed by the public sector. ***Rationale:*** Public facilities are public goods and services that are intended to help the state to meet its needs and achieve its goals in the most efficient, effective, and equitable manner possible. Oregon must maintain its overall investment in public facilities and services if it is to continue to meet its needs and achieve its goals. The benchmark focuses attention on the level of investment in public infrastructure in Oregon. ***Data source:*** *Government Finances*, U.S. Department of Commerce, Bureau of the Census. Consumer Price Index for the Portland Metropolitan area used to convert figures to 1990 dollars.

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256. Percentage of public agencies which are high performance work organizations

Explanation: This indicator is a submeasure of Benchmark 214, and is a measure of government performance by a similar standard used for all employers. It measures the rate at which public agencies are adopting a set of four fundamental practices: focus on customers; involving employees in decisions that affect their jobs; support of teamwork through specific programs and training; and demonstrably effective continuous improvement orientation. ***Rationale:*** Government performance, and especially efficiency and effectiveness, are increasingly important public concerns. Increasing per capita and per worker incomes depends both on increasing the skills of Oregon workers and on fostering businesses which can fully use those skills. Oregon's education reform measures are premised on a workplace that requires teamwork, communication, less hierarchy, greater responsibility and shared responsibility. It is important that public agencies adopt and follow these principles in order to deliver services more effectively. **Data source:** *Oregon Works II: 1994 Survey of Oregon Employers*, Oregon Economic Development Department.

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257. Percentage of government agencies that employ results-oriented performance measures: (a) State government; (b) Schools; (c) Local government

Explanation: This measures the percentage of employees that work toward clear and measurable outcomes that have been established consistent with the mission of the organization. ***Rationale:*** Most agencies historically have measured themselves based on inputs (dollars spent, employees/unit of production, etc.) rather than on the outcomes. The 1992 Governor's Task Force on State Government emphasizes that measurable outcomes is a key to improving the performance of government and recommends that the state work quickly to employ such measures. Short-term priority will be to focus on utilizing performance measures as an agency management tool. ***Data source:*** Department of Administrative Services, Fiscal Policy Analysis.

CHAPTER 4

BENCHMARKING STATE AND LOCAL INFRASTRUCTURE PROGRAMS

State and local governments—and regional planning organizations as well—have substantial traditions of planning for development and for the infrastructure that underlies successful communities. Their use of multi-year capital improvement programs, annual capital budgets, and long-term bond financing of public works is almost universal.

In the 1980s, these planning traditions were transformed by the concept of strategic planning. This transformation moved physical development planning programs away from "comprehensive" plans—which tried to thoroughly consider all factors—toward a more "strategic" approach focused on creating widely held visions of the future for the government and the people, coupled with an identification of key opportunities for achieving the vision through practical actions. These actions include infrastructure investment, maintenance, and operation—using capital and operating budgets and other instruments of government together to achieve desired results.

The 1980s slow-down in new investment, coupled with the accumulation of massively expanded systems of public works since World War II, brought a realization that a much larger share of public works efforts now needs to be directed toward maintaining the facilities already built, and operating them increasingly efficiently to meet growing service needs with less new construction. Thus, a new emphasis on "managing" facilities grew. In other words, the goal of efficiency took on greater priority.

In this new environment, state and local governments began to search for efficiency-producing management techniques. One technique, borrowed from some of the best private corporations, is benchmarking.

Although performance measures of various sorts began to be used in state and local government budgets before the 1980s—the Texas state budget being one example—most of the public sector benchmarking recognized today began in the 1980s or later. It is generally keyed to a process that develops a vision of the future and a strategic plan to achieve it by taking practical steps each year, measuring progress along the way, and adjusting programs to keep moving toward adopted goals. State and local governments were open to this approach, in part, because of their long traditions of planning and capital programming.

National attention was drawn to benchmarking at the state level by the *Oregon Benchmarks* report (which has been distributed to well over 50,000 people all across the country). At the local level, the Sunnyvale, California,

experience has received widespread notice, and was used as the basis for the federal *Government Performance and Results Act of 1993*.

This chapter examines the recent trend toward state and local benchmarking from two separate perspectives: (1) a review of current benchmarking reports from 11 state and local jurisdictions, and (2) a special survey of 16 state and local public works agencies prepared for this study by the National Academy of Public Administration (NAPA).

Review of State and Local Benchmarking Reports

ACIR reviewed the Oregon and Sunnyvale reports, along with nine others (see Table 4-1).

As the table shows, Sunnyvale's performance planning and management system is the oldest, and Oregon's is the second oldest of those we examined. But, in spite of their shared longevity, they illustrate very different approaches.

The Sunnyvale system is imbedded in a budgeting framework. It relies on input and output data largely derived from the internal operations of the city government, and it turns these indicators into productivity measures and trends aimed largely at achieving efficiency and budget savings. The multi-year trends are graphed visually in the budget document right where the performance statistics are presented. This process is reported to be quite successful in producing savings while improving services. However, even though the system is based on the city's comprehensive plan, its performance measures are not heavily outcome oriented.

Among the states, Texas is closest to Sunnyvale's budget-oriented model. Its performance reporting systems began in the 1970s, but they did not take on

Table 4-1
ACIR Review of Eleven State and Local Benchmarking Reports

Jurisdictions	Title of Report	Responsible Parties	Year Benchmarking Introduced
LOCALITIES			
Cleveland, OH (Region)	Rating the Region	The Citizens League Research Institute	1993
Jacksonville, FL	Life in Jacksonville: Quality Indicators for Progress	Chamber of Commerce and City Government	1992
Portland/Multnomah, OR	Portland-Multnomah County Benchmarks	City/County Progress Board	1993
Sunnyvale, CA	Planning and Management System	City Government	1970s
STATES			
Connecticut	Goals and Benchmarks for the Year 2000 and Beyond	Connecticut Progress Council/Legislature	1993
Minnesota	Minnesota Milestones: A Report Card for the Future	Governor/Legislature	1991
Oregon	Oregon Shines/ Oregon Benchmarks	Oregon Progress Board, Governor/Legislature	1986
Rhode Island	Rhode Island Competitiveness Report Card	Rhode Island Public Expenditure Council	1992
Texas	Texas Tomorrow	Governor/Legislature	1991
Utah	Utah Tomorrow	Legislature/Governor	1990
Wisconsin	Citizen, Community, Government: Wisconsin for the 21st Century	Commission for the Study of Administrative Value and Efficiency	1995

the "benchmarking" form until 1991. Cost savings are a central theme in the Texas process.

Oregon Benchmarks, on the other hand, is a very heavily outcome-oriented system. However, it is comparatively light on direct ties to the state budget, and is not yet at the point of demonstrating cost savings. It is more of a broad policy guide, and a driver of public and internal debates about major policy directions for the government that frequently cross program and organizational boundaries. The Oregon, Connecticut, and Portland/Multnomah County benchmarking programs reviewed by ACIR are overseen by independent "progress" boards or councils established specifically for the purpose.

The other performance systems were initiated in the 1990s. Wisconsin's report is the newest, and the study commission is still at the stage of recommending that the state government begin a benchmarking effort of the Oregon type.

Utah's benchmarking is very similar to Oregon's. However, it is newer and not yet as firmly established within the government. It began in the legislature, gained gubernatorial support later, but then started losing legislative support.

Minnesota's program began as a 1991 initiative by the governor, following the Oregon model, and then became a statutory requirement for 21 state departments and agencies in 1993. The first agency reports to the legislature were made in 1994, and were a qualified success, according to a report by the Office of the State Legislative Auditor. Seven of the 21 agencies used customer satisfaction surveys as one measure of their performance in the 1994 reports, and again the state legislative auditor found that this practice was a qualified success.[1]

A big part of the problem in the initial agency reports to the Minnesota legislature was the short time to prepare them. To help alleviate this problem, the legislature changed the reporting requirement from annual to every two years. The legislative auditor also has recommended improvements to the quality of the reports and the data.

The Minnesota legislative auditor reported in 1995 that the performance reporting law:

- Caused some agencies to undergo useful self-appraisals;
- Caused some legislative committees to give serious consideration to performance issues;
- Left many agencies and legislative committees with room for great improvement in the use of these reports; and
- Produced 1994 reports whose benefits did not outweigh the costs of developing them, although most agency heads believe that the benefits of future performance reports will outweigh their costs.

The Rhode Island and Cleveland benchmarking reports are attempts by groups outside the government to get the governments to undertake benchmarking. Their approaches are more goals oriented than budget oriented.

All of these benchmarking reports cover a wide range of public policies, and all of them include public works infrastructure as important means of achieving desired outcomes. Most of the benchmarking processes included significant amounts of public involvement—particularly in the visioning and goal-setting phases—and several use citizen surveys as part of their performance monitoring systems. Employee involvement tended to be deeper in the budget-oriented (input and output) processes than in the more citizen-oriented (outcome) processes.

Survey of State and Local Public Works Agencies

The 16 state and local public works agencies surveyed by NAPA for ACIR are listed in Table 4-2. The respondents were asked to choose a single type of infrastructure to report on, so that their responses would be as specific as possible. As the table shows, most chose to report on transportation or water supply, while the others chose wastewater treatment, solid waste, or public buildings.

The full report from NAPA is in Appendix 2. A summary of their findings follows.

Types of Benchmarks

The respondents reported the following eight different types of benchmark indicators (with definitions):

- **Process/Activity/Input**—amount of internal activity

Table 4-2

Respondents Included in NAPA Survey

Transportation	Water Supply	Wastewater Treatment	Solid Waste	Public Buildings
STATE	**STATE**	**STATE**	**STATE**	**COUNTY**
Minnesota	Utah	North Carolina	Connecticut	Multnomah County, OR
Virginia				
Wisconsin	**CITY**	**CITY**	**CITY**	
Texas	Charlotte, NC	Dallas, TX	San Jose, CA	
	Dallas, TX	Jacksonville, FL		
CITY	Fairfield, CA			
Boston, MA	Portland, OR			
Fremont, CA				

TOTAL: 16
(7 States, 1 County, and 8 Cities)

- **Output**—services delivered
- **Service Quality**—degree to which services delivered are timely and meet established standards
- **Efficiency/Cost Effectiveness**—cost per units of service delivered
- **Outcome**—progress against priority goals and targets for improving conditions
- **Customer Satisfaction**—surveyed opinions or ratings by customers
- **External Benchmark**—comparison against performance of other public or private organization in the same line of work
- **Internal Benchmark**—comparison against historical data in the same government or against an internal standard of performance

Table 4-3 lists some typical benchmark indicators reported by respondents for each type of benchmark. On average, the seven respondents with benchmarks more than three years old saw the importance of outcomes slightly more than those with newer benchmarks, and gave less weight to outputs. The nine respondents with newer indicator systems placed more weight on outputs. Both groups placed only moderate importance on linking their outputs and outcomes to inputs.

Participation in the Benchmarking Process

Among these agency respondents, the benchmarking process was heavily weighted toward staff participation. On a scale of 1-5, with 1 being most involved and 5 being least involved, no group outside the government scored better than 3.3, whereas all the staff groups scored 2.7 or better. Table 4-4 shows the "pecking order" of 12 groups. The top leadership of the agencies was noticeably less involved than more technical employees.

This staff dominance stands in contrast to much greater citizen involvement in the more general governmentwide processes reviewed by ACIR. It may be that the agency-level processes measured by NAPA are considered more detailed and technical, and less amenable to public involvement, or perhaps there is just less sensitivity to the potential for significant citizen input within the agencies.

In answer to another series of questions, most of the agencies acknowledged that their benchmarks had been developed inside the agency, and more often than not they had been decided on by the program manager. Most of the benchmarks were developed to use quantitative data and are revised when more information becomes available.

Motivation for Benchmarking

The strongest reasons for benchmarking, cited by the agency respondents, were to:

- Aid in implementing the agency's mission;
- Help the agency communicate its performance record better;

Table 4-3
Typical Benchmark Indicators Reported by Respondents for Each Type of Benchmark

Process/Activity/Input	Staffing, supplies, maintenance, budget vs. needs, contracts signed and completed Number of surface water quality analyses performed
Output	Install 24,000 feet of water main in FY __ Number of discharge permits issued or communities assisted
Service Quality	Percentage of potholes filled within 1 day of report Improvement in . . . emergency response time
Efficiency/Cost Effectiveness	Custodial costs per square foot Cost/quantity of water pumped monthly
Outcome	Water meets U.S. EPA and state water quality standards No public health problems resulting from the water supply Rest areas are attractive
Customer Satisfaction	Percentage of households satisfied with quality of water Increase in percentage of customers rating facilities management performance as satisfactory or outstanding
External Benchmark	Costs of connections and repairs as compared to private sector costs Percentage engineering costs for design and construction comparing in-house and consultant costs
Internal Benchmark	Dollar value of unprogrammed costs against goals Collect 98 percent of active accounts within 50 days of billing

Process/Activity/Input—Amount of internal activity
Output—Services delivered
Service Quality—Degree to which services delivered are timely and meet established standards
Efficiency/Cost Effectiveness—Cost/services delivered
Outcome—Progress against priority goals and targets for improved conditions
Customer Satisfaction—Surveyed opinions or ratings by customers
External Benchmark—Comparison against performance of other public or private organization in the same line of work
Internal Benchmark—Comparison against historical data within the same government or against an internally adopted standard of performance

- Provide program managers with performance monitoring; and
- Meet a requirement of the chief executive or the legislative branch.

The weakest reasons cited were to meet grant program and regulatory requirements.

Thus, it appears that, as far as the public works agencies are aware, they are doing benchmarking to meet the needs of their own government, not the needs of another level of government.

Uses of Benchmarks

Besides engaging agency leadership, which was cited most frequently as an important use of the benchmarks, the other important uses (in descending order of mention) were to:

- Track the program's progress and provide performance data back to the operating unit;
- Measure the quality of services;
- Develop the annual budget at the agency level (but much less frequently at the executive branch and legislative branch levels);
- Improve management; set challenging goals to encourage progress beyond historical performance levels, streamline processes; and reevaluate, redesign, or terminate programs in light of changing agency missions;
- Align one program with other programs to meet established goals;

Table 4-4
Who Was Involved in Developing Public Works Benchmarks?

1.5	Program Managers
2.1	Policy and Budget Staff
2.3	Front Line Employees
2.7	Special Benchmarks Staff
2.7	Top Leadership
3.3	Stakeholders
3.6	Customers
3.6	Other Levels of Government
3.8	Industry
3.8	Advocacy Groups
3.8	Other Government Agencies
4.2	Public Contractors/Suppliers

- Improve the scope, quality, and timeliness of performance data;
- Inform the legislative body responsible for program oversight; and
- Communicate program value and accomplishments to the public.

Seldom did the process challenge the basic purposes of programs, require overly expensive data, or uncover legislative impediments to good performance.

Training

Managers in all the responding agencies were trained to link benchmarks to mission statements and strategic plans, and so were policymakers in most of the agencies. However, this kind of training was provided to lower level staff personnel in only half the agencies. Only about half the agencies had training requirements imposed on them.

Conclusion

These cases confirm that benchmarking is being used to good effect by both state and local governments, although the uses vary from place to place.

NOTES

[1] Office of the Minnesota Legislative Auditor, Program Evaluation Division, *Development and Use of the 1994 Agency Performance Reports* (July 1995) and *State Agency Use of Customer Satisfaction Surveys* (St. Paul, July and October 1995).

CHAPTER 5

BENCHMARKING FEDERAL INFRASTRUCTURE PROGRAMS

The Government Performance and Results Act of 1993 (GPRA) establishes an outcome-oriented performance improvement framework for the federal government similar to Oregon Benchmarks. It includes strategic planning, goal setting, and the use of performance indicators to track progress toward achieving agreed-on goals—and it sets a schedule for getting the process under way. The ultimate goal is to begin using this process as a central feature of federal budgeting early in the next century.

This chapter (1) reviews the provisions of GPRA, (2) assesses the progress of federal infrastructure agencies in setting up outcome-oriented performance improvement processes, and (3) highlights some of the strong points of these evolving federal practices in federal infrastructure agencies.

THE PROVISIONS OF GPRA

Implementation guidance for GPRA is embedded in OMB Circular A-11, the basic guidance to all federal agencies for preparing their budgets. The placement of this guidance in the budget circular signals the seriousness with which GPRA has been taken by the Administration. Even though GPRA only calls for pilot studies in a few federal agencies at this stage, followed by reports back to Congress, and then further decisions to go forward (or not) with outcome-oriented performance budgeting early in the next century, the current guidance urges all agencies to begin now to gear up for and voluntarily start using that kind of budgeting.

The steps laid out by GPRA, as set forth in A-11, are to:

- Develop strategic plans prior to Fiscal Year 1998;
- Prepare annual plans setting forth performance goals beginning in FY 1999; and
- Report annually on actual performance compared to performance goals, beginning no later than March 2000.

Although these steps are designed to improve the government's performance, they are not necessarily directly related to allocating funds in the budget. Pilot tests of actual performance budgeting in a few federal agencies are not required by GPRA until FY 1998 and 1999.

Budgets, by definition, provide inputs (money, personnel, supplies, and equipment) to support program activities that are presumed to (or, better yet,

designed to) produce services or products (outputs) that, in turn, improve the lives of people (outcomes or end results). The OMB guidance makes these distinctions.

It is not until the connections between inputs, outputs, and outcomes can be made convincingly that budgeting can be connected to public policy outcome goals and used to pinpoint the governmental activities that should receive budget priority to increase the probability of achieving desired outcomes. For many governmental programs, developing these links is not easy, and many managers understandably resist having their budgets tied to outcome goals before it is demonstrated that their funded activities are strongly enough related to the desired outcomes for their impacts to be clearly measured.

It is noted frequently that many other forces and factors also affect the outcomes that government is trying to influence, and sometimes the other forces are stronger than the government's own activities. Thus, it is a very tricky task to measure a government's performance by outcomes, and particularly to sort out the difference made by government programs compared to the difference attributable to other forces. Thus, the need for pilot projects, further research, and continuing program evaluations.

Progress Toward GPRA Goals

Pilot Projects

The pilots began shortly after GPRA was enacted in August 1993, and they were oversubscribed by the agencies. Whereas GPRA required only ten projects the first year, over 50 got under way that year, and there were more than 70 by the second year.

An evaluation of the first-year pilots by the National Academy of Public Administration (NAPA) found that:

1. Most of the pilots had not had enough time to link program activities to outcome measures, even in those programs where relevant outcome data already were available.
2. Many federal personnel working on the pilots needed training in the outcome orientation—which they did not get.
3. There was considerable resistance to using performance indicators for outcomes over which the agency had only limited control.
4. High-level executives were not involved deeply enough in developing performance measures to ensure that they will be used effectively in agency decisionmaking.
5. Few of the pilots focused on the interprogram and interagency relationships needed to achieve most outcome-oriented results.
6. Many of the performance measures did not appear to be related to statutory purposes, agency mission statements, or strategic plans.
7. Performance indicators were based on available data more often than on the data really needed to track performance.
8. Few pilots identified program beneficiaries or involved them in measuring performance.
9. Several pilots were for isolated activities not centrally related to agency missions.
10. Consistent definitions of performance were not used among the pilots.
11. Many performance indicators were for processes and activities (inputs and outputs) rather than for outcome results.
12. There were few customer satisfaction indicators, even though such satisfaction often is (or should be) one of the key outcomes sought.
13. Plans for collecting and controlling the quality of needed data often were missing or unclear.
14. Scheduled goal-achievement targets often were missing, unjustified, or unclear.
15. Many pilots used conventional targets that were neither challenging nor long-range.
16. Few pilots showed how performance measures would be used to improve program effectiveness.
17. Few pilots disaggregated performance data by geographic or population sectors to help managers deliver program benefits more effectively and equitably.
18. Few pilots provided explanatory information to help interpret performance indicators.

19. Few pilots presented performance measures simply enough and with enough general context to communicate effectively with policy officials, legislators, and citizens.[1]

The second year pilots have not yet been evaluated. Hopefully, progress is being made toward overcoming the deficiencies evident in the hurried first round. The NAPA report noted the large amount of work remaining to be done and the relatively short time remaining to do it to meet the GPRA deadlines.

The pilot evaluations, however, miss much of the important GPRA-related activity. Many of the pilots are for programs of limited scope—often related to internal federal activities—rather than to agencywide missions and intergovernmental programs. In addition, few are in the public works field. Thus, much of the agencywide strategic planning and large-scale performance indicators work of the departments and agencies is not reflected in the pilots.

The ACIR Survey

In contrast, the ACIR survey of federal activities is focused specifically on public works agencies, their intergovernmental programs, whole departments and agencies rather than isolated activities, strategic planning processes, and the development of major performance measurement systems. This broader focus picks up much more activity of value to the long-term implementation of GPRA than does the narrower scope of the pilots, and it provides a more optimistic reading.

The 13 agencies included in ACIR's review are:

- Army Corps of Engineers (Defense)
- Bureau of Reclamation (Interior)
- Department of Energy
- Department of Transportation
  - Coast Guard
  - Federal Aviation Administration
  - Federal Highway Administration
  - Federal Railroad Administration
  - Federal Transit Administration
- Economic Development Administration (Commerce)
- Environmental Protection Agency
- Federal Emergency Management Agency
- Rural Utilities Service (Agriculture)

The benchmarking record of each of these agencies is summarized individually in Appendix 3.

The remainder of this chapter draws lessons from the records of these 13 federal agencies. First, it considers their strategic planning processes. Then it examines their performance measures and some key data issues. Finally, it draws some overall conclusions from these experiences.

Strategic Planning

All of the public works agencies we examined either had a published strategic plan or were well along in preparing one. In all but two cases, there appeared to be considerable top executive leadership in these planning processes, resulting in published departmentwide or agencywide strategic plans that are being promoted as government reinvention or renewed political accountability documents aimed at improving the organization's image and performance. They include reformulated mission statements, regrouped program areas (sometimes combined with reorganization plans), and summaries of the more detailed plans being developed by component agencies. Frequently these strategic plans are linked to a performance agreement between the President and the department or agency head.

Examples of this approach include the departments of Commerce, Energy, Interior, and Transportation, plus the Environmental Protection Agency (EPA) and the Federal Emergency Management Agency (FEMA). The Transportation and EPA plans show considerable evidence of customer involvement in the processes that produced them. The other agencies' strategic plans appear to have been generated internally.

The Rural Utilities Service (RUS) in the Department of Agriculture, and the Army Corps of Engineers' civil works program in the Department of Defense, appear to be developing their strategic plans without a formal overarching framework from their departments at the present time, although both have long-term legacies of planning and analysis to draw on, including:

- Regular statutorily required National Rural Development Policy reports submitted to Congress by the President since 1980 (which the RUS plan has built on);
- Benefit/cost analysis as justification for water

resources construction projects (which is a mainstay of the Corps of Engineers); and

- The planning-programming-budgeting system that has permeated Pentagon budget processes (including the Corps') for the past three decades.

Nevertheless, the current RUS plan and the recent "benchmarking" work by the civil works part of the Corps both remain largely input and output-oriented. Thus, it appears that working up from the bottom promotes greater attention to accomplishing tasks more effectively and efficiently, rather than reconceptualizing them to serve larger objectives better. Both bottom-up and top-down approaches are necessary; one without the other gives little assurance of meeting outcome goals and GPRA expectations.

An example of how these two approaches can come together is provided by the U.S. Coast Guard. In its GPRA pilot, the Coast Guard examined issues of employee safety in the commercial shipping industry. In particular, it was found that commercial fishing was the most hazardous of all industrial occupations, and that crews of uninspected towing vessels had unexpectedly high fatality rates.

Using a program evaluation approach, the Coast Guard found that factors other than the physical condition of the vessels were largely responsible for these problems. Local commanders were given discretion to target their contacts with maritime vessels to those with the worst records and to help improve their operating practices as well as the physical equipping and conditions of vessels. The outcome goal of reducing "deaths and injuries from maritime casualties by 20%" over five years, for example, is being monitored and kept on track with this new approach.

The point of the Coast Guard example is that by changing the focus from simply enforcing safety regulations to the letter of the law with routine inspections, a more creative partnership designed to get results has been established with the shipping industry. The lessons learned by the Coast Guard from its GPRA pilot, that they believe may be transferable to other agencies, are listed in Exhibit 5-1. Based on this pilot, the Coast Guard spokesman at House of Representatives hearings in June 1995, Vice Admiral Arthur E. Henn, stated his belief "that GPRA can be implemented successfully. . . ."[2]

Performance Measures

Transportation (along with its constituent agencies), EPA, and the Corps of Engineers are heavily oriented toward measuring performance with quantitative indicators.

On a more limited scale, Energy has a highly automated and quantitative facilities inventory and Condition Assessment Survey (CAS) system that is nearly complete and already has begun to assist the department in maintaining and managing its far-flung physical plant more cost effectively on a life-cycle basis. This is a specially tailored version of a commercially available system that also is being used by New York City, the District of Columbia, NASA, and FEMA.

The outcomes orientation is most fully developed in EPA, Transportation, EDA, and Energy. FEMA also is outcome oriented, but its performance measures are being negotiated state-by-state and incorporated into state performance agreements based on local conditions rather than on national standards.

Several of the outcome-oriented agencies are developing conceptual frameworks for linking their activities to the outcomes they are trying to influence. Exhibit 5-2 arrays five of these frameworks graphically; Table 5-1 extracts the common elements in the five federal goal structures and compares them to the Oregon Benchmarks (described in Chapter 3).

From these two presentations, it can be seen that all six of the outcome-goal frameworks address elements of the economy and quality of life. Four of the frameworks also address elements of energy and resource conservation. Two address national security issues. Only one addresses social equity.

The framework being developed by the U.S. Department of Transportation (DOT) is the broadest one identified in the ACIR review of federal public works agencies. DOT also has a long and unique history of performance reporting to the Congress. Reports on the status and condition of highways have been required biennially since 1968, and reports on the performance of the nation's transit systems have been required since 1984. These reports to Congress were combined into a single report in 1993, and similar reporting on the nation's maritime facilities was added to the 1995 report.[3] Much of the data used by DOT in these reports to Congress is collected by fed-

Exhibit 5-1

Lessons Learned from the Coast Guard GPRA Pilot

Senior line managers must be personally involved (more than passive advocates) in formulating program goals. These goals will be the benchmarks which define success for the organization

GPRA requires a fundamental rethinking of programs. You can't go in trying to document current business and activities–it is a strategic thinking exercise. GPRA is not about what you do–it's about why you exist.

Goals and measures are part of a bigger communication process–the idea is to communicate the value of the programs, in terms which are ultimately comparable with other federal programs, for making high-level decisions on relative priorities.

Goals and indicators must extend beyond what the program/agency controls. By definition, things you can control are not outcomes. You can't comply with the law without dealing in the realm of influence.

Goals should be a reach. Safe target levels do not provide as much intrinsic value to the public, and do not motivate employees to rethink how they do their work. Goals must also be realistically achievable, but program managers shouldn't be punished for failing to meet goals.

It helps to understand that goals/indicators aren't direct measures of a program's performance–they are a window to the external world that we're trying to influence. This fact allows managers to take the risk needed to set outcome-oriented goals.

Outcome-oriented goals inherently cut across organizational lines, and therefore their development is facilitated by use of a cross-organizational group (versus delegation to smaller components of the organization to develop their own goals).

There are two basic questions for which GPRA requires answers: (1) Are the intended outcomes occurring? (2) What is the program contribution to those outcomes? The first question is more easily answered than the second, and can provide a wealth of meaningful management information by itself (to help focus activities and resources).

Goals must be stated in terms that are clearly understandable to your "next door neighbor."

Goals should include major functions only–the things that essentially characterize the organization–not diluted with many trivial programs.

The pursuit of unattainable precision in measures can be a distraction. Imperfect measures are OK. The process is iterative.

Strategies for achieving goals are necessary before the first plan is published. There should be some logical linkage between the goals and your plans to achieve them.

Outcome-oriented goals free the organization to explore alternative approaches to delivering products/services. Managerial flexibility is inherent (and necessary) in the process. In fact, managers can't be held accountable for achieving outcome-oriented goals without sufficient managerial flexibility to achieve those goals.

Organizations must have the flexibility (from higher levels within the Administration and from Congress) to reinvest their own resources toward higher payback activities.

Managerial flexibility can be increased dramatically by simply reducing the organization's own internal rules and standards for activity performance.

Implementing GPRA need not be an onerous, costly effort. The Coast Guard's pilot project has been done entirely by Coast Guard personnel, without any non-federal assistance. The cost has been about four full-time staff, or about one-tenth of one percent of our direct program staffing. However, there may be increased costs to collect measurement data if expanded Coast Guard or governmentwide.

Plans must be simple.

Incentive/reward systems need to be changed to encourage risk-taking.

It is important not to underestimate the strain of reengineering. Implementing GPRA involves new approaches to business which can challenge the more familiar and comfortable management processes already in place.

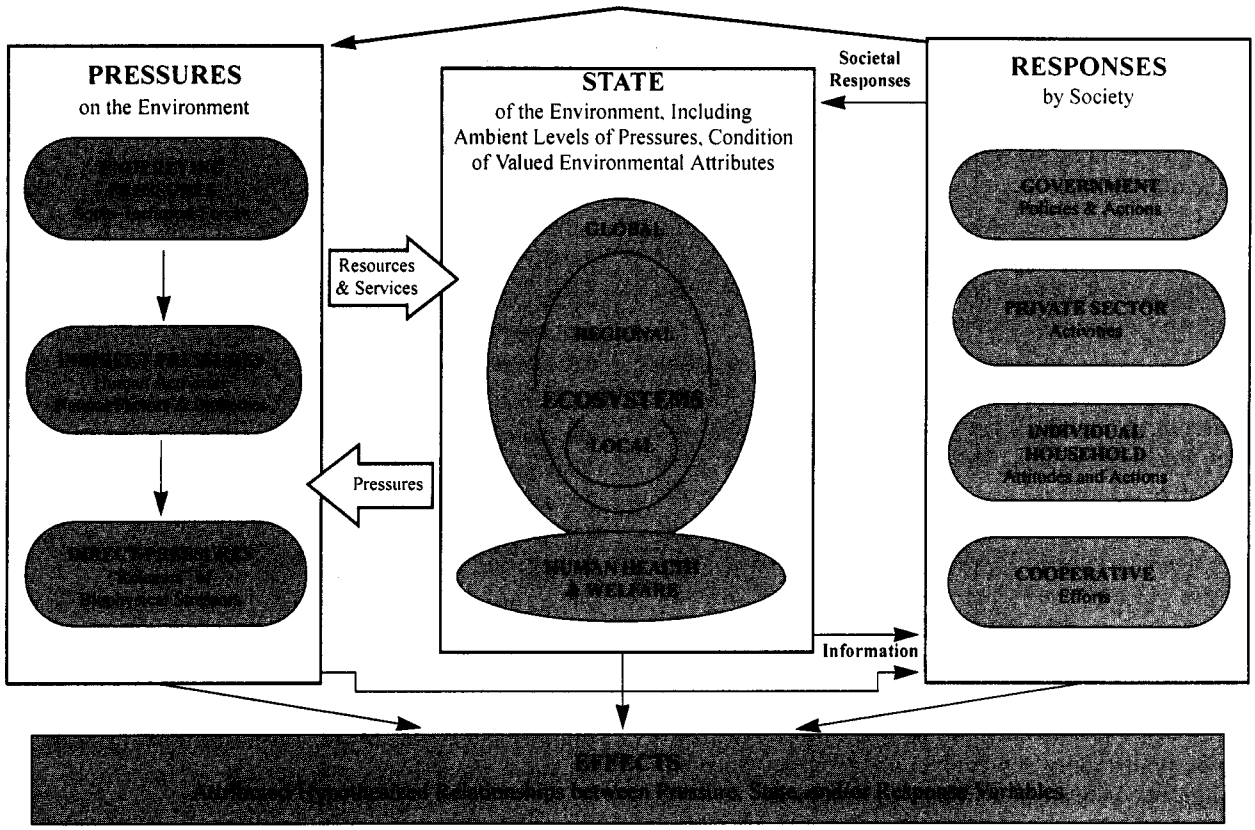
Using outcome-oriented goals and measures, as required by GPRA, may take years to establish trends that show the results of an agency's influence.

Source: Vice Admiral Arthur E. Henn, U.S. Coast Guard, Testimony before the U.S. House of Representatives, Subcommittee on Government Management, Information, and Technology of the Committee on Government Reform and Oversight, June 27, 1995, pp. 9-10.

Exhibit 5-2

Conceptual Frameworks for Measuring Outcome Performance of Federal Public Works Agencies

Pressure-State-Response/Effects (PSR/E) Framework



TRANSPORTATION IS A MEANS TO OTHER ENDS

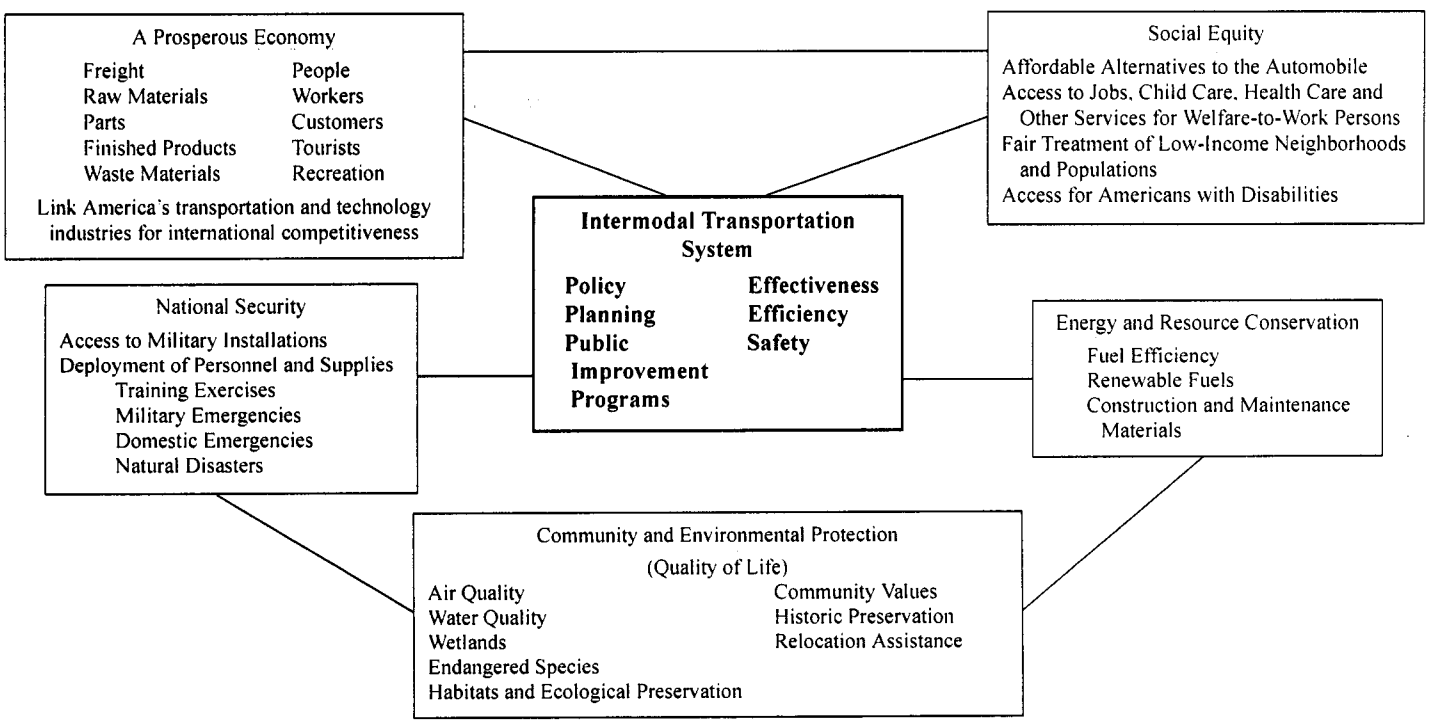
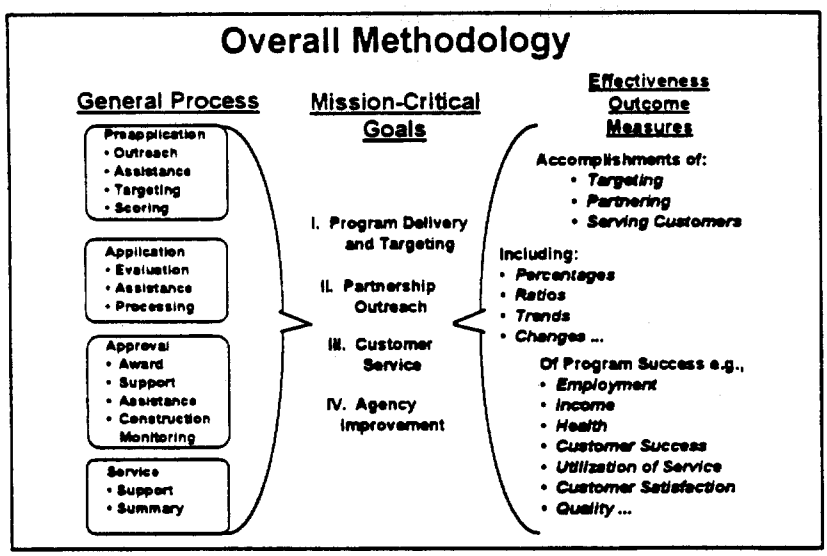
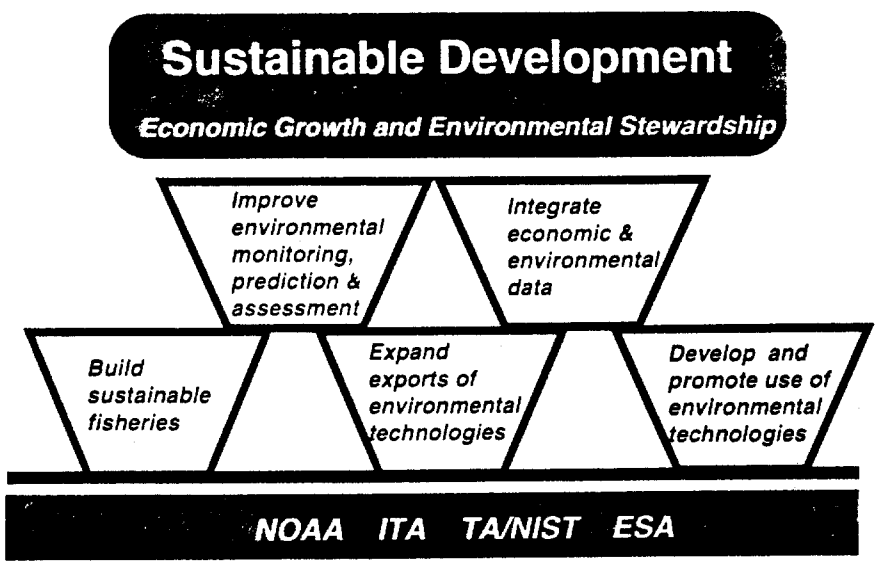


Exhibit 5-2 (cont.)

Conceptual Frameworks for Measuring Outcome Performance of Federal Public Works Agencies





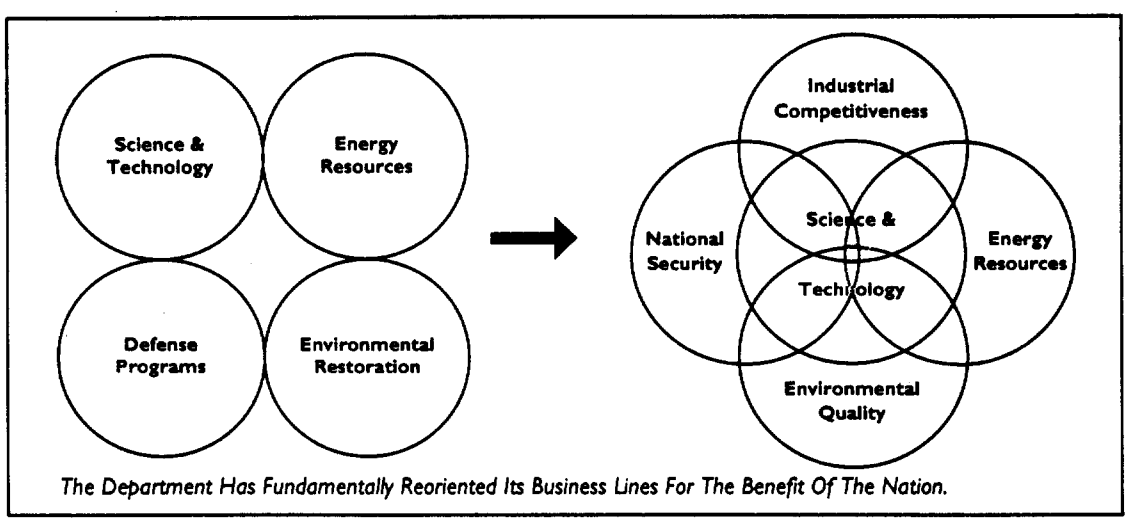


Table 5-1
Comparison of Outcome Goal Frameworks

Outcome Goals	Oregon	Federal Departments and Agencies				
		Commerce	Energy	EPA	RUS	Transportation
Prosperous Economy[a]	X	X	X	X	X	X
Quality of Life[b]	X	X	X	X	X	X
Energy and Resource Conservation	X	X	X			X
Social Equity						X
National Security			X			X
TOTALS	33	3	4	2	2	5

[a] Includes goals such as jobs, income, business success, energy, environment, and transportation technologies.

[b] Includes goals such as environmental protection, ecological systems, health, safety, human welfare, and livable communities

erally assisted state DOTs, metropolitan planning organizations (MPOs), and local transit operators.

DOT's 1995 performance report describes the physical extent of the transportation systems, their condition and current usage, projected future usage, transportation financing features, environmental and economic consequences, and alternative investment scenarios for maintaining current and enhanced levels of service. Further improvements are planned.

Meanwhile, an all-modes transportation performance measurement system is being designed with the help of outside consultants, focus-group sessions with experts, and a national conference. At the National Transportation System Performance Measurement Conference in Washington, DC, on November 1-2, 1995, DOT and its consultants presented a preliminary performance measurement system for review and comment and listed nearly 200 potential performance measures as well as a large number of transportation system "descriptors." It will be some time before this system will be ready for use. By then, it is anticipated that the number of key performance measures will be considerably smaller.

The importance of sound transportation statistics was recognized by the Congress in 1991 when it created an independent Bureau of Transportation Statistics (BTS) in DOT—the first new statistical office created by federal law since 1979. The mission of BTS, as spelled out by the Congress, is to provide data that are "free of bias, relevant to decision-making and acceptable to decision makers, timely, accurate, and comparable across different regions and modes of transportation."[4]

Data Issues

For the most part, each federal agency is striking off on its own to develop performance measures to meet the requirements of GPRA. There is no organized governmentwide effort to mobilize the statistical resources of the federal government for a cooperative push to support GPRA with indicators of the outcomes experienced by the general population—many of which are measured by the major statistical agencies, rather than by the program agencies.

There are a few examples of interagency cooperation on performance measures, however. For example, the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) and EPA's Office of Water are working together closely on the Coastal Indicators Project, which follows the Pressure/State/Response framework developed by the international Organization for Economic Cooperation and Development (OECD) and adopted as an important part of EPA's thinking about environmental performance measures.[5] This project is examining such indicators as fisheries, sediment quality, human activities in coastal waters, habitat, and water quality, and attempting to build them into a measurement system (with data from both agencies) that provides benefits greater than the sum of the parts.

The President's Council on Sustainable Development has laid out ten goals, with related performance indicators and policies for supporting sustainable development in its final report published in March 1996.[6] The Council consists of 25 members from the private sector, non-governmental organizations, and the Cabinet, all appointed by the President.

It is also notable that a great deal of the nation's environmental protection and natural resources conservation data recently have been compiled into a single report by the National Biological Service (NBS).[7] In addition to an abundance of purely descriptive data, this report provides special analyses of the major ecosystems, specific ecoregions, and special issues such as global climate change, human influences, non-native species, and habitat assessments.

Also deserving note is DOT's long-standing practice of cooperating with the Bureau of the Census to help fund and use journey-to-work, personal transportation behavior, and household activities data to track transportation trends and demands.[8] The report resulting from this cooperation examines all the major determinants of person and vehicular travel.

The Oregon Option experience suggests that additional interagency and intergovernmental data partnerships will be necessary to the successful pursuit of outcome-oriented benchmarking. One of the early realizations in the Oregon Option meetings was the need for a special committee of statistical experts to help find, refine, and create national data series against which to benchmark the progress of state and local government programs. Often, these data series need state and local contributions as well as from the national statistical agencies.

Because much of the data needed for benchmarking public works programs is place-specific, important performance measures are likely to be found in federal, state, and local geographic information systems (GIS). These systems are not yet well coordinated, but the need for such coordination has been recognized and is beginning to be worked on.[9]

The 1990 revision of OMB Circular A-16 established the Federal Geographic Data Committee (FGDC) to bring together 18 federal agencies that produce and/or use geographic data. This circular requires FGDC to coordinate its activities with state and local governments and other producers and users of geographic data. Although there are several significant precedents for such coordination, most of these essential partnerships have only begun to develop.[10]

The crucial need for relevant, reliable, timely, and understandable performance data in support of the congressionally mandated GPRA process stands in stark contrast to the recent budgeting misfortunes of the major federal statistical agencies.[11] Coordination and standards for data exchange are as important as adequate budgets.

CONCLUSION

This review of federal activities shows that a great deal of GPRA activity is under way, but that even more remains to be done—and time is short. A summary of these findings follows.

Accomplishments

The implementation guidance for GPRA is provided governmentwide in OMB's budget Circular (A-11). This guidance establishes a strong strategic planning and management improvement thrust to the effort, and links agency thinking about GPRA to the budget process as well.

In accordance with this guidance, the following accomplishments are being realized:

- Strategic planning processes, government reinvention activities, and management improvement programs are well along in federal public works agencies.
- Performance measurement frameworks that link desirable societal outcomes to governmental activities are being developed in several of the federal public works agencies, and there is much in common among them—particularly the elements of a prosperous economy, a sustained or improved quality of life, and the conservation of energy and natural resources.
- Large quantities of outcome statistics and program performance data are being collected by the statistical and program agencies of the federal government and by others, and some of these data are being reported to Congress as performance measures.
- In at least three cases in addition to the Oregon Option, federal agencies have formed

consortiums to share GPRA-related experiences: (1) the Natural Resources Performance Measurement Forum, chaired by the Interior Department, (2) the Performance Measures and Research Roundtable, chaired by the Department of Health and Human Services, and (3) the Interagency Working Group on Sustainable Development Indicators.

Gaps in GPRA Implementation

Despite the significant progress that is being made, GPRA is a long way from being implemented. For example, the progress cited above is countered by the following realities:

- Significant reluctance remains to linking strategic planning, reinvention activities, and management improvement programs to the budget process, and the traditional budgeting incentives discourage this linkage.
- Only one of the performance measurement frameworks being developed in the federal government appears to be spanning plans and programs in more than a single department or agency, and all the frameworks remain experimental.
- Most of the federal outcome statistics and program performance data being collected are neither integrated into a performance measurement framework nor used in the budget process, and they are not included in regular performance reports to the Congress.

A more deliberate strategy to help fill these gaps in knowledge and practice may be needed to achieve full implementation of GPRA. Some of the gaps in implementing GPRA that need attention are:

- Integrating the involvement of policymaking and working levels in agencies so that the connections between inputs, outputs, and outcomes can be clarified and used to link strategic planning and budgeting processes;
- Developing performance measurement frameworks across programs and agencies to accelerate their development and make programmatic connections that might improve performance;
- Integrating non-federal stakeholders into the process of developing performance measurement frameworks to help make them more realistic—both in the goals included and in the data available to measure performance;
- Strategically integrating key data collection and reporting efforts of the federal general statistical agencies, the program agencies, and the intergovernmental and other partners involved in delivering services and achieving desired outcomes;
- Keeping the strategic goals and performance measures simple, so that they can be easily communicated to policymakers, stakeholders, and the public for purposes of political debate, policy choice, and budget allocations; and
- Keeping the goal-setting and performance-tracking processes affordable.

In all of this, there is a timing dilemma. The deadlines for implementing GPRA that appear so far away to the Congress and other political officials look uncomfortably close to the personnel responsible for meeting them. The "performance partnerships" called for in the Administration's FY 1996 budget and the new block grants being debated in the Congress will have effective intergovernmental accountability only if they can rely on performance goals and performance measures. The prospect, however, is for many programs to be relying on program accountability systems based on performance measures before these systems have been developed and tested.

Clearly, "business as usual" will not meet these immediate expectations. The "guiding principles" for performance partnerships drafted by the NPR Phase II Federalism Team,[12] and the lessons being learned from the Oregon Option[13] and the best of the GPRA pilots may help to fill the GPRA implementation gaps on an interim basis.

However, the General Accounting Office recently issued a report reminding the Congress of the many difficult issues faced in designing accountability provisions for block grants.[14] Full implementation of GPRA could significantly strengthen the accountability of the intergovernmental service delivery system. Thus, intensified efforts to implement the GPRA process may be indicated.

NOTES

[1] Shortened and paraphrased from NAPA Advisory Panel on Improving Government Performance, *Toward Useful Performance Measurement: Lessons Learned from Initial Pilot Performance Plans Prepared under the Government Performance and Results Act* (Washington, DC: National Academy of Public Administration, November 1994). See also "Assessment of FY 1994 GPRA Pilot Project Performance Plans," Memorandum for Alice Rivlin and John Koskinen from Walter Groszyk, U.S. Office of Management and Budget, August 10, 1994; and Walter Groszyk, "Using Performance Measures in Government: Implementation of the Government Performance and Results Act of 1993," a paper presented to the Organization for Economic Cooperation and Development in Paris, November 13-14, 1995.

[2] Vice Admiral Arthur E. Henn, U.S. Coast Guard, Testimony before the U.S. House of Representatives, Subcommittee on Government Management, Information, and Technology of the Committee on Government Reform and Oversight, June 27, 1995, p. 12.

[3] U.S. Department of Transportation, *1995 Status of the Nation's Surface Transportation System: Condition and Performance Report to Congress* (Washington, DC, November 1995).

[4] Janet L. Norwood, *Organizing to Count: Change in the Federal Statistical System* (Washington, DC: The Urban Institute Press, 1995), p. 40.

[5] U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Ocean Resources Conservation and Assessment, "Coastal Indicators Project," Draft, June 1995.

[6] The President's Council on Sustainable Development, *Sustainable America: A New Consensus for Prosperity, Opportunity, and a Healthy Environment for the Future* (Washington, DC, March 1996).

[7] U.S. Department of the Interior, National Biological Service, *Our Living Resources: A Report to the Nation on the Distribution, Abundance, and Health of U.S. Plants, Animals, and Ecosystems* (Washington, DC, 1995).

[8] See, for example, Alan E. Pisarski, *Travel Behavior Issues in the 90s*, Prepared for Federal Highway Administration, Office of Highway Information Management (Washington, DC, July 1992).

[9] Mapping Science Committee, *Toward a Coordinated Spatial Data Infrastructure for the Nation* and *Promoting the National Spatial Data Infrastructure through Partnerships* (Washington, DC: National Academy Press, 1993 and 1994).

[10] Ibid.

[11] Norwood, *Organizing to Count*.

[12] NPR Phase II Federalism Team, "Performance Partnerships: Summary and Guiding Principles," Washington, DC Working Draft, February 1995. This document was transmitted to the heads of executive departments and agencies by OMB Memorandum M-95-08 (March 28, 1995), in which OMB Director Alice M. Rivlin urges its use.

[13] See Chapter 3.

[14] Paul L. Posner, *Block Grants: Issues in Designing Accountability Provisions* (Washington, DC: U.S. General Accounting Office, September 1995).

APPENDICES

APPENDIX 1 Reprint: Chapter V of Fragile Foundations, "Enhancing the Performance of Public Works Systems:"

APPENDIX 2 NAPA Survey of State and Local Government Use of Benchmarking for Public Works Infrastructure

APPENDIX 3 Federal Agency Cases

APPENDIX 1

REPRINT: CHAPTER V OF FRAGILE FOUNDATIONS, "ENHANCING THE PERFORMANCE OF PUBLIC WORKS SYSTEMS"

CHAPTER V

ENHANCING THE PERFORMANCE OF PUBLIC WORKS SYSTEMS[1]

The importance of measuring the performance of public works systems is a theme that runs through the preceding chapters. Such measures are necessary for gauging infrastructure needs more precisely, maintaining and expanding service capacity more effectively and efficiently, and supporting a growing and prospering economy.

This chapter suggests ways to use performance information to develop and manage public works in ways that will make the nation's infrastructure investments pay off more productively. It recognizes that public works performance must be improved within the cost constraints imposed by public budgets, user fees, and the nation's capital markets. To pursue cost-effective approaches we must:

- Base our decisions on performance goals and performance monitoring.
- Emphasize better maintenance.
- Reduce delays in siting, design, and construction.
- Speed innovation in technology and management.

We explore innovations in the next chapter; the other approaches are examined here.

MAKING DECISIONS BASED ON PERFORMANCE

Basing public works decisionmaking on the performance of infrastructure systems requires consideration of the following four topics:

- Performance goals.
- The decisions required to reach those goals and the decisionmakers responsible for making them.
- The performance data and analytical tools needed to support performance-based decisions.
- The means of encouraging and supporting the installation of performance-based information systems and decisionmaking processes.

These four interrelated topics are addressed next.

Public Works Performance Goals

Public works programs should help meet at least six basic objectives.[2] These include:

- To maintain appropriate levels and quality of service.
- To support economic development, employment, and fiscal policies.
- To distribute services equitably.
- To limit deferred maintenance liabilities.
- To synchronize public works services with the pace of land development, redevelopment, or diminishing use.
- To enhance the economic return on public works investments.

These objectives illustrate the broad scope of infrastructure policies that federal, state, and local officials confront regularly. Each is described briefly below.

1. *Maintaining appropriate service levels.* Local communities may establish service levels, and national or state standards may define minimally acceptable levels of service. Success in providing public works services can, in part, be measured by comparing actual levels (or projected levels) against established goals.
2. *Supporting economic development.* Infrastructure use is an essential ingredient of economic activity all

[1] For a more detailed discussion of these issues see Apogee Research, Inc., "A Consolidated Performance Report on the Nation's Public Works," prepared for the National Council on Public Works Improvement, August 11, 1987; and Deloitte Haskins and Sells, in association with Apogee Research, Inc., Berkeley Planning Associates, and CH2M Hill, "Final Report on Recommendations to Improve Public Works Decision-Making," prepared for the National Council on Public Works Improvement, November 1987.

[2] These types of public works goals were drawn largely from the following reports prepared for the Council: Apogee Research, Inc., "A Consolidated Performance Report on the Nation's Public Works;" Garn and Fosler, Economic Considerations in Infrastructure; Deloitte Haskins & Sells, et al, "Final Report on Recommendations to Improve Public Works Decision-Making;" Hatry, "The Capital Investment and Maintenance Decision Process;" and Apogee Research, Inc., "Making More Efficient Use of Limited Public Revenues."

across the country.[3] Federal, state, and local officials all must determine how much and what type of public works capacity to provide; where to provide it; and when to provide it to support their economic goals.

Political considerations often influence expenditure decisions in different directions.[4] However, whether public facilities will be expanded in the hope of attracting economic activity, provided just in time to meet demands, or installed in an effort to catch up, economic development and public works are inevitably linked.

3. *Distributing services equitably.* Deciding where to spend public works dollars and which groups to benefit is an age-old political matter. However, the growing influence of objective analysis and standards for equitable treatment now vie with traditional lobbying to determine when, where, and how to invest in public works. Ways of accommodating these influences include funding formulas and targeting; regulations about the handicapped, the elderly, or the disadvantaged; criteria for considering alternatives; requirements for analyzing project benefits as well as costs; and environmental impact analysis. Mapping and reviewing performance data is one way to measure progress toward equity among geographic neighborhoods and jurisdictions and the diverse demographic groups that cluster there.
4. *Limiting deferred maintenance.* Many public works systems suffer from deferred maintenance; facility breakdowns or other interruptions become more frequent and the service quality deteriorates. This phenomenon, examined nationwide, led to the charge that America is in ruins or could soon reach that condition.[5] Regular maintenance can forestall such results. Analyzing failure rates, condition surveys, and maintenance costs can help in deciding what maintenance will be most effective. Many officials already use computer programs to schedule pavement maintenance;[6] such programs offer largely untapped potential in other fields.

   Scheduling effective maintenance can extend the life of facilities to, and perhaps even beyond, the design life of the facility at the least cost. The relationship of actual replacement to replacement needs is one rough way of gauging the extent to which deferred maintenance is being handled. The city of Milwaukee, for example, makes estimates of replacement rates every year, along with condition measurements and estimates of remaining useful life of facilities, to show whether deferred maintenance is growing or declining.[7]
5. *Synchronizing public works with development.* It is difficult to achieve an ideal balance between public works investment and private development. Planners have traditionally used such tools as the twenty-year comprehensive plan; zoning, subdivision, and mapped streets ordinances; the five-year capital improvements program; and the one-year capital budget. These tools frequently have not been equal to the task.

   For well over a decade, rapidly growing communities have been developing two supplemental methods to address this deficiency: (1) "adequate public facilities" or "staged growth" ordinances that slow private building when adequate public facilities are not available,[8] and (2) developer financing techniques that let the private sector help

[3] U.S Department of Commerce, Office of Economic Affairs, "Effects of Structural Change in the U.S. Economy on the Use of Public Works Services," prepared for the National Council on Public Works Improvement, July 30, 1987. See also Chapters I and II of this report.

[4] Harvey A. Garn and R. Scott Fosler, "Economic Considerations in Infrastructure Decision Making," prepared for The National Council on Public Works Improvement, September 25, 1987.

[5] Pat Choate and Susan Walter, *America in Ruins; Beyond the Public Works Pork Barrel,* (Washington, DC: Council of State Planning Agencies, 1981).

[6] The American Public Works Association, "Good Practices in Public Works," prepared for The National Council on Public Works Improvement, August 18, 1987, pp. 42-48.

[7] City of Milwaukee, *The 1987-1992 Capital Improvements Program* (Milwaukee: 1987) p. 46.

[8] American Society of Planning Officials, *Constitutional Issues in Growth Management.* (Chicago: 1977); Robert M. Winick, "Balancing Future Development and Transportation in a High Growth Area," *Compendium of Technical Papers,* Institute of Transportation Engineers, 55th Annual Meeting, August 1985, pp. 55-59.

speed the provision of lagging public facilities.[9] There are many variations of these approaches; in some places they are linked together.

6. *Enhancing economic return on investments.* "Return on investment" analyses for public works projects are not the same as those prepared for private business.[10] However, we can estimate the relative economic merits of infrastructure elements using such measures as productivity ratios, cost-effectiveness evaluation, benefit-cost ratios, and cost recovery ratios. These proxies for economic efficiency help in the difficult tasks of choosing among alternatives and ranking projects in priority order.

There are many different ways of meeting these performance goals. Each alternative has advantages and disadvantages that need to be carefully weighed. This evaluation process bears elaboration here because it is such a key factor in making the nation's infrastructure investments pay off more productively.

Analyzing Alternative Infrastructure Strategies for Achieving Goals

Council research suggests that applying the following principles can improve the efficiency, effectiveness, and equity of investments in public works:[11]

- Enhanced performance should be the combined goal of all public works activities (including operations, maintenance, and capital improvements).
- Projects should be selected from the widest feasible group of alternatives.
- All public works investment alternatives should be evaluated rigorously and consistently against performance goals and project selection criteria. Such alternatives should include opportunities for eliminating obsolete and uneconomic public works facilities.

To act on these principles, officials need to analyze alternatives designed to improve overall system performance by (1) stretching the capacity and life span of existing facilities, (2) reducing demand for new facilities by pricing and regulating, and (3) combining or eliminating systems, as necessary, for better efficiency. The following discussion examines performance-based approaches to analyzing such alternatives, as well as some of the barriers and risks associated with substituting low-cost alternatives for new capital investment.

Stretching capacity and life spans of existing facilities. Public works construction, operations, and maintenance should work together within budget constraints to help maximize infrastructure performance.[12] Timely maintenance reduces long-term maintenance costs and ensures the life expectancy of existing facilities and equipment.[13] Innovative operations can add capacity for little cost and can reduce maintenance needs (e.g., computerized traffic control systems and non-corrosive snow and ice melting compounds). New equipment or facilities can be designed for:

- Ease of operation (equipping transit buses with brake retarders for safer performance and less wear).
- Ease of maintenance (installing sensors in equipment and structures to provide continuous condition monitoring).
- Reduced maintenance (using easily removable microprocessor controllers in transit railcars).

In spite of the importance of good operations and maintenance to improved

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[9] James E. Frank and Robert M. Rhodes, editors, *Development Exactions,* (Chicago: American Planning Association, 1987). See also Michael Stegman, *Paying for Development* (Washington, DC: Urban Land Institute, 1986); "Symposium: Development Impact Fees," *Journal of American Planning Association,* Vol. 54, no. 1 (Winter 1988).

[10] For a recent example of the use of such efficiency measures to evaluate public works programs (the expected economic efficiency of the $12 billion air traffic control modernization plan), see Congressional Budget Office, *Improving the Air Traffic Control system: An Assessment of the National Airspace System Plan* (Washington, DC: August 1983). For an in-depth discussion of the limitations of rate-of-return analysis in public decision making, see Apogee Research, Inc., "Infrastructure Issues Problems, and General Solutions," a report to the National Council on Public Works Improvement, October 1986. For additional discussion of project versus program efficiency and controlling for quality of service, see Congressional Budget Office, *Efficient Investments in Wastewater Treatment Plants* (Washington, DC: June 1985).

[11] Apogee Research, Inc., "Making More Efficient Use of Limited Public Resources," op. cit.

[12] Operations refers to the day-to-day delivery of services. It includes labor, engineering, and other support activities. Maintenance refers to routine inspection and repair of existing facilities, and equipment. Operational changes can improve service and add capacity; better maintenance can help to extend the life of facilities and equipment.

[13] Apogee Research, Inc., "Maintaining Good Maintenance," prepared for the National Council on Public Works Improvement, September 1987.

performance, federal funds have been most readily available for capital projects.[14] Moreover, the matching ratios for federal funds encourage capital investment instead of operations and maintenance expenditures. For example, until recently, the Water Pollution Control Act and its amendments favored construction-oriented wastewater treatment.[15] However, alternatives to plant construction are now being accepted. These include lower levels of treatment under certain circumstances, improved sewer lines that do not allow groundwater to infiltrate the system, and control of pollution sources other than sanitary sewers.

Operational improvements can increase current capacity and improve performance. For example, the primary problem with airport and airway facilities is congestion. However, new runways may not be the only or most urgent answer; the most immediate solution may be the installation of equipment letting planes depart and land at closer intervals. Also, alternative pricing strategies, such as peak-load landing fees, have reduced congestion at all three major airports serving New York City.[16]

The Council sponsored Symposium on New Directions in Technology and Infrastructure concluded that the major opportunity for public works innovation in the next 20 years will be found in new techniques for operation, maintenance, and upgrading.[17] Current needs could be met by using new technologies to improve operations, to enhance performance, and to extend useful life; total replacement of America's current infrastructure would be prohibitively expensive.

Managing demand. Demand management can provide low cost alternatives to new capital investment. The Council's reports on hazardous waste[18] and solid waste[19] both recommend reducing the introduction of pollutants into the waste stream. Such a reduction would lessen the demand for waste disposal services and the need for greater landfill capacity.

Waste can be reduced by providing:

- Incentives to generate less solid waste.
- Subsidies and other inducements for recycling.
- Incentives for reusing recycled materials.

Although it may not be easy politically, state and local governments can promote waste reduction by setting goals and by making recycling more convenient. Certain states have established goals of recycling anywhere from 15 to 40 percent of the waste stream. Several states—including Oregon, Massachusetts, Maine, and Michigan—have implemented "bottle bills" that provide incentives for recycling glass bottles and metal cans. Massachusetts' 1983 bill is being followed up by building a series of material-recovery facilities throughout the state. The first facility was scheduled for operation in late 1987.

Regulations governing product packaging also can help reduce waste. Taxes on items that are difficult to dispose of (e.g., lead, zinc, or plastics) could reduce

[14] The Urban Institute, *The Nation's Public Works: Report on Mass Transit.* (Washington, DC: National Council on Public Works Improvement, May 1987); and Apogee Research, Inc., *The Nation's Public Works: Report on Wastewater Management.* (Washington, DC: National Council on Public Works Improvement, May 1987). See also Roger J. Vaughn, "Excerpts from: Rebuilding America, Financing Public Works in the 1980s" in *Civil Engineering,* American Society of Civil Engineers, September 1983, pp. 65-68.

[15] Gerald Bernstein, *Infrastructure Innovation and Technology,* SRI Business Intelligence Program Report No. 723, Summer, 1985.

[16] Apogee Research, Inc., *The Nation's Public Works: Report on Airports and Airways.* (Washington, DC: National Council on Public Works Improvement, May 1987), p. 51-52. See also: Alan Carlin and R. E. Park, "Marginal Cost Pricing of Airport Runway Capacity," *The American Economic Review,* Vol. 60, (1970); Dayl Cohen and Amedeo Odoni, *A Survey of Approaches to the Airport Slot Allocation Problem.* (Massachusetts Institute of Technology: May 1985); and Amedeo R. Odoni and Joseph F. Vittek, "Airport Quotas and Peak-Hour Pricing: Theory and Practice," (Massachusetts Institute of Technology May 1976).

[17] New York University, Graduate School of Public Administration, Urban Research Center, *New Directions in Technology and Infrastructure,* draft report on a symposium held at the Harrison Conference Center, Glen Cove, New York, June 5-7, 1987, prepared for the National Council on Public Works Improvement, September 1987.

[18] Apogee Research, Inc., *The Nation's Public Works: Report on Hazardous Waste Management.* (Washington, DC: National Council on Public Works Improvement, May 1987).

[19] R. W. Beck & Associates, *The Nation's Public Works: Report on Solid Waste.* (Washington, DC: National Council on Public Works Improvement, May 1987).

their use and provide funds to process them. Regulations requiring reuse of or deposits on recyclable items (e.g., automotive batteries or motor oil) serve the same purpose.

Decommissioning and consolidation. When demand for infrastructure services declines, dilapidated or outmoded facilities may not need to be repaired or replaced. Rural road systems are especially vulnerable, particularly in farming communities where public revenues have not kept pace with increasing demands for maintenance. Recently, the Richland County, ND, board of supervisors reexamined its options for road maintenance. All things considered, the supervisors decided to reduce the road mileage and the number of bridges under county maintenance, to downgrade sections of the road network, and to apportion available funds by priority.[20] A recent study analyzed evaluation techniques that can be used by county road officials to determine whether or not certain rural roads should be downgraded or abandoned.[21]

Consolidating or regionalizing services is another way to maintain service while reducing costs. For example, regional water supply cooperation can include:

- Regional integration of water supply and wastewater treatment.
- Areawide water-supply management.
- Integration of private sector services by cooperation agreements, acquisition, or merger.
- Regional integration of all water resources management.[22]

Regional cooperation can mitigate the impact of federal and state regulations, can offer financial savings and can improve service delivery. Such benefits accrue from comprehensive management, improved planning and design, and increased economies of scale.[23]

Overcoming barriers to low-cost alternatives. Priority infrastructure problems can be solved through capital investment or by low-cost alternatives such as those discussed above. But despite the potential of these alternatives, certain barriers often keep officials from pursuing them.

Most federal programs promote expansion of public works facilities (rather than other means to improve services). For example, over $57 billion in federal spending to build or upgrade over 6,000 municipal wastewater treatment plants has been the centerpiece of the 1972 Clean Water Act. Although not fully effective, the investment has at least stopped the decline in water quality.[24] Currently, however, experts agree that controlling runoff from rain on farms and city streets may clean up some waterways more efficiently than building additional wastewater treatment plants.[25]

Evidence also shows that federal grant programs actually made replacing buses less costly to localities than maintaining them. UMTA has helped to rectify this by not allowing local transit authorities to replace buses until they reach a certain age.[26]

One key to using alternatives to capital spending is broadening the eligible uses of federal grants. For example, localities can now substitute mass transit (or other highway investments) for economically unjustifiable sections of the Interstate Highway System. Over 70 percent of the sections traded in for other investments would have yielded zero or negative traffic returns. This also concentrated federal Interstate spending on portions that will yield positive returns.[27]

Earmarked funds at other levels of government also may create barriers to cost-effective alternatives (see Chapter III).

Finally, public works programs seldom specify performance standards for

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[20] North Dakota Department of Transportation, Planning Division, "Richland County's Road and Bridge Network," March 1987.

[21] Iowa State University, *The Economics of Reducing the County Road System: Three Case Studies in Iowa.* (Washington, DC: U.S. Department of Transportation, January 1986).

[22] Wade Miller Associates, Inc., *The Nation's Public Works: Report on Water Supply.* (Washington, DC: National Council on Public Works Improvement, May 1987).

[23] Apogee Research, Inc., "Problems in Financing and Managing Smaller Public Works," prepared for the National Council on Public Works Improvement, September 10, 1987.

[24] Richard A. Smith, Richard B. Alexander, and M. Gordon Wolman, "Water Quality Trends in the Nation's Rivers," *Science,* Vol. 235, p. 1607 (March 27, 1987), as cited in Apogee Research, Apogee Research, Inc. "A Consolidated Performance Report," op. cit.

[25] Apogee Research, Inc., *The Nation's Public Works: Report on Wastewater Management.* (Washington, DC: National Council on Public Works Improvement, May 1987). p. 18.

[26] U.S Department of Transportation, Urban Mass Transportation Administration, *The Status of the Nation's Local Mass Transportation: Performance and Conditions.* (Washington, DC: June 1987). pp. 134-138.

[27] "National Consequences of Changing Investment Priorities in the Interstate Highway Program." (Washington, DC: Federal Highway Administration, 1981).

facilities or equipment. However, using such standards (rather than design criteria) can increase the number of ways to meet program goals. The Clean Water Act originally awarded grants for treatment plants only if the plants could meet discharge standards based on capital-intensive designs. Over time, the program took account of high costs and broadened the criteria to allow more innovative technologies. By 1985, advanced treatment techniques had been found that cost approximately one-half as much as the EPA-approved technology.[28]

Considering risk assessment and management. When discussing low-cost alternatives, we must consider risk, particularly when the alternatives include innovative concepts or practices. As a result of court rulings against sovereign immunity for state and local government,[29] many public agencies have developed risk management programs.[30] Such programs emphasize consistency in design, construction, and operation. Manuals, standards, warrants, and policies that have been researched and codified by the engineering community frequently become standard practice guides for public agencies. Facilities must meet a concept of standard practice that is defensible in court.

This approach preempts many low-cost or service-oriented solutions in favor of capital-intensive improvements. In effect, tort law has become a regulator in public works.[31] This limits the range of available options. To help lower this barrier, we need further research, development, and demonstration of innovations.[32] Reforms in tort law also may be helpful in limiting punitive damages and distributing damage assessments equitably among responsible parties rather than assigning them exclusively or largely to the party most likely to be able to pay (which often is a public body).

In a somewhat different vein, the U.S. Environmental Protection Agency (EPA) recently has been recasting its entire program within a risk assessment and risk management framework.[33] With environmental pollutants viewed as risks to the American people and environment, EPA's tasks fall into two categories: (1) objectively assessing the levels and health risks of various pollutants, and (2) evaluating alternative means of reducing those levels and risks considering economic, technological, and legal factors. In the first category, scientific objectivity is paramount. In the second, political judgment plays a major role. EPA's attempt is to foster consistency among its many programs in using the best science and reasoned value judgments in an explicit risk management process to arrive at its regulatory and investment decisions. EPA seeks the following advantages from this approach:

- Risk management helps set priorities.
- Risk management provides a context for balanced analysis and decisionmaking.
- Risk management produces more efficient and consistent risk reduction policies.

Evaluating alternative investments consistently. The analytical key to better investment decisions is a system for evaluating the alternatives. Such a system would include:

- Comparable performance measures for assessing competing alternatives (including indicators of physical facilities, level of service, health and safety, and economic performance).
- Measurements of the durability of alternative structures and equipment.
- Assessment of risks and liabilities.
- Assessment of the potential for and consequences of miscalculating project costs and benefits.

Analytic techniques and information support for such decisionmaking are described in a later section. We turn now

[28] Congressional Budget Office, *Efficient Investment in Wastewater Treatment Plants.* (Washington, DC: June, 1985).

[29] John C. Pine, and Robert D. Bickel, *Tort Liability Today: A Guide for State and Local Governments.* (Washington, DC: Public Risk and Insurance Management Association and the National League of Cities, 1986).

[30] George L. Head, *The Risk Management Process.* (New York: Risk Management Publishing, Inc., 1978).

[31] Peter Huber, "The Bhopalization of American Tort Law," in *The Positive Sum Strategy: Harnessing Technology for Economic Growth,* (Washington, DC: National Academy Press, 1986).

[32] Committee on Infrastructure Innovation, National Research Council, *Infrastructure for the 21st Century: Framework for a Research Agenda,* prepared for the National Council on Public Works Improvement (Washington, DC: National Academy Press, 1987).

[33] U.S Council on Environmental Quality, *Environmental Quality 1984: The Fifteenth Annual Report of the Council on Environmental Quality* (Washington, DC: U.S. Government Printing Office), Chapter 4.

to an exploration of the types of decisions and decisionmakers involved in this approach.

Linking Performance Goals to Decisions and Decisionmakers

Reaching public works performance goals requires a wide variety of decisions. They range from adopting broad plans and policies, to administering specific regulations, programs, and budgets, to establishing performance data monitoring systems (See Exhibit V-1).

Pursuing these decisions requires different types of expertise at each level of government. The responsible parties can be classed into three broad categories of decisionmakers:

- *Policymakers:* chief executives, council members, and legislators.
- *Managers:* project managers, program managers, section heads, and department heads.
- *Technical staff:* engineers, data systems personnel, planners, and budget and policy analysts.

The decisions in each category differ greatly but contribute distinctly to overall policy results. Ultimate public service outcomes occur as the result of many decisions made by all three classes of decisionmakers at all three levels of government pursuing their individual responsibilities and interacting with one another.

Exhibit V-2 illustrates the relationship between the decisionmakers and the types of decisions they make as they contribute to overall public service outcomes.

Three principal spheres of decisionmaking are of central concern in pursuing public works performance goals: (1) providing public works, (2) regulating development, and (3) sponsoring associated intergovernmental aid and regulation. Each of these spheres of activity involves all three types of decisionmakers, including elected and non-elected officials. Exhibit V-3 illustrates the roles of decisionmakers within these three activities in achieving public works performance goals. Infrastructure performance data can be useful to these decisionmakers by providing them with a common language to help them achieve common goals.

Public works providers. Public works departments and agencies, along with chief executives and legislative officials,

EXHIBIT V-1
PUBLIC WORKS PERFORMANCE GOALS
AND RELATED DECISIONS

	Performance Goals					
Necessary Decisions	Synchronize Public Works w/Development	Attain Established Levels of Service	Support Economic Develop. & Fiscal Policies	Distribute Services Equitably	Limit Deferred Maintenance Liabilities	Enhance Economic Return on Investment
1. Adopt Development Plans & Fiscal Policies	X		X			X
2. Adopt Level of Service Stds.	X		X			
3. Admin. Devel. Regs.	X		X			X
4 Adopt Capital and Operating Budgets	X	X	X	X	X	X
5. Admin. Development Exactions	X	X				
6. Set User Fees	X	X		X		X
7. Regulate the Use of Public Facilities	X	X		X	X	X
8. Design, Construct, Operate and Maintain Public Facilities				X	X	X
9. Collect and Analyze Data	X	X	X	X	X	X

EXHIBIT V-2
TYPES OF PUBLIC WORKS DECISIONS AND DECISIONMAKERS

Decision Types	Types of Decisionmakers		
	Policymakers: (chief executives, council members, legislators)	*Managers:* (project managers, program managers, section heads, department heads)	*Technical Staff:* (engineers, data systems personnel, planners, budget & policy analysts)
1. Adopt Development Plans and Fiscal Policies	L	S	S
2. Adopt Level of Service Standards	L	S	S
3. Admin. Develop. Regs.	L	S	S
4. Adopt Capital and Operating Budgets	L	S	S
5. Admin. Development Exactions	L	S	S
6. Set User Fees	L	S	S
7. Regulate the Use of Public Facilities	L	S	S
8. Design, Construct, Operate & Maintain Public Facilities		L	S
9. Collect & Analyze Data		L	S

Legend:

L = lead role
S = support role

EXHIBIT V-3
TYPICAL PUBLIC WORKS PERFORMANCE GOALS, SPHERES OF DECISIONMAKER ACTIVITY AND CHARACTERISTIC ROLES

Performance Goals	Spheres Of Decisionmaker Activity		
	Public Works Providers	Development Administrators	Associated Intergovernmental Aid and Regulatory Officials
1. Synchronizing public works with develop.	S	L	–
2. Attaining desired service levels	L*	L*	S
3. Supporting economic development	S	L	–
4. Distributing public works benefits equitably	S	–	L
5. Limiting deferred maintenance	L	–	S
6. Enhancing economic return on investments	L	S	S

Legend:

Lead Role = L
Major Support Role = S
Minor or No Role = –

*Leadership for this goal is shared because its attainment is dependent upon regulation of development (demand) and provision of service (supply).

own, operate, and manage physical facilities. Public works of all kinds can be locally owned. State ownership is concentrated in highways, parks and forests, universities, prisons, hospitals, courts, and administrative offices. Occasionally, states own airports, water ports, or other specialized facilities. Federal ownership includes public lands, major water resources facilities, military installations, veterans hospitals and homes, post offices, federal offices, courts, and penitentiaries.

The chief responsibilities of these agencies and officials are to:

- Plan, design and construct capital projects efficiently and on schedule.
- Reduce demand, if possible, to help live within established spending limits.
- Operate existing facilities efficiently to help avoid construction of new facilities.
- Maintain existing facilities well to extend their lives as long as feasible.

Development regulators. City and county governments, along with planning commissions, planning and building departments, citizen groups and others, work together to establish and administer comprehensive land development plans as well as ordinances for zoning, subdivision regulation, building construction and occupancy regulation, and public facilities timing. They have a primary role in preparing capital improvement programs.

Because of their regulatory role, these organizations generally take the lead in synchronizing public works with development. Their land-use regulatory powers put them in a position to negotiate with developers under state law.

Development regulators at the county and municipal levels, however, have little jurisdiction over state and federal lands. The states themselves, and the federal government, have primary control over those territories. Acting through their executive, legislative, and judicial arms, they administer public lands, major installations, and public buildings. State and federal agents negotiate leases, land swaps and other public land agreements. Generally, these actions are subject only to review and comment by local governments.

A few states also exercise some land-use powers themselves (such as facility siting) or have significant review over local land-use authority.[34] Some of the states also exercise concurrent land-use powers with local governments in coastal and other critical areas.

At the federal level, there is significant review over state and local land use in coastal areas and, in turn, strong state and local influence over federal development in those areas.

Associated intergovernmental aid and regulatory officials. Seldom can officials at any single level of government provide public works or regulate development without assistance or intervention by officials at other levels of government. State and federal aid, the regulations that accompany aid programs, and interlocal transfers of funds are important tools for providing this assistance. In addition, state and federal regulations, independent of financial assistance programs, have major effects. Each of these external influences brings the decisions of an array of legislative, executive, and judicial officials from other levels of government to bear on decisions at hand.

For example, federal aid for infrastructure is established by Congress and the President, and administered by a variety of executive departments. It currently runs to $25 billion per year and is distributed among a wide variety of state and local governments where officials strive to use it to best advantage through their own decisionmaking processes.

State aid to local governments for public works is established by state legislators and governors and administered by a variety of executive departments. Like federal aid, it is substantial and it affects decisionmaking within a large number of recipient governments.

Public works funds transferred among local governments are allocated by local elected officials or by members of special district governing bodies.

Aside from the issue of whether the amount of intergovernmental aid is sufficient, these aid programs typically pursue objectives set by the decisionmakers of the government supplying the funds. Such objectives may include:

- Stimulating more public works activity.

[34] John M. DeGrove, *Land Growth and Politics.* (Chicago: American Planning Association, 1984).

- Encouraging cost-effectiveness for assisted services.
- Establishing public activity in new public works fields (such as hazardous waste).
- Building greater policy, administrative, managerial, or technical capacity in the aided governments.

Progress toward such goals cannot be measured without performance data.

In addition to the external influences of decisions made by officials responsible for intergovernmental aid programs, there are significant influences by state and federal regulators. For example, federal environmental regulations (particularly those covering wastewater, air quality, and solid and hazardous wastes) heavily influence state and local public works decisions. Parallel state programs often affect the local decisions. Frequently, state and federal regulations are combined with aid programs, superimposing multiple layers of influence by external decisionmakers.

Conclusion. Council research indicates that all three basic groups of decisionmakers should reinforce one another in a coordinated effort to improve the nation's infrastructure. Although they play diverse roles, they share a common purpose. Consistent and reliable performance data could help not only to unify them, but to make each group more effective in its own right.

Information and Analysis for Making Better Public Works Decisions

Council research indicates that improved performance information would encourage more informed public works decisions in two ways. It would allow decisions to be based directly on (1) service adequacy relative to service demand, and (2) the most cost-effective service delivery alternatives.

Service adequacy measures include:

- The population served.
- Actual use versus available capacity.
- Compliance with established service standards.
- Frequency of delays, overcrowding, accidents, breakdowns, or other interruptions to service.
- The frequency of health and safety incidents.
- Actual economic and social benefits compared with expected benefits.

These performance measures supplement traditional data (such as the extent, value and condition of facilities and equipment) in important ways. Although traditional data help officials maintain facilities in accordance with engineering standards, they offer little advice about service adequacy. They do not show whether more facilities are needed or if different facilities would be more effective. Traditional data alone are not adequate for setting spending priorities and exploring low-cost service delivery alternatives.

Cost-effectiveness measures include:

- Unit costs of providing services.
- Service benefits in relation to their costs.
- The rate of facility and equipment replacement versus expected remaining life.
- The extent to which costs are being recaptured from users and other identified beneficiaries.

These measures can supplement traditional spending data (such as current spending in relation to past spending). They can provide more precise information about the productivity and return-on-investment expected of alternative projects and programs. Public works officials can use this information to assess such things as the trade-offs between improved operations, better maintenance, new equipment, and additional construction.

Performance measures like these, when consistently available statewide or nationwide, can be aggregated and summarized to help officials at each level of government develop and fund more effective intergovernmental public works programs. However, information based on public works performance and related analyses generally are not available to support public works decisionmaking.[35]

Analytic Techniques. Various analytic techniques can support performance-based evaluation (see Exhibit V-4). These can be classified as follows:

- *Descriptive:* inventories and data bases storing information about the physical, social, and economic environment, such as air and water quality, and population, and public

[35] For example, see: George Peterson, et al, "Infrastructure Needs Studies: A Critique," prepared for the National Council on Public Works Improvement, October 1986; Harry P. Hatry, et al, "The Capital Investment & Maintenance Decision Process in the Public Sector," prepared for the National Council on Public Works Improvement, October 1986; Apogee Research, Inc., "A Consolidated Performance Report on the Nation's Public Works," prepared For The National Council on Public Works Improvement, August 1987. Deloitte Haskins and Sells, "Final Report on Recommendations to Improve Public Works Decision-Making," prepared for The National Council on Public Works Improvement, November 1987.

EXHIBIT V-4

REPRESENTATIVE ANALYTICAL TECHNIQUES FOR SUPPORTING PUBLIC WORKS DECISIONMAKING

CLASSIFICATION	PURPOSE	TECHNIQUES
Inventory systems	Maintain current descriptive information	Attribute databases Condition/deficiency index systems Service levels/standards databases Maintenance history/cost data Geo-based mapping systems
Management models and systems	Assist in project design and construction, operation and maintenance of current assets, and evaluation of project and program performance	Infrastructure asset management systems Maintenance management systems Quality control models Computer-aided design and drafting systems Risk-Safety analysis Value engineering models Repair/replace models Cost accounting systems Bond analysis systems Budgetary models Parts and supplies control systems Equipment management systems Project management systems
Policy models	Assist in developing long-term program strategies (using performance goals and related project selection criteria)	Benefit-cost analysis Life cycle cost analysis Fiscal impact models —socio-economic analysis —growth-tracking systems Environmental analysis Capital improvement programming systems Forecasting models

Source: Adapted from Deloitte, Haskins and Sells, et al, *Final Report on Recommendations to Improve Public Works Decision-Making*, prepared for the National Council on Public Works Improvement, November 1987.

works assets (listings of assets, maintenance histories, and so on).

- *Management:* techniques to help public works managers design and build projects, operate and maintain current assets, and evaluate project performance (based on identified goals and criteria).
- *Policy:* techniques to assess long-term performance of public works programs and make decisions for the future (using performance goals and related project selection criteria).

Some governments are using these techniques to make project and program decisions. Microcomputers with software tailored for public works support this trend.

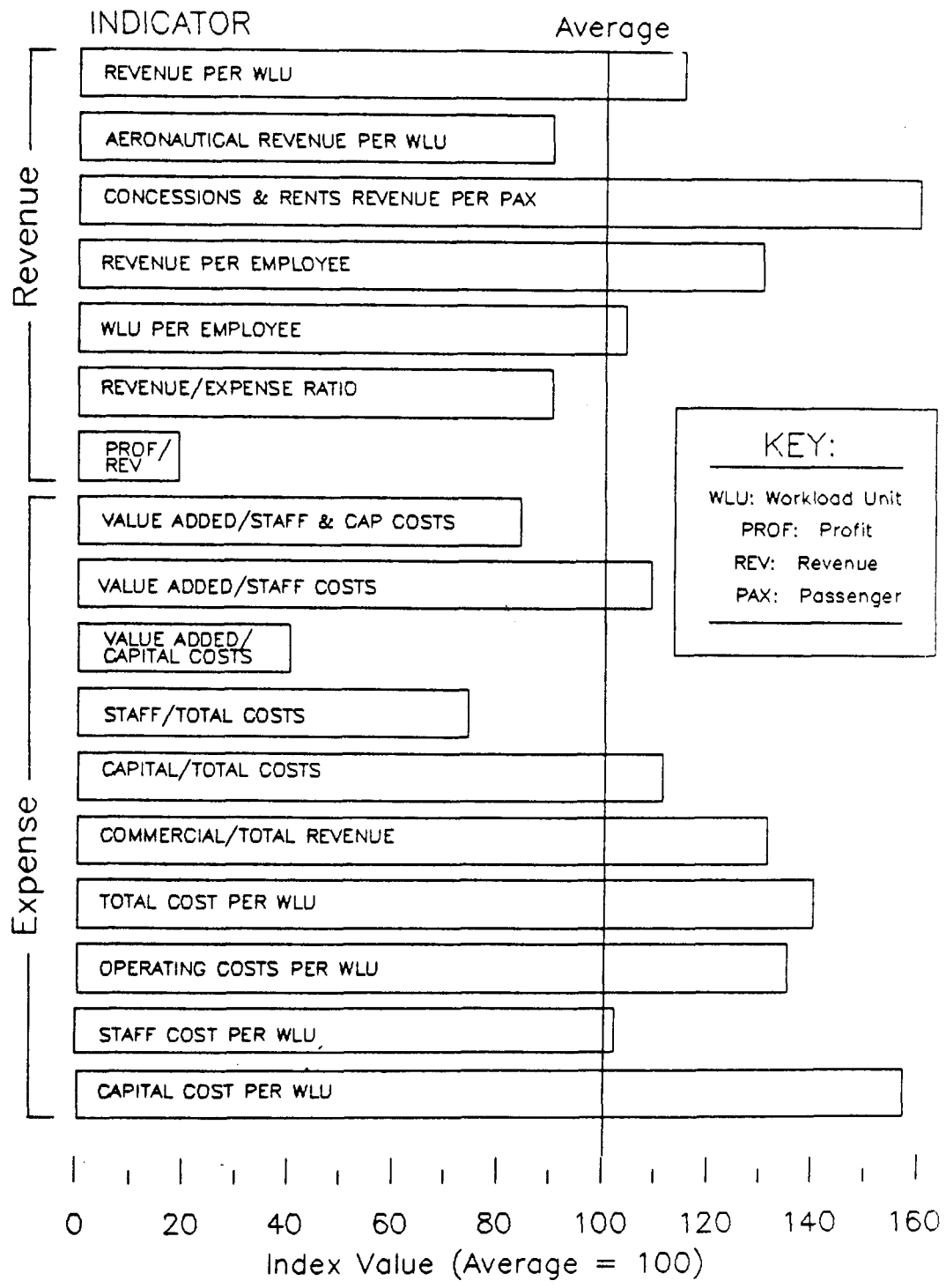
Properly analyzed public works performance information is crucial to policy decisions. Such information can:

- Help public works managers make better daily operating decisions.
- Help public works policymakers develop improved future programs.
- Help program officials justify program changes to top executives, legislators and the general public.

For example, performance data can help managers measure a facility's current operating performance. In a recent study, the Amsterdam Airport was compared to other European airports on the basis of seven revenue indicators and ten expense indicators (see Exhibit V-5).[36] By comparing Amsterdam's performance against the indexed average of the other airports, managers could pinpoint

[36] David Woolley, *Airport Forum*, Nov. 2, 1987, as cited in Apogee Research, Inc., "A Consolidated Performance Report" op. cit., p. 32.

EXHIBIT V-5
PERFORMANCE INDICATORS FOR THE AMSTERDAM AIRPORT ACOMPARED TO EUROPEAN SYSTEM-WIDE AVERAGES



SOURCE: David Woolley, "Airport Forum," Nov. 2, 1987.

shortfalls in operating procedures or investment needs and devise means for improvement.

The recent Rail Modernization Study prepared for the Urban Mass Transportation Administration (UMTA) provides an example of improved future-program decisions. Initially, an asset inventory and evaluation had determined that $17.8 billion would be required to upgrade and modernize U.S. urban rail transit systems. A further evaluation based on cost and quality of service showed that 8584 percent of the total passenger miles could be restored to good condition and that 69 percent of the net service quality benefits could be obtained at half the original study's suggested cost.[37]

In another example, a proposed change in the configuration of the Dayton, Ohio, trolley bus system was met with initial resistance by some transit board members and a vocal minority of the general public. However, an analysis based on service delivery, operating performance, and cost data showed that reducing the extent of trolley bus service (while continuing the motor coach service) could achieve significant savings in operations and maintenance costs without harming service.[38]

Principles for collecting and sharing performance data. Council research determined that despite the different backgrounds of public works decision-makers, the data and analytical techniques they need at all levels are remarkably similar. As much as 70 percent of the data could be shared.[39] Moreover, the value of performance-based information depends on a regular schedule of reports to managers, elected officials, and the public.[40] For example, facility managers may need daily reports. Elected officials and citizens can monitor progress on the basis of monthly or quarterly performance reports. Annual reports showing multi-year trends and projections provide elected officials and top executives useful information for preparing capital investment plans and programs.

The following guidelines for improving the collection and use of performance data emerged from the Council's research:[41]

- It is important to measure all kinds of performance, not just physical assets.
- Data should be consistent in units of measurement and in geographic units.
- The source of data must be the system operator.
- Data will be more accurate if they are useful to the system operator and are not so voluminous as to discourage updating.
- National, state, or regional cooperation to set data standards will promote consistency, unified analyses, and broad dissemination.

Performance data should be automated to facilitate updating, analysis, presentation, and sharing. Rapid advances in information science present an unprecedented opportunity to achieve these goals. Studies of specific public works agencies show that investments in automated data systems often pay back in less than four years.[42]

Barriers to performance monitoring. Local performance data too often are not regularly collected and used. Those public works managers who do use performance monitoring to manage their own systems, seldom are able to compare their performance with that of other systems.[43] As a result, they may not be aware of alternatives which could help their systems perform better.[44]

The extent and quality of performance monitoring varies greatly. Almost without exception, however, the greatest weaknesses lie in the data available to measure service quality and cost-effectiveness. Measures of quality are not well

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[37] Gannett Fleming Transportation Engineers, Inc, et al., *Rail Modernization Study-Final Report.* (Washington, DC: Urban Mass Transportation Administration, Office of Grants Management, April 1987).

[38] Daniel Dunoye and Walter Diewald, "Trolley Bus and Motor Coach Operational Cost Comparisons Utilizing Section 15 Data," a paper presented at the 67th Annual Meeting of the Transportation Research Board, January 1988.

[39] Deloitte, Haskins and Sells, et. al., "Final Report on Recommendations to Improve Public Works Decision-Making," op. cit., p. 10.

[40] *Ibid.*, p. 14.

[41] Apogee Research, Inc., "A Consolidated Performance Report," op. cit., p. 35.

[42] Deloitte, Hawkins and Sells, et. al., "Final Report on Recommendations to Improve Public Works Decision-Making," op. cit., p. 58.

[43] Urban Mass Transportation Administration, *The Status of the Nation's Local Mass Transportation: Performance and Conditions.* (Washington, DC: June 1987), p. 191.

[44] This is more characteristic of small public works systems for larger ones. See Apogee Research, Inc. and Wade Miller Associates, "Problems in Financing and Managing Smaller Public Works," prepared for the National Council on Public Works Improvement, September 10, 1987, pp. 86-88.

defined and data collection is costly; many decisionmakers do not request detailed data about alternatives. They and their constituencies seldom question staff recommendations. In fact, Council research has identified certain barriers to the acceptance of performance monitoring.[45] These include:

- The lack of valid comparative data and the difficulty of agreeing upon consistent standards for data collection.
- The unfamiliarity with new techniques.
- The need for new skills in public agencies to use these new capabilities effectively.
- The cost of new information systems.
- Finally (and perhaps most significantly) the time and expense required to establish and maintain the new data bases.

The first three are skills-related barriers, while the latter two are financial constraints. Using performance information depends on overcoming these barriers.

Encouraging Performance-Based Decisions

The best incentive for collecting and maintaining performance data is to have immediate and important uses for it. The next best is to be required or paid to do it.

Two important uses for performance data have emerged from Council research. One is to enhance the capital budgeting process, and the other is to organize more effective and highly accountable performance centers.

Capital budgeting. State and local public works planners have used capital budgeting over half a century. It ties comprehensive development plans to investment strategies, approval of individual projects, appropriation of funds, and the issuance of debt.

The major deficiencies of capital budgeting are lack of criteria for judging the relative worth and priority of projects, lack of comprehensiveness, and the separation of construction from operations and maintenance.[46]

Performance information can help improve capital budgeting by supporting program- and project-level evaluations. Such evaluations can provide objective criteria in the budget process. The National Conference of State Legislatures recently recommended that "the development and use of explicit criteria for reviewing capital budget requests should be an essential part of the legislature's capital review process."[47] Projects can then be selected on the basis of need and efficiency rather than for their "pork value."

The chief obstacle to comprehensiveness in local capital budgeting is the overlapping of many jurisdictions in the same geographic area (cities, counties, and special districts).[48] At the state level, this problem arises from the common practice of excluding projects funded through federal grants, dedicated revenues, or allocations to independent units. At the federal level, several agencies work on capital projects in the same public works category without cross-agency programming. Sharing program information among the many units can help improve intergovernmental coordination of interrelated systems.

Finally, with respect to the separation of construction from operation and maintenance, decisionmakers and operating agencies seldom consider maintenance and rehabilitation as alternatives to new construction. Examination of all the options, using performance data, could help capital improvement programs tie in with current expense budgets and avoid a capital bias.

The potential of performance centers. Clear visibility of public works programs has the advantage of creating public awareness of services, of their costs, and of the link between costs and performance. This has the effect of transforming public services into consumer commodities. In many cases, these can be priced more realistically. For example, when sewer services are charged on the water bill, the price can be related to the amount of water used, and a larger recovery of costs often can be achieved

[45] Deloitte, Haskins and Sells, et. al., "Final Report on Recommendations to Improve Public Works Decision-Making," op. cit., pp. 47-50.

[46] Harry P. Hatry, et al, "The Capital Investment and Maintenance Decision Process in the Public Sector," prepared for the National Council on Public Works Improvement, July 1, 1986, pp. 59-61.

[47] Barbara Yondorf and Barbara Puls, *Capital Budgeting and Finance: The Legislative Role.* (Washington, DC: National Council of State Legislatives, November 1987), p. 59.

[48] Harvey A. Garn and R. Scott Fosler, "Economic Considerations in Infrastructure Decision-Making," prepared for the National Council on Public Works Improvement, September 25, 1987, pp. 8-9.

than when sewer service is billed separately at a flat rate.[49]

Council research suggests that organizing public works programs as visible performance centers can be desirable, especially in the present fiscal environment. The purpose of such centers would be to isolate all their costs and benefits, and seek to recover at least a substantial share of the costs from the various classes of beneficiaries. The centers can also provide superior management data and use it to improve performance in a more focused and publicly accountable way.[50]

Special districts and authorities are examples of performance centers that are particularly useful where services must be provided across local jurisdictions and state lines, or where local taxing or borrowing limits leave no alternative. However, special taxing areas administered by cities or counties, or other programs funded by dedicated revenues, also can operate as visible performance centers. These entities can then link costs more closely to benefits without the danger of too much independence sometimes exhibited by special districts and authorities.[51]

Intergovernmental incentives for performance monitoring. The federal government provides funding for public works built and operated by state and local governments. Thus, it is important that federal, state and local programs be coordinated to achieve national goals. Performance monitoring is an essential link in achieving this goal. It can be promoted by the following:[52]

- A coordinated and cooperative national program of technical assistance.
- Data collection requirements within public works programs.
- Financial incentives for using performance monitoring programs.

Some elements of such an effort are already in place. The foremost example is the federal-aid highway program. For many years, 1.5 percent of the funds for this program has been dedicated to research and planning. Much of that money has gone for data collection. In recent years, the fund has paid for data to support the biennial report to the Congress by the Federal Highway Administration *(The Status of the Nation's Highways: Conditions and Performance).*[53] The information is generated through the cooperatively established Highway Performance Monitoring System (HPMS).

Section 15 of the Urban Mass Transportation Act also requires extensive performance reporting by transit operators as a prerequisite for federal funding. UMTA provides planning assistance grants that help defray the expense. However, serious problems with the quality of the data and the heavy burden of the requirement led to a four-year cooperative reevaluation with the transit industry. The result was a substantial streamlining of the reporting system that is expected to improve data quality and reduce the burden of collection.[54]

The biennial wastewater needs survey submitted to Congress by the EPA is also based on a cooperative data system.[55] The data are supplied by states with the assistance of federal planning grants.

A more comprehensive and consistent system of performance reporting could evolve from these beginnings. Such a system should draw upon cooperatively set data collection and reporting standards. Federal requirements, funding, and technical assistance have already provided incentives to improve the current data systems. Council research suggests

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[49] Apogee Research, Inc., *The Nation's Public Works: Report on Wastewater Management,* op. cit., pp. 110-111.

[50] For a discussion of data reporting to enhance public accountability, see: Deloitte, Haskins and Sells, et al, "Final Report on Recommendations to Improve Public Works Decision-Making," op. cit., pp. 58-60.

[51] The Advisory Commission on Intergovernmental Relations recommends that counties establish subordinate taxing areas to provide special services needed in only part of the county. See *ACIR State Legislative Program: Part 2. Local Government Modernization.* (Washington, DC: U.S. Government Printing Office, November 1975), pp. 84-86.

[52] Additional discussion of these options may be found in: Apogee Research, Inc., "A Consolidated Performance Report on the Nation's Public Works," op. cit., pp. 35-38. See also Deloitte Haskins and Sells, et al, "Final Report on Recommendations to Improve Public Works Decision-Making," op. cit., pp. 60-62.

[53] U.S. Congress *Report of the Secretary of Transportation to the United States Congress.* (Washington, DC: U.S. Government Printing Office, June 1987), Committee Print 100-11.

[54] Joel Markowitz and Tom Rubin, "Revising the Federal Reporting System: Recommendations of the APTA Section 15 Committee," a paper presented to the APTA Eastern Training Conference, Ottawa, Canada, May 1987.

[55] Apogee Research, Inc., *The Nation's Public Works: Report on Wastewater Management,* op. cit. p. 21.

that such incentives could continue to improve national performance monitoring.[56]

EMPHASIZING BETTER MAINTENANCE

This section examines the importance of maintenance, why it is often deferred, and options for improving it.

Importance of Maintenance

The maintenance of public works facilities has a major impact on the delivery of service, and consumes a significant share of public works expenditures. Maintenance spending amounted to about $28.4 billion in 1984, about 29 percent of all public works spending. Local governments provided the bulk of maintenance spending, about $19.2 billion or 68 percent.[57] Maintenance spending varies considerably because it depends on the characteristics of each category (facility and equipment age, use, and history of maintenance and rehabilitation actions). It also depends on the level of available funding.

Maintenance is Vulnerable

Lack of visibility. Maintenance spending does not generate the excitement associated with new capital projects. The public is seldom aware of maintenance unless a pothole persists or a bus air conditioner breaks down.

Along with being invisible, maintenance is not politically compelling. Decisionmakers seldom take strong positions; there is too little political demand for maintenance. Also, few public officials have had to face the task of recapitalizing existing facilities (the most notable recent exception being the New York City subway system). Generally, as communities have grown and expanded, it has been possible to generate interest in new facilities in the name of growing demand, new technology, or new federal grant programs. Mature communities face difficulties in financing replacement of aging facilities if their tax base and demand for public works is level or declining.

Operation and maintenance budgets are often easy to cut because voters do not see infrastructure deterioration. Even public officials who understand that breakdown maintenance is eventually more costly than preventive maintenance are often forced to defer maintenance because of competition from other priorities.[58] Ultimately, delay and postponement of maintenance result in the need for premature rehabilitation, rebuilding, or replacement.

Council research shows that neither policymakers nor constituents demand analyses of the impact of deferred maintenance, of alternative repair or replacement strategies, or of costs and benefits.[59]

Lags in applying new ideas. Engineering curricula and related public works education programs rarely include maintenance, although professional associations and federal agencies offer organized information-sharing on methods and techniques, diffusions and actual use of new ideas is limited.[60]

Nevertheless, research on maintenance management techniques and procedures has provided some useful results. For example, UMTA has reported on the application of work methods to bus maintenance that reduced maintenance costs by 30 to 50 percent.[61]

The principles of design for reliability and ease of maintenance, which are widely recognized as important to the proper functioning of highly complex equipment such as aircraft, are being applied to public works equipment as well.[62] Cost analyses have shown that improvements in railcar design can yield significant cost savings.[63]

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[56] Deloitte, Haskins and Sells, et al, "Final Report on Recommendations to Improve Public Works Decision-Making," op. cit., pp. 46-47. See also Apogee Research, Inc., "A Consolidated Performance Report," op. cit., and Apogee Research, Inc., "Making More Efficient Use of Limited Public Resources," op. cit.

[57] Apogee Research, Inc., "Maintaining Good Maintenance," op. cit.

[58] Breakdown maintenance and unscheduled maintenance are often used interchangeably. Breakdown maintenance specifically refers to unscheduled maintenance which is performed after the system or component has failed.

[59] Deloitte, Haskins and Sells, et. al., "Final Report on Recommendations to Improve Public Works Decision-Making," op. cit., pp. 25-26.

[60] *Ibid.*, pp. 34-39.

[61] UMTA Maintenance Tools for Bus Maintenance.

[62] F. Stanley Nowlan, and Howard F. Heap, *Reliability-Centered Maintenance.* (Washington, DC: Office of the Assistant Secretary of Defense for Manpower, Reserve Affairs, and Logistics, Department of Defense, 1978).

[63] Walter Diewald and Donatus Muotoh, *Rapid Transit Car Maintenance and Overhaul Analysis.* (Washington, DC: May 1985).

Alternative maintenance approaches that have been developed in other fields are also applicable to public works. Studies have examined better ways to plan and organize maintenance tasks to reduce costs. For example, failure rate statistics can be extracted from standard transit maintenance records to provide operators with an accurate comparison of fixed-interval component replacement with failure or inspection-based maintenance.[64]

Equipment-monitoring techniques and management information systems can provide data bases for analysis. For example, a group spearheaded by large wastewater utilities created the Instrument Testing Service (ITS) in 1986. The ITS has conducted field tests on several instruments; an expanded test program is planned, including tests on a group of dissolved oxygen analyzers. The potential of these devices to reduce maintenance costs provided the impetus for the program.[65]

Options for Improving Maintenance

All the Council's studies of individual public works categories have emphasized the importance of maintenance. Public works professionals universally agree that inadequate and deferred maintenance can lead to costly equipment failures and shorter equipment lives. Nevertheless, performance-based measures for improving maintenance have been neglected.

Pavement maintenance management systems (PMMS) are a notable exception.[66] These systems enable managers to access an inventory of consistent and comprehensive data on pavement conditions. The PMMS program typically generates reports for pavement inventory, condition rating, and maintenance and repair requirements.

A PMMS can provide an agency with a basis for rational decisions regarding repair and rehabilitation of roads and streets. Information routinely available from a PMMS can provide managers with a way to schedule repair and avoid losses due to failure maintenance.

PMMS applications have also proven valuable for condition analysis, maintenance strategy, and life-cycle cost analysis. A disadvantage of the PMMS, which is shared by nearly all inventory data systems, is that it is time-consuming to set up the data bases.

Giving maintenance greater visibility. For public works maintenance to have greater visibility, public works decision-makers must have greater accountability. Improved accountability will be both a result of and a contributor to improved performance measurement.

Removing restrictions on funds. Restrictions in public works grants could be modified. For example, in block grants the separations between capital, operations, and maintenance are removed or deemphasized. If the separations are not removed, percentage relationships at least can be established, monitored, and adjusted periodically as needs change.

Establishing set-asides. Reserve funds for maintenance and sinking funds for replacement are frequently established when revenue bonds fund public works. That practice could be used more widely. In addition, certain percentages of public works budgets and grants are sometimes set aside for maintenance; these can be adjusted to improve the state of repair of particular systems.

Creating incentives. Requirements for federal and state assistance can be revised to include greater commitment to maintenance and rehabilitation. Such requirements could stipulate maintenance performance standards, and could call for maintenance plans, sound maintenance practices, and periodic maintenance audits.

Design for maintenance. Equipment design or facility construction does not always take maintenance requirements into consideration.[67] Maintenance managers are not usually consulted in the development of specifications for equipment for which they will be responsible. A change in this approach can yield significant cost savings.[68]

Summary. Suggestions for improving the maintenance situation include dedicating a portion of capital grant funds

[64] James Foerster, et al. *Maintenance Tools for Bus Maintenance.* (Washington, DC: Urban Mass Transportation Administration University Research and Training Program, May 1983).

[65] Wade Miller Associates, Inc., *The Nation's Public Works: Report on Water Supply,* op. cit., p. 58.

[66] American Public Works Association, "Good Practices in Public Works," prepared for the National Council on Public Works Improvement, August 18, 1987, pp. 42-48.

[67] James M. Montgomery Consulting Engineers, Inc., *Water Treatment: Principles and Design.* (1985), Chapter 24.

[68] Robert Contino, "Employee Participation: The Blue Collar Edge," *Public Works,* June 1987, pp. 81-82.

to maintenance, establishing sinking funds for maintenance, and setting incentives for maintenance. Together with better design and visibility for maintenance deficiencies, these measures could ensure significant improvements.

ALLEVIATING MAJOR PUBLIC WORKS DELAYS

A common complaint concerns the increasing amount of time required for major public works projects to be planned, authorized, and built.[69] The reasons for this include:

- Growing difficulty in siting certain facilities in populous areas.
- An increasingly complex contracting process, with set-asides for certain classes of contractors and complex safeguards against abuses.
- Increasingly complex projects, requiring sophisticated project management techniques.

A generation ago, it took only two or three years to get many major public works projects underway. Now, it may take fifteen years for similar projects. Such delays are expensive; in many cases, they completely foreclose projects because of inflated costs or other developments.

There are no easy solutions to the problem of delay. However, Council research suggests potential for easing siting and project-impact concerns through focusing responsibilities, clarifying accountability, establishing deadlines for required reviews, and using increasingly well developed techniques for preventing and resolving disputes.[70] Computerized project design and management techniques also can help keep authorized projects on schedule.[71] In addition, research by the Advisory Commission on Intergovernmental Relations suggests that there is potential to review federal mandates for simplification and streamlining without compromising the intent of those requirements.[72]

CONCLUSION

Clearly defined public works goals with measurable performance objectives would serve decisionmakers at every level of government well. A national performance monitoring system could provide all public works professionals with a common language.

Such monitoring could also bring a new degree of visibility and accountability to public works management—management that will be crucial in addressing the nation's future public works concerns.

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[69] For example, unpublished transcript of Boston hearing by the Council, August 3, 1987, Statement by Jim Sullivan, Chairman, Greater Boston Chamber of Commerce, p. 35.

[70] Rivkin Associates, "Review Paper on the Accommodation of Diverse Views in the Public Works Improvement Process," prepared for the National Council on Public Works Improvement, July 1987.

[71] Deloitte Haskins and Sells, et al., "Final Report on Recommendations to Improve Public Works Decision-Making," op. cit. pp. 28-34, B2, and B5. For additional considerations in avoiding delays in the design and construction of public works see: T. F. Como, J. D. Borcherding, and R. L. Tucker., *Engineering Design Delay Survey.* (Austin, Texas: The University of Texas at Austin, Construction Industry Institute, August 1983); and David F. Rogge, *Foreman-Delay Surveys for Construction Sites.* (Austin, Texas: The University of Texas at Austin, Department of Civil Engineering, December 1981).

[72] Advisory Commission on Intergovernmental Relations, *Regulatory Federalism: Policy, Process, Impact and Reform. (Washington, DC: February 1984), pp. 295-301.*

APPENDIX 2

NAPA SURVEY OF STATE AND LOCAL GOVERNMENT USE OF BENCHMARKING FOR PUBLIC WORKS INFRASTRUCTURE

A Study for the U.S. Advisory Commission on Intergovernmental Relations

February 1996

Survey of State and Local Government Use of Benchmarking for Public Works Infrastructure

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BACKGROUND INFORMATION

Much of the impetus for performance-based budgeting in the federal government has come from those who point to its successes elsewhere. Vice-President Gore's National Performance Review recommended reinventing the U.S. Advisory Commission on Intergovernmental Relations (ACIR), in part, by working to improve performance measures for the federal government's intergovernmental programs and projects. Under contract to ACIR, the National Academy of Public Administration (NAPA), in collaboration with the University of Akron's Department of Public Administration and Urban Studies, obtained detailed information on benchmark practices for public works infrastructure from 16 state and local public works and environmental protection agencies across the country.

The Vice President's specific recommendations called for ACIR to "develop appropriate benchmark and performance measures to improve the understanding of public service delivery effectiveness." The use of performance measures is now required for many federal programs and projects under the Government Performance and Results Act of 1993 (GPRA).

ACIR, charged by NPR "to provide leadership in developing a systematic process to define and measure national benchmarks," is building on its recent work with the Army Corps of Engineers to develop a federal infrastructure strategy. A key step toward that goal was examining the use of benchmarks as a tool for performance measurement by state and local public works agencies. The NAPA survey sought to identify promising benchmark practices that could be incorporated into federal budget, planning, or other practices for federally assisted and federally required public works projects.

The NAPA advisory panel established to guide this project recognized early on that the widespread use of "benchmark" as both a noun and a verb has contributed to over-generalization and a diffuse understanding of the practice. Benchmarks are one of many performance measurement indicators. The benchmarking process is part of a strategic planning and goal-setting approach to measuring performance. The process requires a strong commitment to implementing genuine change in any organization. NAPA's survey of state and local public works agencies provides background on the development of benchmarks, the reasons for using them, and ways other units of government are using them. Survey responses are reported below.

NAPA received a positive response from 30 state, city, county, and special district governments already involved in benchmarking for infrastructure-related activities. The participants were selected from a variety of sources that discuss performance measurement and infrastructure-related activities. Specifically, NAPA consulted the Alliance for Redesigning Government's semi-monthly publication, *The Public Innovator*; the International City/County Management Association (ICMA) Comparative Performance Measurement Consortium; a June, 1994, Southern Growth Policies Board paper titled "Benchmarking Pioneers"; and a March, 1995, *Financial World* article, "Ranking the Cities".

The following analysis considers the 16 responses received from the participants able to complete this survey. Those who did not participate cited the immaturity of their benchmarking endeavors, the time necessary to complete the survey, and lack of familiarity with the benchmarking process.

NAPA first attempted to contact the departmental executive. For state government, NAPA staff telephoned the director of each agency selected. At the city/county level, the chief executive's office was contacted. In most cases, the point of contact became the program manager or engineer responsible for public works in each specific agency. In three instances, NAPA was instructed to solicit participation from the agency's

budget office. For these reasons, perspective and decision-making authority varied widely among survey participants.

NAPA, in consultation with ACIR, formed an advisory panel of five members (See Exhibit 1). The panel, composed of Academy Fellows and supplemented by one outside expert, possessed the necessary backgrounds and expertise to comment on the survey results and analysis and received support from NAPA staff. Panel appointments were made by the Academy president and approved by its Board of Trustees chair.

The panel met with the ACIR project team twice during the study period. The first meeting focused on the survey instrument and desired outputs of the survey. A follow-up meeting was held to discuss findings and analysis of the survey results.

The survey questionnaire was divided in two sections: in the first, open-ended questions allowed respondents to describe the development and application of benchmarking in their departments; in the second, closed-ended questions forced respondents to answer in fixed categories. The differing portions of the questionnaire were designed to complement and clarify each other. Each respondent was asked to consider the survey questions as they applied to one particular infrastructure activity of the agency. Additionally, respondents were asked to send any other benchmarks their agency may have been using to measure performance for other infrastructure activities. Eleven agencies forwarded benchmark indicators.

Most benchmarking practices combine development, operations and maintenance. Benchmarking has developed mostly in the 1990s, although two departments used benchmarks prior to 1984. One-half use between one and five benchmarks for the infrastructure activity they described, while the others use considerably more (10+). For the infrastructure types described (transportation, water supply, water treatment, solid waste disposal, or public buildings), 75 percent of the respondents said their agency uses 10 benchmarks or fewer for the infrastructure activity they described.

Of the benchmarks described by the respondents, some are only proposed (such as those of the Virginia Department of Transportation) while others have been adopted. Some have been incorporated into budgets. This presumably means budget decisions have been made using progress toward the benchmark as a guide.

All departments update their benchmarks, most of them annually. Nearly all have updated their benchmarks since 1990. Respondents to the survey appear in Box I.

Box I: Respondent to NAPA/ACIR Survey on Benchmarking for Public Works Infrastructure

States:
Connecticut, Department of Environmental Protection
Minnesota, Department of Transportation
North Carolina, Department of Environment, Health, and Natural Resources
Texas, Department of Transportation
Utah, Department of Environmental Quality
Virginia, Department of Transportation
Wisconsin, Department of Transportation

Cities:
Boston, MA: Department of Public Works, Public Roads Division
Charlotte, NC: Department of Utilities
Dallas, TX: Water Utilities
Fairfield, CA: Department of Public Works, Water Treatment
Fremont, CA: Department of Public Works, Transportation and Roads
Jacksonville, FL: Water Department
Portland, OR: Bureau of Water
San Jose, CA: Department of Public Works

Counties:
Multnomah, OR: Department of Environmental Services

The following section describes the closed-ended and open-ended responses to the survey. Exhibit 2 describes the range and variety of performance indicators by infrastructure type. Exhibit 3 presents information on performance indicators by jurisdiction.

SURVEY RESULTS: Closed-Ended Questions

Motivations for Developing Benchmarks

The strongest reason cited by survey respondents for developing benchmarks was to better communicate their agency's performance records. They also said the benchmarks helped to supplement and aid implementation of the agency's missions and to provide program managers with performance monitoring. Another strong reason cited for developing benchmarks was to meet executive and legislative requirements.

Less frequently, respondents said they developed benchmarks to allow agencies to engage other agencies and stakeholders, or to provide guidance for budget decisions. The two least motivating factors in the development of benchmarks: meeting program grant requirements and regulatory requirements.

Table I presents how frequently different motivations for developing benchmarks were cited by respondents.

Table I
Motivations for Developing Benchmarks

	Frequency Distribution Not Important		Somewhat Important		Very Important	
In your opinion, how important were the following in motivating the agency to develop benchmarks?	1	2	3	4	5	Mean
To allow agency to better communicate its performance record	0	1	2	2	11	4.43
To supplement and aid implementation of agency mission	0	0	2	5	8	4.40
To provide program managers with performance monitoring	0	1	2	4	9	4.31
To meet requirement by executive or legislative branch	0	3	1	1	9	4.14
To allow the agency to engage other agencies and stakeholders	1	2	3	2	7	3.80
To supplement and aid implementation of agency strategic plan	1	1	3	4	5	3.78
To guide budgeting decisions within the agency	1	2	1	8	4	3.75
To guide long-range investment/development planning	1	2	2	7	2	3.50
To meet requirement by a higher level of government	3	2	4	2	5	3.25
To meet regulatory requirements	5	1	5	0	4	2.80
To meet program grant requirements	6	2	3	3	0	2.21

Development of the Benchmarks

Most respondents said that benchmarks were developed within the agency itself. Respondents cited the program manager more often than the agency head as the individual responsible for deciding on the benchmarks. In most of these organizations, the benchmarks were designed to use both qualitative and quantitative data.

Respondents indicated it was not very important to receive program-specific guidance through development of their benchmarks. Additionally, the cost of data collection did not have a strong effect on developing benchmark criteria. In addition to program managers, policy and budget staff primarily developed benchmarks. Participation by top leadership and front-line employees was clear-cut; they were either very involved or not involved at all.

Those least likely to be part of benchmark development included contractors/suppliers, other levels of government, and the general public.

The frequency distributions that describe how respondent benchmarks were developed are presented in Table IIa. The frequency distributions that describe who was involved in developing public works benchmarks are presented in Table IIb.

Table IIa
Benchmark Development

	Frequency Distribution					
	Yes, very much		Somewhat		No, not at all	
Were the benchmarks:	1	2	3	4	5	Mean
Initially developed inside the agency?	11	3	2	0	0	1.43
Designed to use quantitative data?	11	2	2	1	0	1.56
Decided on by the program manager?	9	3	3	0	1	1.81
Given program specific guidance during development?	6	5	4	1	0	2.00
Designed to use qualitative data?	6	4	4	0	2	2.25
Decided on by the agency head?	5	3	4	1	3	2.62
Affected by the cost of data collection on benchmark criteria?	1	2	8	3	2	3.18

Benchmark Applications and Uses

The respondents indicate that, without exception, the benchmarks they describe are revised over time, are tied to a performance monitoring, measurement, and reporting system, and are engaging agency leadership. Additionally, with only a single exception, the benchmarks are used to track program performance, provide performance data back to operating units, measure quality of service, and are a part of a continuous management improvement effort. Again, with only a single exception, respondents indicated they do not require expensive data sources to measure performance.

Respondents said the benchmarks are almost always used to develop annual budget proposals at the agency level, align programs to meet goals, communicate program accomplishments to the public, and inform the legislative body responsible for oversight of the program. By more than a two-to-one margin, benchmarks are likely to be used to make future investment decisions.

Also by a two-to-one margin, respondents indicated they have not ranked the benchmarks by priority in any way. Additionally, benchmarks are less likely to be used to align the program described across other levels of government. The use of benchmarks usually has not challenged the program purposes.

Table IIb
Benchmark Development: Who Was Involved

How involved were the following groups in developing the benchmarks?	Very involved 1	2	3	4	Not involved 5	Mean
Program managers	10	3	3	0	0	1.56
Front line employees	5	6	2	2	1	2.25
Policy and budget staff	6	3	4	2	1	2.31
Special office, committee, or work group on benchmarks	6	3	2	1	4	2.62
Top leadership	4	4	2	4	2	2.75
Stakeholders	1	3	2	6	3	3.46
Others (specify) _____	2	0	1	3	3	3.55
Other levels of government (specify) _	1	1	2	4	3	3.63
Customers	1	2	2	6	5	3.75
Other agencies (specify) ___	1	1	1	5	4	3.83
Industry	1	1	3	5	6	3.87
Advocacy groups	1	1	3	5	6	3.87
General public	1	1	1	5	8	4.12
Public contractors/suppliers	0	1	2	4	9	4.31

The frequency distribution describing how respondents apply and use their benchmarks is presented in Table III.

Evolution of Benchmarks

The current application and use of benchmarks has changed in several areas, compared to their initial use. Responses indicated that the longer-running benchmarks have been more likely to undergo a formal or specified review process and more frequently measured and reported. The benchmarks also have evolved to become less directed at outputs and more linked to inputs. The survey described outputs as measure of production or service (i.e., "the DOT built 300 new lane miles of interstate highway") and outcomes as measure of progress against priority goals (i.e., "Delays due to traffic congestion were reduced by 50 percent").

Table III
Benchmark Application and Use

Are the benchmarks:	Frequency Distribution YES (1)	NO (2)	Mean
Engaging agency leadership?	16	0	1.00
Revised over time as more information becomes available?	15	0	1.00
Tied to a performance monitoring, measurement, and reporting system?	15	0	1.00
Providing performance data back to operating units?	15	1	1.06
Used to track the program's progress?	15	1	1.06
Used to measure quality of service?	15	1	1.06
Part of a continuous improvement effort?	14	1	1.06
Used in developing annual budget proposals at the agency level?	14	2	1.12
Used to align this program with other programs to meet goals?	12	3	1.18
Requiring clarification of information input?	13	3	1.18
Used to identify "on time" measures?	12	3	1.20
Used to inform the legislative body responsible for oversight of your program?	12	4	1.25
Receiving formal or specified process for review?	12	4	1.25
Used to communicate program value accomplishments to the public?	11	5	1.31
Used to make future investment decisions?	11	5	1.31
Requiring NEW data sources to measure performance?	11	5	1.31
Used to measure timeliness such as total response time?	10	5	1.33
Used to measure economic performance?	9	7	1.43
Used in developing annual budget proposals at the executive branch level?	8	7	1.46
Used to identify time delays at various stages of processes?	7	8	1.53
Used as a measure for physical assets?	7	9	1.56
Used in developing annual budget proposals at the legislative branch level?	6	9	1.60
Used to align this program across other levels of government?	6	10	1.62
Challenging the basic purpose of the program?	5	11	1.68
Ranked by order of priority or prioritized in some way?	5	11	1.68
Requiring expensive data sources to measure performance?	1	14	1.93

Respondents said information that benchmarks provide has been reported and used more frequently over time to establish performance targets (goals) for the following year. Finally, only one of the respondents indicated the benchmarks were originally adopted in statute or ordinance. Over time, however, benchmarks have been more likely to be formalized through legislation.

If respondents had a benchmarking process in place less than three years, they were instructed to provide responses to the questions in the Table IVa titled "Initially." If benchmarking practices had been in place for three years or more, respondents also provided answers to questions in the succeeding Table IVb titled "Currently."

Table IVa
Benchmark Evolution: Initially

	Frequency Distribution					
	Yes, very much		Somewhat		No, not at all	
Were the benchmarks:	1	2	3	4	5	Mean
Directed at outputs?	8	0	0	0	1	1.40
Revised over time?	6	2	2	0	0	1.60
Subject to a formal or specified process for review?	5	2	3	0	0	1.80
Directed at outcomes?	7	1	0	1	1	1.80
Part of a "hierarchy" of performance indicators.	6	1	0	1	1	1.88
Very limited and specific?	5	2	2	1	0	1.90
Set on a regular basis depending on changing goals?	4	4	1	1	0	1.90
Measured and reported often?	4	4	1	1	0	1.90
Linked to inputs?	4	2	2	0	2	2.40
Providing information describing the basis for their performance targets (goals) for the forthcoming year?	3	3	2	1	1	2.40
Very broad in scope?	2	2	4	1	1	2.70
Adopted in statute/ordinance?	1	0	2	0	7	4.20

Investment in Training in Use of Benchmarking

All managers and nearly all policymakers were likely to be trained to link benchmarks to mission statements and strategic plans. A majority of the respondents said staff receive training in the use of benchmarks, though less often than policymakers. Training was not likely to be mandated by statute, regulation, or management decision.

Table IVb
Benchmark Evolution: Currently

	Frequency Distribution					
	Yes, very much		Somewhat		No, not at all	
Are the benchmarks:	1	2	3	4	5	Mean
Measured and reported often?	8	0	0	0	0	1.00
Revised over time?	6	2	0	0	0	1.25
Set on a regular basis depending on changing goals?	4	4	0	0	0	1.50
Subject to a formal or specified process for review?	4	2	0	1	0	1.71
Directed at outcomes?	4	2	2	0	0	1.75
Providing information describing the basis for their performance targets (goals) for the forthcoming year?	3	3	1	1	0	2.00
Part of a "hierarchy" of performance indicators?	3	2	2	1	0	2.12
Directed at outputs?	3	3	0	1	1	2.25
Very limited and specific?	2	2	3	1	0	2.37
Linked to inputs?	2	2	4	0	0	2.50
Very broad in scope?	2	1	4	0	1	2.62
Adopted in statute/ordinance?	3	1	0	0	4	3.25

The frequency distribution that details the use of training in the use of benchmarks is presented in Table V.

Table V
Benchmarking: Investment in Training

	Frequency Distribution		
	YES	NO	
	1	2	Mean
Were managers educated to link benchmarks to mission statements and strategic plans?	14	0	1.00
Were policymakers educated to link benchmarks to mission statements and strategic plans?	12	2	1.14
Were staff educated to link benchmarks to mission statements and strategic plans?	8	6	1.42
Was training called for by statute, regulation, or management decision?	8	6	1.42

Results from the Use of Benchmarks

Survey respondents overwhelmingly indicated that the use of benchmarks has led to collection and outcome data not identified in the program's initial performance plan. Additionally, respondents

indicated that the use of benchmarks has led to challenges to and reevaluations of conventional program practices, encouraging progress beyond historical performance levels. The benchmarks also have indicated to the respondents whether internal processes were as streamlined as possible. In most cases the benchmarks have not revealed legislative impediments to good program performance.

Responses on results from the use of benchmarks are presented in Table VI.

Table VI
Benchmarking Results

	Frequency Distribution YES	NO	
Has use of benchmarks:			Mean
Resulted in identification of legislative impediments to good program performance?	3	10	1.76
Revealed a need for cutbacks/elimination of programs demonstrated to be obsolete, ineffective, or of little customer value?	7	6	1.46
Led to collecting outcome data not identified in program's initial performance plan?	8	5	1.38
Indicated whether internal processes were as streamlined as possible?	9	4	1.30
Led to challenges to, and reevaluations of, conventional program practices, encouraging progress beyond historical performance levels?	12	1	1.07

SURVEY RESULTS: Open-Ended Questions

Of the open-ended questions, the most important in the panel's view was, "To what extent are benchmarks linked to agency mission?" Most of the open-ended respondents (n=10) said the benchmarks they described are linked to agency mission through customer satisfaction surveys and/or through budget allocations. The respondents viewed these two avenues as most appropriate to aid implementation of agency mission. The panel concluded that the process used to develop measures, beginning with mission, is critical to ultimately arriving at the appropriate outcome measures that demonstrate "mission delivery."

Additionally, when asked about benchmark development, few respondents said their processes involved customers, several were required by legislative or executive action, and most were undertaken by program managers for program managers. In effect, program managers were trying to better communicate their performance record. Moreover, the measures were developed by staff with less involvement by agency leaders. If the benchmarks were "audited," it was usually through a customer satisfaction survey.

Respondents also communicated a wide range of options for choosing program targets. Some respondents selected target data using sophisticated computer models, but at the same time, others indicated program managers used the prior year's budget data as a point of reference--a traditional practice.

Panel Observations

The NAPA advisory panel, at its first meeting, discussed a framework for reviewing the development and implementation of benchmarking practices using the NAPA report Toward Useful Performance Measurement, which describes GPRA pilot projects, as a guide. The panel viewed benchmarking both as a developmental process and a series of programmatic applications. As such, the strategy for developing performance measures was considered critical; but the first step in the process was seen to be specifying the results or outcomes, not how they would be measured.

The panel also agreed that a study of benchmarking practices could not be a review of best practices. They underscored the importance of the process of arriving at the measure. Benchmarks in Oregon, for example, may have very limited utility for other jurisdictions, unless those jurisdictions fundamentally change and rethink their missions as Oregon did, and independently develop a performance measurement system and benchmarks that reflect their own needs. The respondents to this survey were in various stages along that journey.

The panel discussed several factors in implementing the process. Whether benchmarking is legislative or executive-driven, or required by a higher level of government, the panel believed, management needs to embrace the process. The process also must allow for continued input, improvement and appropriate flexibility during implementation to move toward desired outcomes. Moreover, desired outcomes will be difficult, if not impossible, without linkage and alignment among federal, state and local governments.

Even though each unit of government must develop all of its benchmarks internally, the panel concluded, principles for sound benchmark development exist. The process of developing benchmarks should be broad-based, reflecting input from stakeholders, customers, and other affected parties.

The panel cautioned that after an agency has developed its benchmarks, it must make the difficult transition from strategic and tactical development to operational measurement against benchmarks. Additionally, the alignment among strategic, tactical, and operational was viewed as critical to eventual ability to track progress against the broader benchmarks. Performance measures should tie clearly to broader strategies or plans.

The panel discussed the wide range of maturity and sophistication among respondents on benchmark indicators for public works infrastructure. The reported benchmarks (see Exhibit 2 and Exhibit 3) are primarily outputs or activity measures, and not indicators of how well agencies are

progressing toward accomplishment of their missions. The panel remarked that this may mean managers are still only concerned with delivering more services at less cost. The panel also said this may mean that measures developed without regard to mission alignment tend to be more "output" oriented. More sophisticated measures would allow managers to see whether services had intended consequences.

The advisory panel also praised the few agencies moving beyond secondary data and using client or customer survey responses as moving in the spirit of benchmarking more than efficiency. A preponderance of the data used by the respondents, however, were measures widely available and gathered in the past, but are now being called benchmarks. Such performance measures appear ornamental, closely controlled by agencies with little input to or reaction from other agencies, policymakers, or the general public. They do not reflect partnerships within agencies or between consumers and service providers.

From a strategic investment point of view, the respondents' benchmarks do not include the types of information or indicators necessary to guide capital investment decisions. The measures do not address the questions most important to potential investors in state and local government public works capital projects. Benchmarks should be clear on where capital would be invested, the projected economic and social return on investment, and how the planned investment or activity will improve outcomes for the unit of government. Specifically, benchmarks to accompany financial data should include a component that describes capital, operational, and maintenance needs, including quality measures, for potential investors in state and local public works infrastructure.

Lessons Learned for the Federal Government

The panel noted the significance of this review of state and local experiences with benchmarking for public works infrastructure. There is a great deal more to be learned from state and local experiences, perhaps on a more detailed case-by-case basis. For example, the NAPA survey instruments asked whether outputs and outcomes were considered as part of performance measurement, but failed to ask about the link to inputs. Through a careful classification process, outcomes and efficiencies could be tied to inputs, linking the cost of outcomes to resources. Similarly, a great deal more could be learned if external factors that affect performance of state and local infrastructure could be identified.

The clearest lesson for the federal government, based on these experiences, is that state and local performance measurement systems would benefit from national leadership that seeks to establish benchmarks to accompany federally-funded infrastructure projects. With the use of agreed-on performance measures in block grants, for example, federal leadership should gather information and propose a core set of benchmarks. The panel reasoned that, if federally based programs cannot articulate their national mission and goals, state and local governments cannot be expected to align their programs to achieve the mission or commit to the fundamental change process that

benchmarking envisions. Federally facilitated intergovernmental benchmarks would be a welcome component to state and local benchmarking practices.

As the NAPA study of GPRA pilot projects concluded, "the federal government (probably the Office of Management and Budget) needs to standardize the basic format and definitions used for the various performance plan terms for all federal agencies." This standardization would clarify the federal objectives. A wide variety of approaches, formats, and definitions -- and such terms as performance indicators, goals, outputs, and outcomes -- are currently used in a confusing variety of ways for units of government across the country. The reported benchmarks (see Exhibit 2 and Exhibit 3) range from general goals (e.g., roadway clear of ice and snow) to detailed qualitative input, output, and outcome measures.

Clearly, from data in the open-ended and closed-ended sections of the survey, public works initiatives have not been tied to objectives of other units of government. Local governments apparently have not been pursuing broad infrastructure goals outlined by the state or federal governments. Linkages to state and local government infrastructure initiatives could serve not only to foster accountability of block grants, but also as a vital component of interagency, intergovernmental pursuits of national goals.

Exhibit 1

NAPA Advisory Panel Members

Wayne F. Anderson, Panel Chair - Former Distinguished Professor of Public Administration, George Mason University; Secretary of Administration and Finance, and Cabinet Chairman, Commonwealth of Virginia; Executive Director, U.S. Advisory Commission on Intergovernmental Relations; City Manager, City of Alexandria, Virginia.

Thomas M. Downs - President and Chairman, AMTRAK. Former Commissioner, New Jersey Department of Transportation; President, Triborough Bridge & Tunnel Authority; City Administrator, Washington, D.C.; Executive Director, U.S. Urban Mass Transportation Administration; Associate Administrator for Planning and Policy Development, Federal Highway Administration.

Dall W. Forsythe - Managing Director, Lehman Brothers. Former Lecturer in Public Policy, JFK School of Government, Harvard University; Budget Director, Division of the Budget, New York State; First Deputy Director of Budget and Special Assistant to the Governor of New York for Management and Productivity; Senior Vice President, Shearson Lehman Bros.; Budget Director, New York City Board of Education.

Craig Holt* - Chief Information Officer & Manager, Information Systems Branch, Oregon Department of Transportation. Former Assistant Director, Oregon Department of General Services; Manager, Management Information and Employee Incentives, Oregon Department of Transportation; Surveying and Engineering, Geodetic Control Surveys, Transmission and Design, Bonneville Power Administration.

Joseph S. Wholey - Senior Advisor to the Deputy Director for Management, Office of Management and Budget. Former Director, Washington Public Affairs Center, University of Southern California; Professor of Public Administration, University of Southern California; Deputy Assistant Secretary for Evaluation, Department of Health and Human Services; Director, Program Evaluation Studies, The Urban Institute.

* Denotes non-Academy Fellow

NAPA Project Staff Members

Barbara R. Dyer, Director, Alliance for Redesigning Government; Former adjunct professor of public policy, Department of Urban Studies, University of Akron; lecturer, Duke University. Former deputy executive director and director of policy studies, Council of Governors' Policy Advisors, National Governors' Association; special assistant to the secretary of the United States Department of the Interior, Carter Administration; deputy director of the Western Conference of the Council of State Governments.

Jeffrey S. Fitzpatrick, Project Coordinator/Research Associate, National Academy of Public Administration - Former Policy Analyst, U.S. Advisory Commission on Intergovernmental Relations.

Mark G. Popovich, Independent Consultant, Alliance for Redesigning Government; Former Deputy Director and Senior Fellow, Center for Clean Air Policy; Project Director, Council of Governors' Policy Advisors; Staff Associate, National Governors' Association.

Roger L. Sperry, Responsible Staff Officer - Director of Management Studies, National Academy of Public Administration. Former Professional Staff Member, U.S. Senate Committee on Governmental Affairs; Senior Group Director and Special Assistant to Comptroller General, U.S. General Accounting Office.

Christopher G. Wye, Director of NAPA's Program on Ethics and Performance. Former Director, Policy Analysis and Evaluation, Department of Housing and Urban Development.

Exhibit 2

REPORT ON BENCHMARKS AND PERFORMANCE INDICATORS BY INFRASTRUCTURE TYPE

In addition to completing questionnaires, contacts were asked to report their benchmarks and performance indicators. Generally, the respondents provided information on benchmarks and performance indicators ONLY for the singular type of infrastructure program they were reporting on. That information is summarized in the attached charts.

Chart 1.0 is a summary of more detailed charts that follows. It provides one or two examples of each type of benchmark/indicator across all categories of infrastructure.

The next series of charts (**Chart 1.1 - 1.4**) are organized by type of infrastructure and include separate charts for Transportation, Water Supply, Water and Waste Water Treatment, Solid Waste Management, and Public Buildings. In the left column are some categories of benchmarks/indicators. The right column provides one or two examples of those types benchmarks/indicators that were reported.

Chart 2.0, organized by type of infrastructure, summarizes the data sources used to measure benchmarks and performance indicators. It also reports the frequency of measurement and reporting.

RESPONDENTS INCLUDED IN ANALYSIS

Transportation	*Water Supply*	*Waste Water Treatment*	*Solid Waste*	*Public Buildings*
STATES Minnesota Texas Virginia Wisconsin **CITIES** Boston, MA Fremont, CA	**STATES** Utah **CITIES** Charlotte, NC Dallas, TX* Fairfield, CA Portland, OR	**STATES** North Carolina **CITIES** Dallas, TX* Jacksonville, FL	**STATES** Connecticut **CITIES** San Jose, CA	**COUNTIES** Multnomah Cty, OR

TOTAL: 16 (7 States, 8 Cities, 1 County)

* Dallas answered the survey as a provider of water supply and as a manager of waste water treatment

Chart 1.0
ALL RESPONDENTS AND TYPES OF INFRASTRUCTURE

This page summarizes the more detailed charts on following pages. In the left column are some categories of benchmarks/indicators. The right column provides one or two examples of those types benchmarks/indicators that were reported. Definitions for the categories used in the left hand column include:

Process/Activity - amount of internal activity
Efficiency/Cost Effectiveness - cost/service provided
Output - services delivered
Outcome - progress against priority goals
Customer Satisfaction - surveyed opinions or ratings by customers
External BM - compared against performance of other public or private sector organization
Internal BM - not compared to other public or private sector organization.

Process/Activity	Number of effluent discharge permits issued or communities assisted. Water meters of 125 highest use customers tested.
Efficiency/Cost Effectiveness	Cost per square foot of custodial services. Production Index - ratio of level of outputs to inputs.
Output	Occupancy rate of county-owned facilities. Effluent from WWT that meets or exceeds regulatory requirements.
Outcome	Roadway clear of ice and snow. Reduce or eliminate public health problems related to water supply.
Customer Satisfaction	Percentage of customers rating facilities management performance as satisfactory or outstanding.
External Benchmark	Cost of water supply connections and repairs as compared to private sector costs. Percentage of engineering costs for design and construction comparing in-house and consultant costs.

The next series of charts (Chart 1.1 - 1.4) are organized by type of infrastructure and include separate charts for Transportation, Water Supply, Water and Waste Water Treatment, Solid Waste Management, and Public Buildings. In the left hand column are some categories of benchmarks/indicators. The right hand column provides one or two examples of those types benchmarks/indicators that were reported.

EXAMPLES OF BENCHMARKS/INDICATORS BY CATEGORIES

Chart 1.1
TRANSPORTATION

Responses: Boston, MA; Fremont, CA; Minnesota DOT; Virginia DOT; Wisconsin DOT

Process/Activity	Percentage of roadway miles inspected and meeting quality standards.
Efficiency/Cost Effectiveness	Preventive maintenance and treatment costs. Production Index - ratio of level of outputs to inputs.
Service Quality	Percentage of potholes filled within one day of report. Percentage of projects with few or no changes due to plan errors.
Output	Vegetation height control. Average weighted pavement condition categories.
Outcome	Roadway clear of ice and snow.
Customer Satisfaction	Rest area attractiveness.
Internal Benchmark	Dollar value of unprogrammed costs against goals.
External Benchmark	Percentage of engineering costs for design and construction comparing in-house and consultant costs.

Chart 1.2
WATER SUPPLY

Responses: Charlotte, NC; Dallas, TX; Fairfield, CA: Portland, OR; Utah DEQ

Process/Activity	Install 24,000 feet of water main in FY. Test meters of 125 highest use customers. # of water main and service repairs
Efficiency/Cost Effectiveness	Cost/quantity of water pumped monthly. Cost per main and service repair.
Service Quality	Respond to main breaks and emergency shutoffs within 30 minutes.
Output	Ratio of rated capacity to maximum day demand. Daily average of quantity of water pumped.
Outcome	Attain USEPA and state water quality standards. Reduce or eliminate public health problems related to water supply.
Customer Satisfaction	Percentage of households satisfied with quality of water.
Internal Benchmark	Collect 98% of active accounts within 50 days of billing. % of water samples meeting federal standards.
External Benchmark	Cost of connections and repairs as compared to private sector costs.

Chart 1.3
WATER AND WASTEWATER TREATMENT

Responses: Dallas, TX; Jacksonville, FL; North Carolina

Process/Activity	Number of surface water quality analyses performed. Number of discharge permits issued or communities assisted. Total primary pumpage of wastewater.
Efficiency/Cost Effectiveness	Maintain the cost/dry ton of residuals at less than $273. Maintain O&M costs at $0.95 per gallon or less. Cost per million gallons pumped.
Service Quality	Cut number of unresolved sewer cave-ins that exceed 60 days. Minimize customer complaints - respond within 18 hours.
Output	Ensure noninterrupted conveyance of wastewater -- limit down time to an average of two hours or less. Produce effluent that meets or exceeds federal and state regulatory requirements.
Outcome	Percentage of waters meeting water quality standards. % of water samples meeting federal standards.
Customer Satisfaction	Respond to customer complaints within 18 hours.
Internal Benchmark	Provide training so that 98% of construction and maintenance is accomplished in-house.
External Benchmark	

Chart 1.4
PUBLIC BUILDINGS

Responses: Multnomah County, OR

Process/Activity	
Efficiency/Cost Effectiveness	Custodial costs per square foot. Cost per square foot for space leased for county programs.
Service Quality	Improvement in customer satisfaction on emergency response time.
Output	Occupancy rate of county-owned facilities.
Outcome	
Customer Satisfaction	Increase in percentage of customers rating facilities management performance as satisfactory or outstanding.
Internal Benchmark	Increase in percentage of waste recycled compared to prior year.
External Benchmark	Ratio of final project cost to contract award amount.

This chart, organized by type of infrastructure, summarizes the data sources used to measure benchmarks and performance indicators. It also reports the frequency of measurement and reporting.

SOURCES OF DATA AND FREQUENCY OF MONITORING

Chart 2.0

	Data Sources	Frequency
Transportation	Primarily administrative records and budget/financial information. Limited amount of market research and customer satisfaction surveying. Very limited external benchmarking.	States generally are or will measure and report annually. Fremont measures quarterly and reports biannually to Council.
Water Supply	Primarily administrative records and budget/financial information. Very limited activity in measuring customer complaints/surveys.	Cities report as often as twice per year - tied to budget development and consideration.
Water Treatment	Primarily administrative records and budget/financial data. Some monitoring/enforcement records.	Jacksonville to measure and report quarterly. North Carolina ties reporting to biennial budget cycle, and both track historical performance and forecasts over three biennium.

Exhibit 3

COMPILATION AND SUMMARY OF INFORMATION ON BENCHMARKS AND PERFORMANCE INDICATORS BY JURISDICTION

These charts present information on benchmarks and performance indicators by jurisdiction. The summary charts were developed based on the information obtained from respondents.

JURISDICTION	Wisconsin Department of Transportation
TYPE OF INFRASTRUCTURE	Transportation - Highway maintenance and development
BENCHMARKS/INDICATORS	Performance measures correlate to overall corporate performance measures. 1. Unprogrammed Costs - $ value of unprogrammed costs against goals. 2. Production Index - Compares level of outputs to inputs 3. Design On-Time - % plans ready for letting based on estimated construction value. 4. Design and Construction Delivery Costs - % of engineering for design and construction comparing in-house and consultant costs. 5. Design On-Budget - % projects awarded compared to an earlier estimated cost. 6. Design and Construction Quality - % projects with few or no construction or maintenance concerns. % projects with few or no changes due to plan errors.
DATA SOURCES/METHODS	Primarily in-house financial, budget, and reports. Some comparison of costs internal vs consultant.
FREQUENCY	Measured and reported annually
STATUS	Established in 1994 with first annual report issued covering FY 1994

JURISDICTION	Minnesota Department of Transportation
TYPE OF INFRASTRUCTURE	Transportation - Highway Maintenance
BENCHMARKS/INDICATORS	Indicators identified for seven basic products or services. 1. Clear roadways. - Clear of unplanned obstructions; clear of ice and snow 2. Smooth and reliable pavement. - Availability of roadway for year round use; road ride comfort; road reliability 3. Available bridges. - Availability of bridges 4. Attractive roadsides. - Amount of roadside litter; noxious weed control; vegetation height control 5. Safety Features - Guardrail and bridgerail condition; pavement markings, roadway lighting; signing; traffic signals functioning as designed 6. Highway permits/regulations. - Encroachments on right of way; accessibility of permit office; consistency of permit requirements; time required to issue permits 7. Motorist services. - Motorist info on unplanned conditions; rest area attractiveness
DATA SOURCES/METHODS	Emphasizes market research and customer satisfaction. Also administrative records and reports.
FREQUENCY	NA
STATUS	In development. Targets to be set out to the district level.

JURISDICTION	Virginia Department of Transportation
TYPE OF INFRASTRUCTURE	Transportation - Highway maintenance
BENCHMARKS/INDICATORS	NA
DATA SOURCES/METHODS	Customer satisfaction surveys, working environment climate survey, and internal and peer evaluation for quality.
FREQUENCY	Will provide annual reports.
STATUS	Under development.

JURISDICTION	City of Fremont, California
TYPE OF INFRASTRUCTURE	Transportation - maintenance
BENCHMARKS/INDICATORS	1. Average weighted pavement condition categories 2. Preventive maintenance treatment and costs
DATA SOURCES/METHODS	Primarily administrative records and conditions survey.
FREQUENCY	Measured quarterly and reported biannually to Council
STATUS	Developed in 1991. Benchmarks last updated in 1994.

JURISDICTION	Multnomah County, Oregon
TYPE OF INFRASTRUCTURE	Public buildings - maintenance and operation.
BENCHMARKS/INDICATORS	1. % customers rating Facility Management's performance as satisfactory or outstanding. 2. Costs per square foot to maintain facilities. 3. Customer satisfaction on emergency response time. 4. % of customers rating custodial performance as good or better. 5. % of waste recycle. 6. Custodial costs per square foot. 7. Occupancy rate of county-owned facilities. 8. $ per square foot for space leased for county programs. 9. Square feet per occupant. 10. Rental revenue ($/ft^2) on surplus real property facilities. 11. Cost per parcel of tax title real property maintenance. 12. Ratio of project management expenses to total costs of all projects. 13. Ratio of final project cost to contract award amount.
DATA SOURCES/METHODS	Customer surveys. Budget and administrative records.
FREQUENCY	Twice annually.
STATUS	Adopted in 93/94, updated in 94/95.

JURISDICTION	Connecticut Progress Council
TYPE OF INFRASTRUCTURE	Solid waste disposal - development and operations
BENCHMARKS/INDICATORS	1. % of contaminated sites that have been remediated. 2. Number of reported non-transportation spills, releases and improper disposal. 3. % of solid or hazardous waste management facilities operated in substantial compliance with state and federal environmental regulations or standards. 4. % of total solid waste stream that is recycled or avoided. 5. % of operators/facilities practicing waste reduction or prevention.
DATA SOURCES/METHODS	Primarily administrative records, monitoring and enforcement data.
FREQUENCY	Measured and reported annually.
STATUS	Benchmark/Indicators were first adopted in 1995. To be updated every five years.

JURISDICTION	City of Charlotte, North Carolina
TYPE OF INFRASTRUCTURE	Water - supply maintenance and operation
BENCHMARKS/INDICATORS	1. Comply with all federal, state and local regulations concerning water quality and the operation of the treatment facility. 2. Maintain competitive treatment costs - monthly cost per monthly production of water pumped. 3. Maintain treatment capacity that can supply customer needs - rated capacity to maximum day demand. 4. Cost of service connections and repairs as compared to private sector costs. 5. Respond to requests for leaks within 24 hours for emergency, 48 hours for major leaks, and 2 weeks for routine leaks. 6. Perform maintenance to minimize leaks/breaks - number or percent of hydrants repaired.
DATA SOURCES/METHODS	Primarily administrative and budget/financial records.
FREQUENCY	Benchmarks reported twice per year.
STATUS	Benchmarks first adopted in early 1970s. Updated annually with 1994 latest update.

JURISDICTION	City of Jacksonville, Florida
TYPE OF INFRASTRUCTURE	Water Treatment - operations
BENCHMARKS/INDICATORS	1. Provide cost-effective operation and maintenance of collection infrastructure - cost per linear feet. 2. Minimize customer complaints - respond within 18 hours. 3. Minimize backlog of sewer cave-ins - cut number of unresolved cave-ins that exceed sixty days. 4. Train all employees in safety, construction, and maintenance techniques - 98% of activities in-house. 5. Provide public educational awareness. 6. Ensure non-interrupted conveyance of wastewater - limit down time to an average of two hours. 7. Produce effluent quality that exceeds fed and state regulatory requirements. 8. Operation and Maintenance costs management - $0.95/gallon or less. 9. Maintain the cost/dry ton of residuals at less than $273. 10. Ensure safe working environment - reduce number of accidents to six or less. 11. Reduce overtime man-hours ratio to 6.26% 12. Personnel hours not to exceed budget.
DATA SOURCES/METHODS	Primarily administrative, budget/financial records.
FREQUENCY	Measured and reported quarterly.
STATUS	First adopted in 1993 and updated annually.

JURISDICTION	State of North Carolina - Budget, Planning and Analysis
TYPE OF INFRASTRUCTURE	Water treatment
BENCHMARKS/INDICATORS	1. Water quality - % of water meeting quality standards. 2. Number of surface water quality analyses performed. 3. Number of groundwater analyses performed. 4. Number of waste-water treatment facilities evaluated for operation and maintenance. 5. Number of waste-water discharge permits issues or communities assisted. 6. Number of water nondischarge permits issued. 7. Number of compliance inspections of major and minor dischargers. 8. % of evaluated wastewater treatment facilities in noncompliance after technical assistance.
DATA SOURCES/METHODS	Primarily administrative, monitoring/enforcement records.
FREQUENCY	To be tied to budget cycle with at least biennial updates of benchmarks. Tracks historical trend and forecasts over three biennium.
STATUS	Benchmarks first adopted in 1994. Process is still a pilot.

JURISDICTION	City of Portland, Oregon
TYPE OF INFRASTRUCTURE	Water Bureau - water supply.
BENCHMARKS/INDICATORS	1. Provide reliable and adequate water distribution system. - Respond to main breaks and emergency shutoffs within 30 minutes; inspect out of service hydrants and return 90% to service within five working days; conduct monthly tailgate safety meetings; investigate all personnel and vehicle accidents; % of planned nonemergency work completed on schedule; % of new water installations completed within three weeks; % service installation customers expressing complaints; % of control valves tested and operated at least once during fiscal year; % of distribution main network surveyed for leaks; % leaks repaired within two weeks; install 24,000 feet of main in fiscal year; resolve unplanned customer water disruptions within 24 hours. 2. Supply sufficient quantities of water. - Ensure sufficient quantities of water delivered at standard water pressures; ensure that three days of average water demand is available in storage; ensure that water system supply disruptions are below recorded outages in previous years; ensure that water flow, disinfection, and hydroelectric operation in the watershed are monitored 24 hours/day; operate and maintain conduits and reservoirs to prevent failure and to provide sufficient quantities at least 95% of the time. 3. Provide quality water. - Attain USEPA and State water quality standards; reduce or eliminate public health problems related to waste supply; ensure households are satisfied with water quality; ensure that indicator organisms are eliminated and standard chlorine residuals are maintained; continue water quality monitoring on regular schedule; respond to all water quality complaints within 24 hours; remove 1,000 lead service connectors; complete all main flushing work as scheduled; refer customer complaints and address within two working days; test all backflow devices.
BENCHMARKS/INDICATORS (Portland Cont.)	Provide water on an equitable and self-sustaining basis in a customer oriented manner. - Read 99% of meters on scheduled billing frequency; complete and return all inspection service orders within five days; bill 98% of accounts within two days of meter reading; collect 98% of active accounts within 50 days of billing; maintain small city water meters by replacing 5% of total in FY; test large water meters every five years; test meters of 125 highest use customers.
DATA SOURCES/METHODS	Administrative, budget and financial records. Customer complaints/surveys.
FREQUENCY	
STATUS	

JURISDICTION	Utah - Department of Environmental Quality
TYPE OF INFRASTRUCTURE	Water supply
BENCHMARKS/INDICATORS	NA
DATA SOURCES/METHODS	NA
FREQUENCY	Measured and reported every 6 months.
STATUS	Adopted in 1992 and updated annually.

JURISDICTION	City of Boston, Massachusetts
TYPE OF INFRASTRUCTURE	Transportation
BENCHMARKS/INDICATORS	Percentage of infrastructure repairs completed as scheduled. Percentage of roadway miles inspected meeting criteria. Percentage of streets meeting quality inspection. Percentage of potholes filled within one day.
DATA SOURCES/METHODS	Primarily administrative and financial records.
FREQUENCY	Measured and reported monthly and by fiscal year.
STATUS	Adopted in 1994 and updated annually.

JURISDICTION	City of Fairfield, California
TYPE OF INFRASTRUCTURE	Water Supply
BENCHMARKS/INDICATORS	1. Encourage open communication and participation with the community. - Produce and distribute professional-looking materials on water quality, supply, conservation, and other services; survey for customer satisfaction; follow up on complaints; encourage and support public tours of water treatment plants; expand water conservation through school education programs. 2. Enrich the quality of life in the City of Fairfield. - Continue providing the public with superior quality tap water that meets or exceeds all drinking water guidelines and standards; continue lead and copper regulation compliance program; maintain acceptable chlorine residuals through the distribution system at all times; maintain THM levels below 70 ppb in quarterly samples; form corrosion control team; continue regular water line flushing program; develop a taste and odor profile panel for laboratory and operations staff; form a disinfection byproducts team; increase carryover storage in Lake Berryessa to 15,000 acre-feet or more; meet milestones for facility improvements; continue upgrade of system reliability by improving control and data acquisition equipment and software; optimize plant performance by initiating special studies and internal research projects. 3. Develop employee resources. - Form and support staff teams; continue regular staff meetings; maintain regular, comprehensive staff training program; train operations staff to perform more maintenance trouble-shooting before turning work over to the maintenance staff; increase use of computers for data entry tasks and improving quality and accuracy of reports; develop guidelines for a floating training/maintenance slot; evaluate preventive maintenance program; establish and implement a laboratory development and marketing plan; participate in locally hosted training seminars; develop a course with UC Davis extension in organic chemistry for water treatment plant operations using advanced oxidation; encourage all staff to participate in continuing education, including obtaining advanced certification; develop a program to give Grade IV shift operators supervisory experience necessary to qualify for Grade V certificate.

BENCHMARKS/INDICATORS (Fairfield Cont.)	4. Foster responsible development to ensure the city's future. - Continue requiring new developments to install dual water systems; assist Planning Department in negotiating agreements for reclaimed water use; assist Planning and Engineering in enforcing water conserving design standards; work with Planning to implement the water related programs in the 1992 General Plan. 5. Protect the City's financial security. - Continue efforts to find markets for city water services; support the county-wide effort to define water rights on Putah Creek; identify and pursue the future sources of water needed to meet the city's long term needs; continue to support the county-wide effort to gain title to the Solano Project; develop a permanent water supply for Rancho Solano golf course; maintain a water development fund; maintain the overall capital improvement plan; evaluate cost and effectiveness by frequently benchmarking with other agencies and private industry; reassess long-term staffing needs; increase the sale of laboratory services; increase revenue from training seminars.
DATA SOURCES/METHODS	Administrative and financial records. Responses from annual random telephone survey of citizens.
FREQUENCY	Progress against benchmarks/indicators reported twice each year for all and more frequently for many.
STATUS	First adopted in 1986 and updated annually.

JURISDICTION	City of Dallas, Texas
TYPE OF INFRASTRUCTURE	Water Supply and Treatment
BENCHMARKS/INDICATORS	Water Treatment: * total primary pumpage (BG) * cost per million gallons * % of water samples meeting federal standards Water Distribution System: * # of water main and service repairs * miles water mains maintained * cost per repair * % of total miles of water main maintained Water Pumpage: * daily average pumpage (MG) * cost per million gallons pumped * water system pressure violations Laboratory Services: * # of samples collected and analyzed * cost per sample * % of samples analyzed timely and accurately Public Education and Information: * # of contacts through media * cost per contact * % increase in overall public awareness
DATA SOURCES/METHODS	Primarily administrative and financial data.
FREQUENCY	Some labor intensive operations measured on daily or weekly basis. Included annually in budget submissions.
STATUS	First adopted in the 1970s and updated every three years.

APPENDIX 3

FEDERAL AGENCY CASES

Army Corps of Engineers (Defense)

Bureau of Reclamation (Interior)

Department of Energy

Department of Transportation

- Coast Guard
- Federal Aviation Administration
- Federal Highway Administration
- Federal Railroad Administration
- Federal Transit Administration

Economic Development Administration (Commerce)

Environmental Protection Agency

Federal Emergency Management Agency

Rural Utilities Service (Agriculture)

U.S. Army Corps of Engineers

Mission

The U.S. Army Corps of Engineers, through its civil works program, has major responsibility for the nation's water resources, primarily for flood control and navigation. Other significant Corps work includes harbor dredging, shore protection, disaster relief, hydroelectric power, irrigation, and recreation. The Corps also operates and maintains locks and dams to help minimize damages from floods and ensure a smooth flow of traffic on the inland waterways.

The basic Corps programs that support these missions are carried out in the context of economic benefits and costs. *The Flood Control Act of 1936* first called for consideration of costs and benefits in designing flood control projects. Since then, a comprehensive set of "Principles and Guidelines" has been developed by the Congress and the relevant agencies (known as the P & G). The P & G applies to all federal water resource agencies (including the Corps, the Bureau of Reclamation, and the Natural Resources Conservation Service), and requires that policies must maximize National Economic Development (NED) net benefits, that is, benefits minus associated costs. This method of justifying projects is meant to ensure that the benefits of each project to the nation's economy exceed their costs.

Strategic Planning Process

The Corps' mission developed over many years through statute and interagency practice, and there is no overall agency strategic plan. Nevertheless, as the agency has considered various reorganization alternatives, strategic plans are being developed for several specific program areas. In addition, the Corps is affected by strategic plans developed by the departments of the Army and Defense. Thus, the Corps' strategic planning process is reviewed here in relation to those plans.

Department of Defense (DOD) Plans. The plan with the most relevance to the Corps of Engineers civil works program is the DOD "Defense Technology Plan" (September 1994) and the "Defense Science and Technology Strategy" (September 1994). These documents have special relevance for the Corps' laboratories that develop technologies having both civil and military applications. The "Plan" lays out specific goals, programs, and target dates. The "Civil Engineering" section of the document (Chapter 12b) designates lead laboratories in the various areas. The Civil Engineering Research Laboratory (CERL) is the lead for Conventional Facilities. For each "Technology Sub-Area and Investment Strategy," six dimensions are discussed:

- Goals and timeframes;
- Potential payoffs and transition opportunities;
- Major technical challenges;
- Performing organizations (where lead labs are indicated);
- Related federal and private sector efforts; and
- Funding (including a projected budget).

The strategic planning elements relevant to the Corps civil works mission (and to infrastructure planning in general) include:

- A goal to "develop technologies to revitalize and operate DOD aging infrastructure . . . for maximizing productivity of resources in acquisition, revitalization, and operations and maintenance management of infrastructure"; and
- A technical challenge to achieve "aging infrastructure revitalization with scarce resources yet deliver . . . mission enhancing, energy efficient and environmentally sustainable facilities." (pages 12b-1, 12b-2)

While DOD documents such as these focus heavily on military rather than civilian missions, they are relevant to the Corps because:

- The Corps is administratively within the Department.
- Civilian programs such as civil works are affected by the conversion of defense resources to civilian uses.

- Civilian facilities, such as the inland waterways, also have military uses.

Department of Army Plans. Two documents from the Department of the Army relevant to Corps civil works missions are "The Army Plan (TAP) 96-2011" and the "U.S. Army Environmental Strategy into the 21st Century." The TAP for FY 1996 through FY 2011 contains the following general principles applicable to the civil works programs (Civil Works Transmittal Memorandum, January, 21 1994, p. 2):

- Support quality people programs
- Retain technological edge
- Be a steward of Army resources

The U.S. Army Environmental Strategy document states four major goals for restoration, prevention, and conservation as follows (page iii):

- Give immediate priority to sustained compliance with all environmental laws.
- Simultaneously continue to restore previously contaminated sites as quickly as funds permit.
- Focus efforts on pollution prevention to reduce or eliminate pollution at the source.
- Conserve and preserve natural and cultural resources so they will be available to present and future generations.

Corps of Engineers Plans. The Corps strategic plan is still evolving, fueled by a number of proposed reorganization plans in recent years. It includes: (1) the Vision Implementation Process (VIP) and (2) a performance measures development initiative in the office of the Director of Civil Works. Preliminary documents have been produced for both of these initiatives.

Vision Implementation Process. The general goal of the VIP is to create "the best public engineering agency in the world." Four elements of achieving that goal are "mission execution, relationships, organizational efficiencies, future." The Corps vision is to be "a vital part of America's Army . . . proud of our past . . . building for the future . . . providing quality responsive engineering services . . . to support the nation in peace and war . . . ." (attachment to July 21, 1994 memorandum on Vision Implementation Procedures)

A Vision Board of Directors, made up of top Headquarters staff is fleshing out and implementing the VIP in cooperation with a Vision Council, which consists of a mix of Headquarters and field staff, and with Vision Implementation Groups consisting of "appropriate experts and interested Corps staff members." The Board of Directors is responsible for overall vision formulation, while the Council is responsible for identifying practical applications and challenges associated with the general vision. The groups are responsible for addressing specific goals and problems and tracking progress toward meeting those goals. Communication of concepts, goals, and strategies goes both up and down among these levels.

Performance Measures. The civil works performance measures initiative is not strategic planning in the strict sense, but it is the Corps agencywide benchmarking prototype for responding to the *Government Performance and Results Act.* Like the VIP, the basic unit of this process is the working group. More about this measurement follows in the section on performance measures.

Corps Program Plans. Specific programs within the Corps have developed their own strategic plans. The two most significant plans are for the National Operation and Maintenance Program and the Research and Development Program.

Operations and Maintenance (O &M) Program. With increasingly aging navigation and flood control facilities, operations and maintenance accounts for over half of the Corps civil works budget. Development of a plan for such activities became critical approximately five years ago. As a result, the Corps developed the National O & M Program. Headquarters initiated an extensive program review with the goal of assuring that "Federal expenditures for project operation and maintenance provide a justified (effective) level of service in the least cost (efficient) manner" (*Performance Measurement Guidebook*, U.S. Army Corps of Engineers National Operation and Maintenance Program, August 1995, p.2). This objective was also adopted as the long-term goal for O&M program improvement.

The initial assessment began in mid-1991 and was completed in late 1992. Work on the assessment was done by contractors. Based on the findings, four task groups were formed to focus on:

- Program Development and Budget Execution
- Standardized Organizational Structure

- Standardized Operating Procedures,
- Performance Measurement and Data Management.

The task groups consisted of staff members from all organizational levels and geographic regions, and were chaired by District Chiefs or Assistant Chiefs of Construction/Operations. The improvement plan was presented to the O&M leadership in a 1994 national conference, and was endorsed.

Research and Development Program (R & D). The strategic plan process for the Corps Research and Development Directorate is a bit different, in part because the two organizations are different. The Directorate coordinates activities across the four Corps laboratories—Topographic Engineering Center (TEC), Cold Regions Research and Engineering Laboratory (CRREL), Construction Engineering Research Laboratories (CERL), and Waterways Experiment Station (WES). Because these labs work on technologies with both military and civilian applications, the Directorate's strategic plan explicitly references the Army vision for its military programs and relates its own vision to the larger one. (U.S. Army Corps of Engineers Directorate of Research and Development FY 95-96 Strategic Plan, p. 3)

The R&D plan was developed around a strategic planning model referred to as "Scan-Focus-Act" and uses some of the elements of the Corps VIP process to implement that model. An R&D vision was developed with the help of a Vision Committee, and existing activities were scanned (surveyed) with the help of facilitated small groups. With that survey complete, the Vision Committee and Directorate leadership focused on goals and objectives and again used facilitated focus meetings to develop an action and evaluation plan (p. 1).

Goals Set

The various plans at different levels of the Corps have produced a number of goals and objectives. This section highlights crosscutting goals that apply to infrastructure.

First and foremost, the Corps civil works program is governed by the goals and objectives spelled out in the "Principles and Guidelines" mentioned in the introduction. The P&G states the following overall "Federal Objective":

> The Federal objective of water and related land resources planning is to contribute to national economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements (page iv).

The desired outcome of Corps civil works inputs (projects and programs) and outputs (goods and services which those inputs deliver) is to increase economic benefits to the nation larger than the associated costs (an outcome).

With this overall charge in mind, it is worth restating the general goal of the VIP, which is *to create "the best public engineering agency in the world"* (an input goal), and the general Corps vision, which is *to be "a vital part of America's Army . . . proud of our past . . . building for the future . . . providing quality responsive engineering services . . . to support the nation in peace and war . . ."* (an output goal).

Under these broad goals are the goals of the O&M Program and the R&D Directorate. The overriding goal of the O&M Program is to assure that "Federal expenditures for project operation and maintenance provide a justified (effective) level of service in the least cost (efficient) manner." This input and output goal is broken down into more specific program improvement objectives:

- Program Development and Budget Execution
  - Streamline and clarify the process
- Standardized Organizational Structure
  - Streamline management
    - reduce management layers
    - improve spans of control
- Standardized Operating Procedures
  - Performance Measurement and Data Management
    - institutionalize a performance measurement system that recognizes outstanding service and fosters improvements at all levels;
    - improve O&M data management so that it supports performance measurement data and makes project and program execution data universally acceptable. (pp. 3-6)

The R&D Directorate's "Strategic Objectives" include:

- Improve Internal Communications (input)
- Improve Partnering (input)
- Sustain Program Funding (input)
- Enhance Technology Transfer (output)
- Improve Management (input)
- Satisfy Customers (outcome)
- Maintain Facility Excellence (output)
- Recruit and Develop Quality People (input)

Performance Measures

The P&G's framework for performance measurement spells out four accounts that are used to classify the benefits and costs of various alternatives:

- National Economic Development (NED)
- Regional Economic Development (RED)
- Environmental Quality (EQ)
- Other Social Effects (OSE)

It is Corps policy, spelled out in the P&G, that only those actions with net NED benefits can be carried out. However, the four accounts of the P&G are not necessarily consistent with each other, and no consistent means of interrelating them have been developed.

To help develop a consistent set of performance measures for the Corps civil works program, the Director of Civil Works has begun a GPRA pilot program. Measures are being developed in a four-tiered process:

1. Define mission statements, business programs, and guidelines for developing performance measures.
2. Develop, validate and verify performance measures for nine business programs.
3. Implement performance measures at the District (rather than HQ) level.
4. Establish similar measures at the project level.

This overall agency performance measure process is currently at the Tier 2 level. The O&M program, however, has developed a number of concrete performance indicators (*Performance Measurement Guidebook*, p. f-2). The GPRA measures for FY 1996 are:

Business Function	Performance Measure
Hydropower	Percentage of gross unplanned outages
	Percentage of hours of actual service
Navigation	Industry delay cost due to unscheduled closures
	Unscheduled closures
	Lock chamber days available
Environmental Stewardship	Mitigation lands achieving mandated outputs
	Completed Operational Management Plan (OMP) tasks
Recreation	Dollar value of volunteer effort
Flood Control	Percentage of time project is available

BUREAU OF RECLAMATION

Mission

Intergovernmental water resource management is one of the cornerstones of the nation's infrastructure development program, dating back to an initiative by Theodore Roosevelt in 1902. Water resources—including lakes, rivers, and other riparian resources—frequently cross several states. Often, the well-being of an entire region depends on the management of a single water resource. This is especially true in the 17 western states, where water resources are scarce, and there is a national interest in development.

The Bureau of Reclamation (Reclamation) is in the Department of the Interior. Its mission, as stated in its strategic plan, is to "manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interests of the American public" (Bureau of Reclamation, "Strategic Plan: A Long-Term Framework for Water Resources Management, Development and Protection," June 1992, p. v).

In carrying out its mission, Reclamation manages 343 storage dams and reservoirs, as well as 51,400 miles of aqueducts, canals, and other water conveyance systems. These structures support 52 hydroelectric power plants, which annually produce 35.9 billion kilowatt-hours of electricity—the equivalent of the combined residential needs of New York City, Washington DC, Dallas, Chicago, Los Angeles, Phoenix, and San Francisco ("Fact Sheet," 1994).

Reclamation achieves its mission by working with state and local governments, utility companies, water authorities, and irrigation districts that provide direct water and power services to consumers. Reclamation also works closely with federal, state, and local environmental protection and economic development agencies to achieve its goals.

Strategic Planning Process

In 1987, Reclamation's management examined the direction of its programs and recognized the need to improve project management in order to increase their efficiency and effectiveness and protect "environmental values." Today, the 1992 Reclamation Strategic Plan guides the organization in accordance with its long-term mission and vision statements.

Reclamation's long-term mission and goals are designed to provide direction to Reclamation's offices and programs throughout the next 25 years. Reclamation's managers and supervisors use the strategic plan to guide their own planning efforts and priorities.

Two other types of documents establish medium- and short-term priorities for the individual regions and programs. These two documents are:

Implementation Plans, which establish medium-term, 10-year priorities that are aligned and coupled with the goals of the strategic plan; and

Individual Action Plans, which are produced annually by every region and program. The annual goals are expressed as measurable inputs and outputs.

Goals Set

The Strategic Plan represents a long-term vision of Reclamation. It consists of 25 separate program elements grouped into five categories. Each element includes a Guiding Principle, a Goal, and Strategies.

- The **Guiding Principle** provides a context for understanding the importance of the goal to the organization.
- The **Goal** states "where" Reclamation wants to be by 2010.
- The **Strategies** set forth "what" needs to be done to achieve the goal.

Program Elements

The 5 major program areas are:

- **Managing and Developing Resources,** which "sets forth the goals . . . in resource conservation, management, and development. . . . A balanced approach to the stewardship of the West's scarce water and associated land and

energy resources is the keynote of these goals. Full recognition is given to the primacy of State water rights laws and State water allocation responsibilities." ("Fact Sheet," p. iii)

- **Protecting the Environment,** which "recognizes that increased environmental knowledge and changing societal values have placed a greater emphasis on the protection of our natural resources. These goals, which are a logical extension of Reclamation's increased efforts to improve the management of existing resources, focus on the need for an environmentally sound program. . . ."("Fact Sheet," p. iv)
- **Safeguarding the Investment,** which seeks to protect, maintain, and improve upon Reclamation's water resource and hydropower facilities, into which it has paid $16 billion since 1902. Under existing law, much of that investment is to be repaid by users, thus requiring Reclamation to diligently carry out its cost recovery responsibilities.
- **Building Partnerships,** which recognizes that Reclamation faces an increasingly difficult challenge in balancing complex natural resources management, development, and environmental protection issues to provide for further economic growth and an improved quality of life. To do so at a reasonable cost, while simultaneously protecting and improving the environment and investments, will test Reclamation's ability to be innovative and farsighted. Opportunities for building partnerships with other federal and non-federal entities will be pursued to achieve effective stewardship of natural resources. Building partnerships and being responsive to a broad constituency, while continuing to fulfill existing commitments, will be a hallmark of how Reclamation will conduct business.
- **Fostering Quality Management,** which recognizes that its employees are Reclamation's most important asset. Reclamation's goals include creating a fulfilling work environment, inspiring people toward excellence, and empowering employees to achieve extraordinary results.

The intergovernmental infrastructure-related elements in Reclamation's strategic plan are:

Managing and Developing Resources

- Water and Power Operations
- Water Conservation
- Drought Management
- Project Development
- Energy
- Investing in Rural America
- Land Resources, Recreation
- Research and Training

Protecting the Environment

- Fish and Wildlife Resources
- Water Quality
- Instream Flows
- Wetlands and Riparian Habitat
- Hazardous Wastes

Safeguarding the Investment

- Facility Maintenance and Improvement
- Dam Safety

These goals are output and outcome oriented. For example, the Water and Power Operations element includes the following guiding principle and goal:

> **Guiding Principle.** The Nation's investment in existing water and power projects can yield greater benefits and meet additional needs through operational management decisions designed to increase project efficiencies and effectiveness.
>
> **Goal.** To improve the efficiency and effectiveness of project operations.

The specific inputs and outputs that are necessary to achieve the long-term strategic plan are included in the medium and short-term **Implementation** and **Individual Action Plans.** For example, medium-term inputs and outputs for the Water and Power Operations element are found in the **Implementation Plan**, entitled "Hydropower 2002," which lays out the goals necessary for Reclamation to improve the efficiency and effectiveness of these operations. These goals are organized into five phases, which structure the short-term goal setting process and link the long-term outcomes of the **Strategic Plan** with the short-term inputs and outputs of the **Individual Action Plans**. The phases and the goals that comprise each are:

Phase 1: Developing assessment guidelines and performance criteria

- Develop assessment guidelines for six energy strategies
- Develop hydropower performance criteria
- Develop power plant replacement program guidelines
- Review/update guidelines and performance criteria

Phase 2: Assess existing activities and new opportunities for each strategy

- Assess existing 52 power plants relative to six energy strategies
- Assess current energy-related programs and activities
- Assess new opportunities relative to energy strategies
- Conduct periodic assessment audit
- Assess current financing and cost recovery methods

Phase 3: Evaluate and prioritize opportunities and existing activities

- Solicit input from other federal agencies, state/local entities, and the public on assessment of opportunities
- Evaluate energy strategy opportunities and existing related activities
- Prioritize energy strategy opportunities and existing activities

Phase 4: Formulate and implement action plans

- Develop and implement action plans for:
  - Efficiency and operational improvements
  - Conservation program
  - Additional generating resources
  - Research and development, and technology transfer
  - Financing and cost recovery
  - Environmental compatibility
- Secure funding and required authority for selected projects and activities

Phase 5: Review and reassess

- Conduct annual Energy Initiative reviews beginning 10/1/92
- Prepare biennial progress reports beginning 10/1/92

Most of these activities have start and finish dates, but several have only start dates because they are continuous or repetitive (such as the goals in Phase 4.) The exhibit presents the timelines in "Hydropower 2002."

Ultimately, these goals are played out on the programmatic level in the **Individual Action Plans** of Reclamation's subunits. Using the example of Water and Power Operations once again, one of the goals and one of its objectives in the **Individual Action Plan** for Reclamation's Great Plains regional office are:

> **Goal.** Build a future organization that is more effective and costs less, is flexible but consistent in process, and able to adjust to change easily.
>
> **Objective.** Increase efforts in the following areas: Native-American affairs, water conservation and efficiency program, environmental restoration, resource management, and closer working relationships with urban water users.

This goal is coupled with specific directives for various organizational units. Usually, these directives include performance measures.

Performance Measures

The 1994 directives for the Technical Services office of Reclamation's Great Plains region were:

1. By May 1, 1994, reduce the number of line managers in the Technical Services offices by three. From the pool of five Technical Service managers, two will be selected to provide leadership in the following functional areas:
   - Engineering and Construction
   - Resource Management
   - Planning
   - Native American Affairs
2. By May 1, 1994, the following Senior Technical Specialists will be established in the Technical Services Office and will remain until such time as a continuing need and place in the organization is determined:

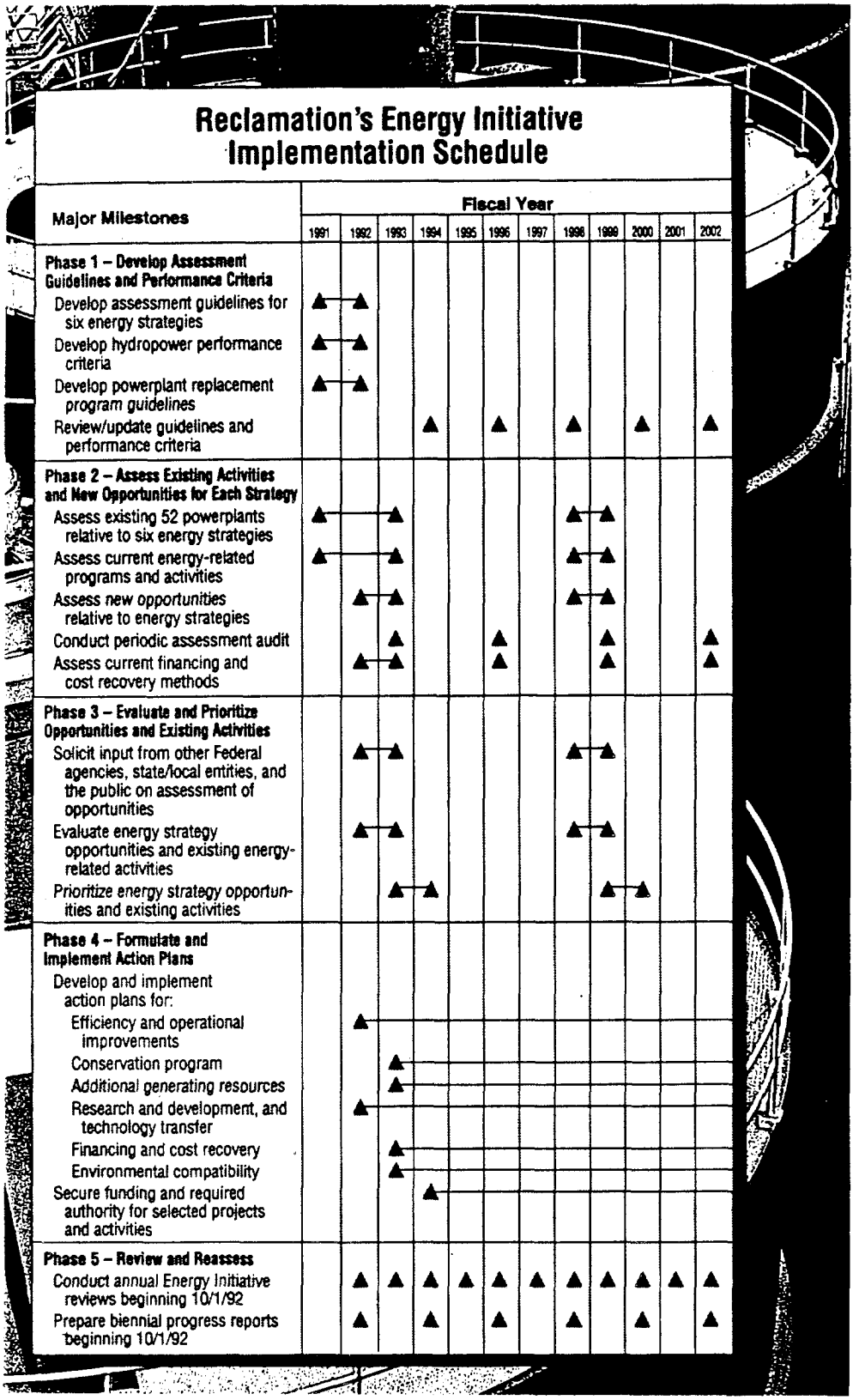
- Native American Affairs Senior Technical Specialist/Coordinator
- Environmental Affairs Senior Technical Specialist/Coordinator
- Planning Technical Specialist/Coordinator

3. By September 30, 1994, realign functions and improve utilization of both management and clerical staff resources in the Technical Services Office. Specifically, improve the ratio of supervisors to employees and reduce duplication of work in the management and clerical support areas. Ensure that staffing in the Technical Services Office corresponds with overall regional program and budget decreases. The following targets are established.
   - Reduce total FTEs in Technical Services by 8
   - Eliminate 9 of the current 22 supervisory and managerial positions

These directives are intended to align with the regional goal of "building a more effective and cost efficient organization" and the "Hydropower 2002" goal: "Solicit input from other federal agencies, state/local entities, and the public on assessment of opportunities." Ultimately, these performance directives carry the weight of the goal as stated in the Strategic Plan: "Improve the efficiency and effectiveness of project operations." Reclamation's performance at programmatic levels is used to measure progress toward its agencywide goal and to establish budgeting priorities for the following year.

Exhibit

Timelines for "Hydropower 2002"



Reclamation's Energy Initiative Implementation Schedule

Major Milestones	Fiscal Year 1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Phase 1 – Develop Assessment Guidelines and Performance Criteria												
Develop assessment guidelines for six energy strategies	▲	▲										
Develop hydropower performance criteria	▲	▲										
Develop powerplant replacement *program guidelines*	▲	▲										
Review/update guidelines and performance criteria				▲		▲		▲		▲		▲
Phase 2 – Assess Existing Activities and New Opportunities for Each Strategy												
Assess existing 52 powerplants relative to six energy strategies	▲		▲					▲	▲			
Assess current energy-related programs and activities	▲		▲					▲	▲			
Assess *new opportunities* relative to energy strategies		▲	▲					▲	▲			
Conduct periodic assessment audit			▲			▲			▲			▲
Assess current financing and cost recovery methods		▲	▲			▲			▲			▲
Phase 3 – Evaluate and Prioritize Opportunities and Existing Activities												
Solicit input from other Federal agencies, state/local entities, and the public on assessment of opportunities		▲	▲					▲	▲			
Evaluate energy strategy opportunities and existing energy-related activities		▲	▲					▲	▲			
Prioritize energy strategy opportunities and existing activities			▲	▲					▲	▲		
Phase 4 – Formulate and Implement Action Plans												
Develop and implement action plans for:												
Efficiency and operational improvements		▲										
Conservation program			▲									
Additional generating resources			▲									
Research and development, and technology transfer		▲										
Financing and cost recovery			▲									
Environmental compatibility			▲									
Secure funding and required authority for selected projects and activities				▲								
Phase 5 – Review and Reassess												
Conduct annual Energy Initiative reviews beginning 10/1/92		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Prepare biennial progress reports beginning 10/1/92		▲		▲		▲		▲		▲		▲

IMPLEMENTATION — THE COMMITMENT

Reclamation is fully committed to furthering energy efficiency, conservation and development programs that are environmentally and financially sound. Execution of Reclamation's Energy Initiative will be an ongoing process that will ensure Reclamation's continued responsiveness to national energy and related economic and environmental needs.

Implementation of Reclamation's Energy Initiative strategies will be accomplished through a five-phase process:

1. *Develop assessment guidelines and performance criteria*
2. *Assess existing activities and new opportunities for each strategy*
3. *Evaluate and prioritize opportunities and existing activities*
4. *Formulate and implement action plans (includes validated ongoing projects and activities)*
5. *Review and reassess*

This implementation process will serve as a foundation for institutionalizing the Energy Initiative throughout Reclamation by ensuring continual assessment and adjustment of energy-related activities, as necessary.

A schedule has been developed to guide Reclamation's efforts during the next decade.

DEPARTMENT OF ENERGY

Mission

The U.S. Department of Energy (DOE) was created in 1977 to consolidate most of the federal government's non-regulatory energy policy, research, and production programs. Its mission is stated as:

> The Department of Energy, in partnership with our customers, is entrusted to contribute to the welfare of the Nation by providing the technical information and the scientific and educational foundation for the technology, policy, and institutional leadership necessary to achieve efficiency in energy use, diversity in energy sources, a more productive and competitive economy, improved environmental quality, and a secure national defense. (United States Department of Energy, *Fueling a Competitive Economy: Strategic Plan,* April 1994, p. 4)

This mission has been subdivided into "five businesses":

- Industrial Competitiveness
- Energy Resources
- Science and Technology
- National Security
- Environmental Quality

Most of these are not intergovernmental, except for environmental quality, which has substantial intergovernmental implications.

Strategic Planning Process

The April 1994 Strategic Plan is a key document in the process of changing the orientation and image of the department's far-flung programs, many of which were the product of wartime and cold war thinking. This plan helped shape the department's fiscal year 1995 budget, and it is intended to be updated annually as part of the budget cycle.

In approaching each of its "businesses," the department identified five critical success factors (*Strategic Plan*, p. 7):

- **Communication and Trust**—how we communicate information and build trust within the organization and with our stakeholders and customers.
- **Human Resources**—how we recruit, train and develop, reward performance, motivate, and promote diversity within our workforce.
- **Environment, Safety, and Health**—how we ensure the safety and health of workers and the public, and protect and restore the environment.
- **Management Practices**—how we allocate, spend, and account for resources, and procure, produce, and contract for goods and services—the tools we use to get it all done.

For each of the department's businesses, and for each of its critical success factors, the strategic plan sets forth a series of goals, and for each goal, there is a series of strategies and success indicators. Further detail is provided in the department's budget.

Goals Set

The situation analysis for Environmental Quality notes the legacy of the nuclear weapons programs of the last five to six decades—high-level nuclear waste contamination at many of the department's 137 installations, covering over 3,300 square miles, and the need to clean up these hazards to workers and the public. The Congress has given primary regulatory authority for this clean-up to the states, and it is anticipated that some of the facilities will be downsized or decommissioned as a consequence of the downsizing of military programs. (*Strategic Plan*, pp. 10, 11, 24-26, 33, 36)

Within this context, the department's **Environmental Quality Vision** is:

- There will be full incorporation of improved environmental quality considerations in DOE's daily operations and decisions to ensure no further degradation.

- The environment, safety, and health risks at all DOE facilities will be well understood.
- DOE will manage, control, and/or return as much land as possible to alternative uses and ownership.
- DOE will be a world leader in environmental technology development and application.
- DOE will promote the use of cleaner energy and production processes.

To achieve this vision, DOE established five environmental quality goals:

1. Reduce uncertainties, prioritize risks, and eliminate threats of our activities to improve environmental quality.
2. By 2000, attain credibility and public trust, and demonstrate openness.
3. By 1996, be in control of environmental activities managerially and financially, and be demonstrably perceived as such by our stakeholders.
4. Achieve independent and credible regulation of departmental activities and facilities, and eliminate conflicting requirements.
5. By 2005, be a leading federal agency in environmental technology development focused on the nation's needs.

The first of these goals is outcome oriented. The others relate to program inputs and outputs.

Performance Measures

The strategies and success indicators under Goal 1, above, begin to show how performance could be measured against the goal:

Strategies

- Characterize and assess all risks and threats to environment, safety, and health.
- Strengthen enforcement of environmental, safety, and health performance.
- Ensure releases are below regulatory limits and implement aggressive waste minimization and pollution prevention activities.
- Promote independently enforced risk and health-based standards.

Success Indicators

- Releases are below regulatory limits and departmental requirements.
- Increased percentage of departmental land and facilities turned over for appropriate alternative use.
- Environmental, safety, and health performance at departmental facilities is better than that of private industry.
- All risks/threats are assessed and characterized.
- Enforcement of agreed-on risk and health-based standards. ("How clean is clean?")
- Environmental enhancement opportunities are assessed and prioritized.

Under the "critical success factors," specific goals emphasize the need to:

- Ensure there are specific environmental, safety, and health performance requirements for DOE activities which are the basis for measuring progress toward continuous improvement.
- Establish clear environmental, safety, and health priorities and manage all activities in proactive ways that effectively and significantly increase protection to the environment and to public and worker safety and health.
- Ensure management practices mirror our best public and private sector counterparts [using] . . . DOE-wide benchmarking to reengineer and integrate management practices for continuous improvement.

Among the management practices needing improvement are quantitative information systems. One such system is nearing completion and is being used in over two-thirds of DOE facilities and by other agencies. It is a state-of-the-art facilities inventory, condition assessment, and maintenance system that is continually being upgraded to perform additional roles. Development of this system is described in the exhibit.

Exhibit

Condition Assessment Survey

The Department of Energy (DOE) Condition Assessment Survey (CAS) was initially conceived in 1990 as an industry-based system of standards to develop deficiency-based capital maintenance and repair costs for use in managing DOE real property assets.

Parsons Brinckerhoff was selected to develop the CAS. Subcontractor KPMG Peat Marwick has been the primary developer of the software system to support CAS (CAIS—Condition Assessment Information System). In the first three years, Tenera L.P. was also a subcontractor, providing training support.

The three basic elements of CAS are:

- Industry-based deficiency description and inspection method standards (CAS Manuals);
- Automated field data collection of deficiencies (Inspection CAIS); and
- Automated roll-up, costing, and summary reporting of inspection results (Site CAIS).

CAS has involved a three-phase effort: Phase 1, the development of the basic standards and automated systems; Phase 2, implementation in the field; and Phase 3, (now under way), maintenance, enhancement, and support.

As CAS developed, so did the requirements and vision of the Department of Energy. The National Performance Review recommendations to move more of the overall management of the DOE mission from the Headquarters to the field and operations offices have had a significant bearing on the application of CAS throughout DOE. The initial concept of having a Headquarters CAIS—an executive-level roll-up of facilities condition information—was removed early in the program. As a result, the individual DOE operations offices and their headquarters secretarial offices have essentially been on their own to mandate the type of CAS system to employ. Several DOE research laboratories were more comfortable in continuing to contract out their CAS inspections to independent consultants, thus making the formally developed CAS an optional system.

Despite this lack of a department-wide mandate to specifically employ the DOE CAS tools, the system is being used in over two-thirds of DOE facilities, which have been aggressively pursuing the direction of the new DOE Life Cycle Asset Management (LCAM) directive successor to the earlier Capital Asset Management Program (CAMP).

The exceptional flexibility of the CAS tools has proven to be of considerable value in successful field data collection efforts. In addition to the development of comprehensive Master Equipment Lists (MELs), it was adapted to collect critical information on Chlorofluorocarbon (CFC) use in the DOE's Defense Programs facilities. CAS is also being evaluated as a mechanism to capture and analyze critical seismic information on vulnerable DOE high-value real property assets.

The implementation of CAS has resulted in numerous requests for expansion and enhancement. Version 2.0 of CAS, which incorporates an array of new routines and capabilities, is being prepared for DOE users.

Among the most significant functional improvements to Site-CAIS in Version 2.0 are:

- Inspection unit downloading
- Inspection routing
- Current asset condition identification
- Equipment information improvements (MEL support)
- Location tracking improvements
- Upload and download improvements
- System functions and defaults controlled by user options
- Support for site-developed add-ins

The Inspection-CAIS field data collection system has been totally revised, presenting a new "look and feel" that is much more user-friendly and intuitive. Other noteworthy changes in Inspection-CAIS Version 2.0 are:

- Support for re-inspections
- Expanded equipment information input formats
- New location structure and approach to "splitting" inspection units
- Routing system
- Increased flexibility for site-defined data

Variations on DOE CAS have been examined or are in use by NASA, the District of Columbia Department of Public Works, and the Procter & Gamble Company. The power and versatility of the CAS have been readily recognized, and plans are under way to implement the tool on a tailored basis once the Version 2.0 package is delivered. Facility managers at NASA's Lewis Research Center and the Jet Propulsion Laboratory have expressed interest in Version 2.0.

Action is under way for the addition of a "front-end" graphical user interface (GUI) for CAS. This Version 3.0 enhancement will allow for integration of CAS information with the new Facility Information Management System (FIMS). This Windows®-based GUI will allow

managers at all levels to prepare reports in a timely and effective manner. Version 3.0, to be released in 1996, will make the CAS and FIMS tools even more flexible and responsive to the changing needs of DOE leadership.

In summary, CAS provides the basis for sound, industry-based life cycle decisions that will promote the most effective use of constrained DOE facilities maintenance and repair dollars.

Source: DOE-CAS Fact Sheet, Updated October 16, 1995.

DEPARTMENT OF TRANSPORTATION

Mission

> The Department of Transportation will "Tie America Together" with a safe, technologically advanced, and efficient transportation system that promotes economic growth and international competitiveness now and in the future, and contributes to a healthy and secure environment for us and our children.

The Department of Transportation (DOT) is the federal steward of the nation's transportation system. The department includes the Federal Highway Administration, National Highway Traffic Safety Administration, Federal Railroad Administration, Federal Transit Administration, Federal Aviation Administration, United States Coast Guard, Maritime Administration, Saint Lawrence Seaway Development Corporation, Research and Special Programs Administration, and Bureau of Transportation Statistics. Each administration has its own mission, its own management and organizational structures and its own strategic plan, but they all operate under the department's mission and have a common commitment to create the best possible transportation system.

DOT and all of its administrations carry out this mission in four ways:

- Setting standards for safety and other key aspects of the transportation system and enforcing those regulations;
- Distributing funds to state agencies, transportation providers, and other transportation-related institutions to plan, construct, and operate the transportation system of America, and shaping the direction of its development in partnership with state and local entities;
- Interacting with other federal agencies to carry out broader federal mandates, such as clean air and national security; and
- Providing law enforcement and traffic management services for the nation's air space and waterways.

Strategic Planning Process

The nation's transportation infrastructure is comprised of 4 million miles of highways and roads; nearly 170,000 miles of railroad routes; 11,000 miles of rail rapid transit; and 26,000 miles of navigable waterways. There is also a substantial national investment in ports, air traffic management systems, and pipelines. As we move toward the next century, however, the biggest challenge for DOT is to focus on how the already built systems can be made to work better for the national interest.

The long-term DOT Strategic Plan defines the range and scope of DOT's activities, the challenges faced, and a mission for DOT as it moves into the 21st century. It works in tandem with a short-term performance agreement between the President and the Secretary of Transportation, which details annual goals and objectives.

Goals Set

The Strategic Plan establishes seven general output- and outcome-oriented goals. The following five goals are related to infrastructure:

- "Tie America together" through an effective intermodal transportation system.
- Invest strategically in transportation infrastructure, which will increase productivity, stimulate the economy, and create jobs.
- Promote safe and secure transportation.
- Actively enhance our environment through wise transportation decisions.
- Put people first in our transportation system by making it relevant and accessible to users.

Each goal includes several objectives and activities. For example, the "Tie America together" goal and its objectives and implementing activities follow:

Goal. "Tie America together" through an effective intermodal transportation system.

Objective. Achieve a new National Transportation System that integrates all modes and emphasizes connections, choices, and coordination of transportation services, and that positions this country as an effective competitor in the global market.

Objective. Restore the health of the aviation, maritime, and passenger rail industries.

To meet these objectives, DOT will:

1. Establish a National Transportation System (NTS), following the model of the National Highway System, to evaluate the nationally significant transportation infrastructure and future freight and passenger needs, and encourage state and regional agencies to support and incorporate these systems.
2. Move Amtrak toward financial stability and world class passenger service.
3. Implement an aviation revitalization strategy.
4. Implement a maritime revitalization strategy.
5. Identify and develop global transportation corridors.

The Strategic Plan's long-term goals, objectives, and activities are echoed in the performance agreement, which includes performance measures.

Performance Measures

The performance measures by which DOT measures its progress toward short-term goals are found in the Annex of the annual performance agreement. The 1994 performance measures for the "Tie America together" goal were listed as follows:

- In consultation with stakeholders and customers, develop a conceptual framework for creation of a National Transportation System, including a definition of concept, plan for integrating data and a format for public involvement. This framework will be proposed by September 1994. By June 1994, publish the first Transportation Statistics Report.
- Based on a detailed study recommending the creation of a corporation to provide air traffic control (ATC) services, the department will develop a comprehensive ATC legislative package and work with the Congress toward early passage of legislation.
- Implement the Administration's Initiative to Promote a Strong Competitive Aviation Industry, including completion of the regulatory review with the aviation industry and high-density rule study during Calendar Year 1994.
- Work with Congress to secure passage of the "Maritime Security and Trade Act of 1994," which includes funding for the Maritime Security Program, by September 1994.
- Strengthen transportation relations with Canada and Mexico and develop a joint plan by June 1994 to improve the safety and efficiency of cross-border transportation. The plan will include recommendations for border planning management and operations that will facilitate the movement of people and goods in a more efficient, cost-effective manner while maintaining high standards and security.
- Develop a joint plan and schedule through the Land Transportation Standards Subcommittee and technical working groups to implement the land transportation provisions of the North American Free Trade Agreement. These provisions focus on resolving compatibility issues regarding each country's existing safety standards and streamlining the flow of goods or services across the borders.
- Work with Congress to secure passage of Amtrak authorizing legislation by September 1994. In conjunction with Amtrak, by the end of September 1994, evaluate the potential roles that passenger rail service might play in the national transportation system. This assessment will evaluate the role the federal government should play, the resources that would be required and potential revenue sources to provide a world-class passenger service.
- To deal with policy concerns applicable to international aviation in the 21st century, prepare a new international aviation policy statement by the summer of 1994 and pursue international aviation negotiations with key bilateral partners, including Japan, the United Kingdom, Germany, and Canada.
- Authorize a formal Trade Promotion Task Force to coordinate ongoing export promotion efforts within the department and to initiate new efforts by June 1994.

UNITED STATES COAST GUARD

Mission

The United States Coast Guard (USCG) has a broad range of maritime infrastructure responsibilities, defined in its mission statement to include the following issues (USCG Operations Manual, pp.1-3):

- Establish and enforce national standards regarding the management of ports;
- Maintain the infrastructure that ensures safe passage of vessels to and from U.S. ports;
- Promote the efficient transfer of passengers and cargo transported via maritime routes to other modes of transportation; and
- Safeguard the safety and welfare of passengers and cargo being transported via U.S. maritime routes.

Strategic Planning Process

The beginning of USCG's performance measurement effort dates back eight years to the implementation of a Total Quality Management (TQM) program, under which, the managers of front-line operations were given a degree of managerial autonomy in return for a measure of accountability. The basic idea was that TQM would allow the managers to identify areas where improvement was needed and to make changes in the unit to deliver service more effectively and efficiently. The program, however, does not require managers to plan a unit's operational agenda or develop agencywide performance measures. Although TQM has remained an important part of USCG's front-line operations, the flag level staff has adopted strategic planning as the model for evaluating the effectiveness and efficiency of many agencywide operations.

The USCG strategic plan—"The Commandant's Executive Business Plan" (EBP)—serves as a long-term and short-term plan. EBP defines the commandant's long-term vision, the goals listed in the EBP with objectives, milestones, and executive performance indicators that will allow the USCG to periodically assess its progress toward the goals the commandant has set. EBP is scheduled to be reviewed in four years.

Goals

EBP identifies eight goals that the commandant wants USCG to achieve within the next four years. Goal 6 relates to infrastructure:

> Engage the Coast Guard as an intermodal partner in the implementation of the DOT Strategic Plan, particularly in the areas of infrastructure, safety, and security.

This goal consists of several objectives, which are further broken down into milestones. The milestones may include inputs, outputs, and/or outcomes, paired with a list of executive performance indicators. The party or parties responsible for achieving each milestone are also identified in EBP. (See the exhibit on the next page.)

Performance Measures

The executive performance indicators under Goal 6 do not include the outcome-oriented measurements envisioned by GPRA, and the Coast Guard has not established data series to objectively track progress toward such goals. The potential for doing so is illustrated by USCG's approach to its safety program.

In 1994, the Coast Guard began a GPRA pilot program promoting marine safety through which, within five years, it would:

- Reduce deaths and injuries from marine casualties by 20 percent.
- Prevent any passenger vessel casualty with major loss of life.
- Improve the safety of commercial fishing from its "most hazardous" ranking to at least halfway toward the median.
- Eliminate substandard commercial vessels from U.S. waters.

The historical data on which these goals were based suggested that they were attainable, but would be a challenge. Although the project is not completed, preliminary results indicate that satisfactory progress is being made toward these goals.

The USCG based its GPRA pilot program on its first Marine Safety Business Plan published in January 1994. The program was developed by assembling the senior management of the safety programs to draft goals to guide all of the USCG's activities, validating these goals with its districts, and outlining some general strategies. The pilot was initiated two months later.

During the planning stages, USCG convened an ad hoc Program Evaluation Group to assist in the development of performance goals and establish annual targets for each of the next five years. The group sorted through potential measures, found and calibrated data, and presented options. Some of the goals they developed included measures of progress and some aimed at resolving specific problems or risks. Many of the safety measures are comparable with those for other industries and activities in other government programs. Collectively, they represent the yardstick by which USCG measures its success in this program.

Exhibit

Illustrative Goal and Related Objectives and Performance Indicators

Goal 6

Engage the Coast Guard as an intermodal partner in the implementation of the DOT Strategic Plan, particularly in the areas of infrastructure, safety, and security.

Objective 6-1: Enhance Coast Guard Participation in DOT team building initiatives relating to waterway and port management and infrastructure, transportation system interactions, and transportation safety.

Milestone 6-1-A: Support and participate in DOT Strategic Plan and National Transportation System (NTS) development and implementation efforts.

Executive Performance Indicators

1. Assign qualified USCG individual to DOT organization, as appropriate.
2. Improve understanding of DOT planning mechanisms.
3. Support appropriate DOT customer service plans.

Objective 6-2: Integrate a national intermodal port management and waterway system.

Milestone 6-2-A: Continue participation in interagency Waterways Management Council.

Executive Performance Indicators

1. Take leadership role in Council activities.
2. Reach 100 percent interagency participation in Council.
3. Provide annual report on Council accomplishments.

Objective 6-3: Serve as a change agent in providing a safer transportation network with an emphasis on prevention and security.

Milestone: 6-3-A: Take actions to prevent accidents in the maritime transportation network.

Executive Performance Indicators

1. Expand the existing Waterways Analysis and Management System (WAMS) to a multipurpose tool which further advances the safety of our ports.
2. Promote VTS 2000 as a cooperative enterprise that maximizes the safe and efficient use of waterways and collects information on relevant activities in the serviced waterway.
3. Complete implementation of the Global Marine Distress and Safety System (GMDSS).
4. Strengthen prevention, response, and enforcement measures relating to the transportation of hazardous material.

Milestone 6-3-C: Engage industry and state and local governments/agencies in cooperation to strengthen security at passenger terminals and on board passenger ships.

Executive Performance Indicator

1. Conduct local "listening sessions" and seminars on implementation of final rule on Passenger Vessels and Passenger Terminals (33 CFR 120 and 128).

FEDERAL AVIATION ADMINISTRATION

Mission

The Federal Aviation Administration (FAA) states as its mission

> to provide a safe, secure, and efficient global aviation system that contributes to the national security and the promotion of U.S. Aviation. As the leading authority in the international aviation community, FAA is responsive to the dynamic nature of customer needs, economic conditions, and environmental concerns. (*FAA Strategic Plan: Vol. 1: Strategic Direction*, 1994, p. 7).

FAA's vision is "to provide the safest, most efficient, and responsive aviation system in the world . . . continuously improving service to customers."

Strategic Panning Process

FAA has had many elements of an effective planning process since 1972. It annually produces more than 50 detailed planning documents, such as its $30 billion Aviation System Capital Investment Plan, the General Aviation Action Plan, and the Airways Facilities Strategic Plan. The new *Government Performance and Results Act* (GPRA) strategic planning process allows FAA to tie these plans together. FAA's goals, objectives, and milestones will be tied into the strategic plan of the Department of Transportation and will be consistent with the performance agreement between the Department of Transportation and the President.

FAA's strategic plan consists of three documents, each of which serves a different purpose.

- *Volume I* is the strategic volume, outlining long-range direction. It sets forth the mission, vision, and values to which FAA will adhere. It discusses the forces that will drive FAA's actions in the future aviation environment. It presents key long-range issues, the goals and objectives, and the commitment FAA makes to achieving results.
- The *Appendix*, like Volume I, changes little from year to year. It describes in detail FAA's evolving future Operational Concept and the air traffic management system.
- *Volume 2: Strategic Implementation* is tactical in nature and contains the shorter term implementation activities. It changes each year as FAA achieves milestones and sets new ones. The 1995 edition details nearly 500 key milestones for the next 5 years to meet the needs of the aviation community.

In addition to the formal strategic planning process, many of FAA's offices produce their own strategic plans, called Business Plans. The Business Plans are reviewed each year, and contain milestones that are oriented toward the concerns of the individual offices, in addition to those which are oriented toward FAA's customer base.

Seven strategic planning elements are identified in FAA's Strategic Plan:

- System Safety
- 21st Century Aviation
- System Capacity
- Industry Vitality
- International Leadership
- Environmental Responsibility
- FAA Organization

Of these seven elements, three are pertinent to intergovernmental infrastructure: System Capacity, System Safety, and Environmental Responsibility.

Goals Set

The facility-related elements, goals, objectives, and milestones are:

System Safety (Element)

> **Goal:** Eliminate accidents and incidents in the aviation system with a strategy that targets the most critical areas. (Outcome)

Objective 1D: Minimize risk of collisions on the ground (Outcome)

Facility Milestones

- Improve airport design (Output)
- Install airfield lighting (Output)
- Install airport signs (Output)
- Install pavement marking (Output)
- Install runway status lights (Output)

Objective 1G: Reduce weather-related accidents (Outcome)

Facility Milestones

- Install airport surface weather detection equipment (Output)
- Install automated surface weather observing systems (Output)

System Capacity (Element)

Goal: Meet System Capacity Needs (Output)

Objective 5F: Reduce weather related delays (Outcome)

Facility Milestones

- Install terminal doppler weather radar (Output)
- Install low level windshear alert systems (Output)

Objective 5I: Provide needed airport capacity (Output)

Facility Milestones

- Reduce delays for airlines (Outcome)
- Maximize potential of general aviation (Outcome)
- Facilitate ground access (Outcome)
- Relieve congestion (Outcome)
- Improve congestion related air quality (Outcome)
- Improve airport runway pavement to accommodate new aircraft (Output)

Environmental Responsibility (Element)

Goal: Provide strong leadership in mitigating the adverse environmental impact of aviation. (Input)

Objective 9A: Reduce the impact of aircraft noise by 80 percent (based on population) by 2000 through land use initiatives. (Outcome)

Facility Milestones

- Design an aircraft noise impact model (Input)
- Provide airports a simplified computer system, which includes integrated noise methodologies, data bases, and noise assessment tools by 1998 (Input)

Objective 9B: Minimize impact of airport emissions (Outcome)

Facility Milestones

- Maximize efficiency of operational procedures to reduce aircraft ground operations by 10 percent in 1996 and by 25 percent at selected airports by 2000 (Output)
- Conform airport development programs to State Implementation Plans as required by *Clean Air Act Amendments* (Output)

Objective 9C: Create an environmentally effective and responsive FAA (Input)

Facility Milestones

- Assess the impact of new and proposed environmental regulations (Input)
- Ensure that environmental impacts of all significant FAA operations and decisions are appropriately assessed (Input)
- Reduce FAA energy consumption in all non-exempt facilities (Output)
- Eliminate release of highly toxic substances by 1999, and reduce the use of potential contaminants by 30 percent of 1997 baseline by 2002 (Output)
- Achieve environmental cleanups in FAA facilities by 2010 (Output)

Other milestones under FAA's objectives describe non-facility inputs and outputs needed to reach the objectives and the larger outcome goals, although clear linkages are not specified.

Performance Measures

Many objectives included in *Strategic Plan: Volume 2* are not measurable. The next evolution of *Strategic Plan* is expected to express more objectives and milestones in measurable terms.

Two specific milestones indicate work toward measuring outcomes:

- Develop winter runway friction measurement and reporting procedure: FAA/industry working group (under Objective 1G)

- Develop airport system performance measures (under Objective 5I)

Because of its long history of planning, FAA has a rich body of data it can draw on to develop realistic goals and measure its progress. Some of the data series are:

Airport Capacity

Air Traffic Capability

- Number of runways
- Number of planes able to land and take-off concurrently, safely
- Average distance between aircraft landing and taking off

Ground Traffic Capability

- Average taxiing time
- Number of planes able to use pre-flight check area.

Average Length of Flight Delay

Safety/Runway Incursions

Airport Traffic Accidents

- Number of Accidents

Pavement Condition

Number of Pavement Anomalies

Density of Pavement Anomalies

Types/Classes of Airplanes Capable of Being Serviced by Airports

Airport Accessibility

Airport Facility Traffic Capability

- Numbers and types of intermodal transportation resources serving the airport facility

Environmental

Air Quality

- Fuel/energy consumption by aircraft/facilities

FEDERAL HIGHWAY ADMINISTRATION

Mission

The mission of the Federal Highway Administration (FHWA) is:

> to ensure the highest quality surface transportation system which promotes the Nation's economic vitality and quality of life of its people. (*FHWA National Strategic Plan, 1996–Highways Make the Connection*)

Within the scope of its mission, FHWA works to:

- Preserve, improve, and expand the surface transportation system, and enhance its operations, efficiency, and intermodal integration;
- Implement surface transportation programs so as to protect and enhance the environment;
- Provide innovative, effective research and development; market and implement technology;
- Provide program oversight and accountability for public resources and ensure appropriate uniformity; and
- Improve surface transportation safety.

FHWA is one of the DOT's largest and oldest administrations. It was brought into the department by the 1967 *Department of Transportation Act* (49 U.S.C. app. 1651 note). FHWA administers the highway transportation programs, most of which are intergovernmental. FHWA works closely with state and local governments through grant, research, and safety programs. State and local governments plan, operate, and maintain most federal highway projects.

Strategic Planning Process

The National Strategic Plan sets forth the goals and objectives FHWA will strive to achieve to successfully close out the Interstate era.

Completion of the Interstate highway system was marked by enactment of the *Intermodal Surface Transportation Efficiency Act of 1991* (ISTEA). This Act changed the role of FHWA and spurred new strategic planning.

The current FHWA plan supports the overall DOT plan, and is updated annually to detail goals, guide activities, and establish target dates for objectives.

Goals Set

The FHWA 1996 Strategic Plan establishes the following goals:

> **Mobility.** Meet the public's need for improved access and for safe, comfortable, convenient, and economical movement of people and goods.
>
> **Environment.** Be an environmentally conscious organization that practices active leadership in working with our partners to protect and enhance the natural and human environment.
>
> **Program Delivery.** Improve the delivery and quality of our transportation programs and products.
>
> **Research and Technology.** Develop, transfer, and implement technology through alliances with our partners and the international community.
>
> **Safety.** Improve surface transportation safety through a coordinated effort to reduce fatalities, injuries, property damage, and hazardous materials incidents.
>
> **Organizational Capacity.** Increase and enhance FHWA's capacity through innovative and effective human resources, information, and administrative management programs and improvements.

The mobility, environment, and safety goals are outcome oriented. The others deal with program inputs and outputs that support the desired outcomes. None of the outcomes are quantified.

Each of the six goals is comprised of more detailed objectives and specifically scheduled activities. The objectives and activities listed under the Mobility goal are reproduced below as an example of this technique:

> **Objective 1:** Implementation policies for the approved National Highway System (NHS) are established.
>
> - National Highway System connections to

major ports, airports, public transportation facilities, and other intermodal transportation facilities are approved for all states by 1/96.

- An outreach program to inform our customers on the features of the enacted NHS is developed and implemented by 12/95.
- Interim procedures for administering future changes to the NHS are established by 1/96; final procedures are established by 7/96.
- A strategy and implementation schedule to develop or refine existing policies, goals, and guidelines, and to define the performance, operation, and maintenance expectations for the NHS are established by 9/96.

Objective 2: A leadership role is established in the planning and analysis of the U.S. transportation system.

- The appropriate items from the North American Free Trade Agreement (NAFTA) action plan are incorporated into the planning and analysis for a national transportation system by 3/96.

Objective 3: The *Intermodal Surface Transportation Efficiency Act* planning requirements and management systems are implemented and coordinated.

- FHWA input for a department-wide effort to define the national transportation system performance measures to be used in a system evaluation process for a national transportation system is developed by 3/96.
- Review of the management systems rule is completed and a revised rule issued by 9/96; guidance and outreach activities are enhanced to reflect the revised rule.
- Programs are implemented to enhance the quality of state/metropolitan planning organization (MPO) traffic characteristics data provided for the Traffic Monitoring System for Highways by 12/96.
- An overall national assessment of the metropolitan planning process and its implementation under ISTEA is completed by 9/96.
- Conduct a review of the relationship between the ISTEA transportation planning process and the management system and implement changes, if any, are recommended by 12/96.

Objective 4: The core Intelligent Transportation System (ITS) infrastructure (for metropolitan areas and commercial vehicle operations) is deployed appropriately nationwide.

- A strategy for national deployment of core ITS infrastructure (including mainstreaming into the planning process, funding, project tracking, educating, providing technical assistance, and achieving "buy-in" and application at the state/local level) is completed and legislative action is initiated, if necessary, by 12/96.
- ITS deployment planning efforts are completed or under way in 75 metropolitan areas and 10 State Commercial Vehicle Operations (CVO) groups, with results both shared with partners and incorporated into the appropriate local planning processes by 9/96.
- National ITS architecture is specified and a standards process is launched by 12/96.
- 75 percent of operational tests running and evaluated, and results are shared with partners by 12/96.
- Initiative is launched to showcase the model deployment of both core CVO and core Metropolitan Area ITS infrastructure by 9/96.

Objective 5: A national transportation investment strategy is developed that addresses the highway infrastructure needs of the nation.

- The effectiveness of the first group of innovative financing projects is evaluated and lessons learned are implemented by 9/96.
- Conduct research supporting the implementation of innovative financing strategies, and conduct a national conference by 3/96.
- Develop a national transportation investment strategy to support development and advancement of legislative positions by 9/96. .
- Reports pursuant to legislative request on costs allocation and truck size and weight are completed by 12/96.

Performance Measures

At present, the only quantified measures of performance in FHWA's strategic plan are the dates for completion of program input and output activities.

FEDERAL RAILROAD ADMINISTRATION

Mission

The mission of the Federal Railroad Administration (FRA) is:

> to promote safe, environmentally sound, successful railroad transportation to meet current and future needs of all customers. FRA encourages policies and investment in infrastructure and technology to enable rail to realize its full potential.

To this end, FRA works with the railroad industry, the Congress, other federal agencies, and the general public to make progress and define solutions where problems exist. (*Mission and Vision*, 1995)

"FRA was created in 1966 to promote and enforce safety throughout the U.S. railroad system, rehabilitate Northeast Corridor rail passenger services, consolidate federal support for rail transportation, and support research and development of rail transportation. FRA is one of ten agencies within the U.S. Department of Transportation concerned with intermodal transportation, the timely and effective implementation of ISTEA, technological advancement, the use of national resources, and the well-being of the nation's communities." (*Strategic Plan*, 1995)

Strategic Planning Process

FRA's planning efforts are rooted in the 1970s, but its scope of activities then was largely rail safety. Activities now include preparing new technologies such as high-speed passenger rail and magnetic levitation trains; improving Amtrak and rail commuter services; encouraging innovations in freight railroad service and technology; forging an efficient North American rail network; and stimulating the development of intermodal facilities. The Strategic Plan is designed to work in tandem with FRA's Performance Agreement.that aligns the missions and goals of the administration and DOT.

Goals Set

The FRA Strategic Plan identifies eight goals, each accompanied by objectives and actions. Five of the goals deal with intergovernmental issues:

- **Safety:** To promote and improve the safety of the national rail transportation system.
- **Intermodalism:** To strengthen the national intermodal transportation system by fully integrating rail services.
- **Investment:** To increase strategic public and private investment to enhance the railroad industry's contribution to the nation's transportation system, economy, and quality of life.
- **Technological Advancement:** To advance technological innovation in rail transportation through leadership and partnership.
- **Environment and Community:** To promote rail transportation policies and rail solutions that are ecologically sound and enhance the well-being of our communities.

These goals are linked to inputs, outputs, and outcomes through the objectives and activities. For example, the goals under **Safety** are:

- To reduce rail-related incidents and casualties;
- To minimize rail operation risks; and
- To foster safety partnerships with and between rail labor and management.

The activities under **Safety** are:

- Uniformly enforce rail safety laws and regulations consistent with improvements to the National Inspection Plan and Staffing Allocation Model.
- Continue to implement and support programs, including the Highway-Rail Grade Crossing Action Plan and Operation Lifesaver, in cooperation with the industry and state and local agencies, to upgrade or eliminate high-risk or redundant crossings.
- Establish and maintain communication with customers to resolve safety issues.
- Revise or develop regulations and legislation, as appropriate, consistent with statutory directives, pressing safety problems, and changing industry practices and technology.

- Provide leadership on rail safety education and regulatory enforcement programs.
- Cooperate with the railroad industry on research and development initiatives, integration of advanced technologies, and new techniques for improved safety and risk reduction.
- Provide continuous training to our customers.
- Work with other agencies to promote intermodal and other safety initiatives.

The exhibit lists FRA goals, objectives, and activities related to intergovernmental infrastructure.

The FRA Performance Agreement goals are slightly different from those in the Strategic Plan. Nevertheless, they are consistent and specific. Environmental goal activities in the Performance Agreement include:

5.4: Work closely with EPA, DOE, state and local governments, and MPOs to implement fully the *Clean Air Act Amendments of 1990.*

5.7: Harmonize transportation policies and investments with environmental concerns.

Performance Measures

Performance measures are not part of the Strategic Plan. They are an integral part of the strategic planning process. FRA accomplishes many of its infrastructure goals through the states and localities with which it works. FRA requires Implementation Plans that incorporate clear, measurable objectives of the state and local governments.

FRA also measures progress toward the goals in its Performance Agreement. For example, scheduled activities under Enhancing the Environment include:

5.4: Work closely with EPA, DOE, state and local governments, and MPOs to implement fully the *Clean Air Act Amendments of 1990.*

Update nonattainment areas in the FRA GIS to facilitate transportation planning and analysis. (6/95)

Continue to work with OST, EPA, the rail industry, and states, as appropriate, to assure that all relevant issues affecting locomotive emission regulations are addressed as EPA develops its Federal Implementation Plan for California and new locomotive emission standards, and as California develops its State Implementation Plan. Develop FRA comments on EPA's proposed new locomotive emission standards when they are published in the Federal Register. (Ongoing)

5.7: Harmonize transportation policies and investments with environmental concerns.

Alameda Corridor Project

As joint lead agency with FHWA for the Environmental Impact Statement (EIS) for the proposed Alameda Corridor Project to improve rail and highway access to the ports of Long Beach and Los Angeles, FRA will monitor status, assist in defining issues, and provide comments. The EIS process is expected to be completed in FY 1995.

New Surface Transportation Environmental Procedures

FRA will work with FHWA and FTA to complete by mid-1995 proposed joint FHWA/FTA/FRA environmental policies and procedures to implement the *National Environmental Policy Act of 1969*, as amended, and Council on Environmental Quality regulations. The combined procedures should simplify the compliance process for recipients of DOT financial assistance.

Work with Other Agencies (governmental and non-governmental)

FRA will continue to work with other agencies and organizations (such as EPA, Department of Energy, Amtrak, Consumer Energy Council/Research Foundation, Surface Transportation Policy Project) to address environmental and energy impacts.

Work with EPA's Freight Task Force to identify intermodal terminal access problems (including community disruption) where improved connections would have significant environmental benefits. Identify remedial strategies.

Training Courses

Consider including additional environmental guidance and compliance information in FRA's safety training courses (noise and hazmat are now covered), with EPA regional assistance.

Exhibit

Strategic Planning Goals, Objectives, and Activities

Safety: Promote and improve the safety of our national rail transportation system

Objectives

- Reduce all rail related incidents and casualties
- Minimize risks related to rail operations
- Foster safety partnerships with and between rail labor and rail management

Activities

1. Uniformly enforce rail safety laws and regulations consistent with improvements to the National Inspection Plan and Staffing Allocation Model
2. Continue to implement and support programs, including the Secretary's Highway-Rail Grade Crossing Action Plan and Operation Lifesaver, in cooperation with the rail industry and state and local agencies to upgrade or eliminate high-risk or redundant highway/rail grade crossings.
3. Establish and maintain productive communication with and among customers to identify and resolve safety issues.
4. Revise or develop regulations and legislation, as appropriate, consistent with statutory directive, pressing safety problems, and changing industry practices and technology.
5. Provide leadership on rail safety education and regulatory enforcement programs.
6. Cooperate with the railroad industry on continued research and development initiatives, integration of advanced technologies, and new techniques for improved safety and risk reduction.
7. Provide continuous training to our customers.
8. Work with other agencies to promote intermodal and other safety initiatives.

Intermodalism: Strengthen the national intermodal transportation system by fully integrating rail services

Objectives

- Improve the effectiveness of passenger and freight rail service as an important component of a national transportation system.
- Improve the flow of goods and passengers between rail and other modes.
- Make rail service, passenger and freight, a more viable option for the public.

Activities

1. Work with the office of the Secretary; other modal administrations; and state, regional and local agencies to develop a national transportation system.
2. Work with state, regional and local agencies to (1) advance the national transportation system, after it is developed; (2) include the national transportation system in their transportation plans; (3) ensure that the reauthorization of ISTEA includes rail; and (4) promote the use of flexible funding in surface transportation authorizations to strengthen the role of rail.
3. Work with Amtrak to develop a Strategic Plan that will provide financial stability and will make Amtrak a very high quality passenger option.
4. Work with the railroad industry, Federal Highway Administration, and Maritime Administration, to minimize/eliminate freight bottlenecks.
5. Promote the development of efficient intermodal terminals to facilitate freight and passenger moves between modes.
6. Encourage the coordination of intercity and commuter train services.
7. Work with appropriate agencies to address issues related to commuter rail access to railroad rights-of-way.
8. Promote development of improved intermodal connections; better information and signage; high-speed ground transportation alternatives; and integration of intercity, commuter rail, and transit schedules to make rail service more user friendly.
9. Work within DOT, the rail industry, and with our international partners to implement the North American Free Trade Agreement (NAFTA).
10. Work with other parts of DOT and other agencies to analyze each transportation mode's full impact on society, and identify federal and other public sector assistance to each mode.

Investment: Increase strategic public and private investment to enhance the railroad industry's contribution to the nation's transportation system, economy and quality of life

Objectives

- Strategically invest in rail-related projects to improve safety, productivity, economic stimulation,

environmental enhancement, and job creation and retention.

- Strengthen investment partnerships with countries, states, localities, and the private sector to move toward a balanced transportation system.
- Enhance rail opportunities under ISTEA and future legislation.

Activities

1. Implement the Northeast Corridor Transportation Plan, within established time frames, to enhance transportation options, such as high-speed ground transportation, in that region.
2. Pursue innovative financing for rail infrastructure to maximize the benefits of federal investment.
3. Identify opportunities to provide strategic support to new rail transportation industries that have the potential to benefit the nation's economy.
4. Promote the use of flexible funding under ISTEA to support the development of needed rail projects.
5. Ensure cost-effective and results-oriented investments of FRA-authorized funding to improve rail transportation.

Environment and Community: Promote rail transportation policies and rail solutions that are ecologically sound and enhance the well-being of our communities.

Objectives

- Harmonize transportation policies and investments with environmental and community concerns.
- Implement environmentally friendly solutions for FRA's internal activities.

Activities

1. Identify, quantify, and compare environmental and community effects of rail relative to other transportation infrastructure investments, working with other DOT offices, other agencies, and interested parties.
2. Publicize the environmental and social benefits of rail transportation.
3. Comply with all environmental requirements that affect FRA-supported rail projects and provide information on environmental requirements to interested railroads.
4. Work with all interested parties on proposed clean air act standards affecting locomotive emission regulations, as well as the development and implementation of other environmental standards to assure that all rail issues are addressed.
5. Support environmental research initiatives in areas such as air quality, high-speed rail noise and vibration, and electromagnetic fields.

FEDERAL TRANSIT ADMINISTRATION

Mission

The Federal Transit Administration (FTA) mission is

> to ensure personal mobility and America's economic and community vitality by supporting high quality public transportation through leadership, technical assistance, and financial resources. (*Strategic Plan*, 1994)

FTA is one of nine agencies in the U.S. Department of Transportation. FTA works with Metropolitan Planning Organizations, Regional Transportation Authorities, State Departments of Transportation, and manufacturers to plan, construct, and operate safe, reliable, and efficient transportation systems. FTA's program is designed to increase the livability of communities and mitigate some environmental problems arising from other forms of transportation.

Strategic Planning Process

FTA has used strategic planning processes to restructure its activities and priorities since the *Intermodal Surface Transportation and Efficiency Act* (ISTEA) passed in 1991. The FTA strategic plan identifies goals and objectives that are consistent with those of the Department of Transportation.

The FTA's strategic plan:

- Supports a heightened federal interest in mass transit research and development, which will support the production of better transit vehicles and components and foster transit industry adaptability to current demands;
- Fosters connections between bus, rapid rail, light rail, and commuter rail and inter-city services by airplane, bus and train; and
- Ensures that FTA emphasizes mutual respect among its employees and maximizes their contributions.

These objectives are played out in eight "Vision Strategies":

- Maximize security and safety of transit systems for service users
- Foster customer-oriented public transportation
- Foster industry adaptability to enable the industry to respond to changes in transportation patterns, technologies, and needs
- Maximize a multimodal approach to transportation
- Ensure a quality organization that emphasizes mutual respect
- Ensure highest level of transit service assistance delivery
- Promote linkages between transit needs and community needs
- Foster a positive image for public transportation and FTA

Goals Set

Each Vision Strategy includes a statement of rationale, several goals, and activities for achieving the goals. The principal goals under the five Vision Strategies most directly related to infrastructure are:

Maximize Security and Safety of Transit Systems for Service Users

Goal 2: Improve operational safety.

Goal 3: Develop and demonstrate new and innovative security and safety technologies.

Foster Customer Oriented Public Transportation

Goal 1: Emphasize improved transit services for minorities and transit-dependent persons living in economically distressed communities.

Goal 2: Make transit systems easier to use and more reliable to the customer.

Goal 3: Support development of full-service transit systems that have the ability to meet a variety of customer needs.

Maximize a Multimodal Approach to Transportation

Goal 1: Lead the development of seamless transportation systems that provide options and ensure convenient linkages between modes

for all persons in all communities, combined with a public awareness of those transportation choices through easily accessible integrated information.

Goal 2: Promote a collaborative process among federal, state, local, and other organizations (public and private) which provides a greater variety of choices in the transportation of people and goods.

Goal 3: Identify and address community and individual transportation needs through intermodalism.

Ensure Highest Level of Transit Service Assistance Delivery

Goal 1: Provide improved technical assistance to FTA grantees.

Goal 2: Provide stable and reliable sources of funds for improved service.

Goal 3 Improve ongoing program evaluation to increase effectiveness of the FTA program in supporting and improving public transportation and mobility.

Goal 4: Streamline the grant delivery process and provide improved program management to FTA grantees.

Promote Linkages between Transit Needs and Community Needs

Goal 1: Promote the development of transit facilities and services that meet the needs of communities, which are linked to land use planning and design that encourages pedestrian/bicycle access.

Goal 2: Link transit and environmental planning to enhance environmental preservation.

Goal 3: Promote a participatory planning and design process that stresses community involvement.

Many of the intergovernmental infrastructure goals are either inputs or outputs. Several refer to changes within FTA (e.g., improve program evaluation, and streamline the grant delivery process), and others refer to services that FTA will provide for its program partners (e.g., provide improved technical assistance and stable, reliable sources of funds).

Some outcome-oriented intergovernmental infrastructure goals are included in the strategic plan (e.g., make transit systems easier to use and more reliable, meet the needs of the communities, and enhance preservation).

Performance Measures

All of the goals are coupled with a list of activities and the target-completion dates. The timelines are used to establish budgeting priorities for the future years.

The activities and achievement schedules for transit safety goals are presented in the exhibit to illustrate the management approach being used.

FTA is required to report regularly to the Congress on the condition and performance of the nation's transit systems. The 1995 report, *Status of the Nation's Surface Transportation System: Conditions and Performance,* combined by DOT with the status report on the nation's highways, bridges, and maritime systems describes the transit systems' condition, performance, and physical characteristics, as well as financing and investment requirements.

Condition

- The nation's bus and paratransit fleets are older, on average, than the normally expected useful lives of those vehicles, creating a backlog of over-age vehicles that need to be replaced.
- For rail transit, the conditions of maintenance facilities, stations, bridges, and rail cars have improved over the past decade, but many still are substandard.

Performance

- Transit train speeds improved about 10 percent since 1984.
- Transfer and waiting times for over half of all transit rides are 5 minutes or less, and 10 minutes or less for about 80 percent of the riders.
- 29 percent of transit trips involve standing for at least part of the trip.
- Total trip times were 10 minutes or less for about 25 percent of riders, and one-half hour or less for 76 percent of riders.

Improvement Needs (Federal, State, Local, and Private Sources)

- $7.9 billion per year to maintain existing conditions and performance.
- $12.9 billion to improve transit systems to eliminate substandard conditions and increase speed, comfort, and convenience.

FTA FY 1995 STRATEGIC PLAN QUARTERLY TRACKING REPORT

INITIATIVE	OFC.	STATUS'	PLND COMP. DATE
1. MAXIMIZE SECURITY AND SAFETY OF TRANSIT SYSTEMS FOR SERVICE USERS			
1.1 Improve personal security.			
1.1.a. Conduct FTA-sponsored roundtable on security. **Project: Invite select transit general managers & chiefs of police for a discussion of issues and solutions.**	TRI	Grant signed and mailed to SEPTA 9/21/94. Roundtable tentatively scheduled for January, 1995.	9/95
1.1.b. Increase security awareness training programs. **Project: Provide for additional security awareness training programs.**	TRI	Grant with Long Island Railroad and John Jay College is being processed. Anti-terrorism program is scheduled for FY 1996.	Multi
1.1.c. Require planning & implementation of system security programs. **Project: Provide research on various aspects of security, gather security information, do security audits, & provide security guidelines. SSO/system security plans will be required as part of system safety program plans.**	TRI	Ongoing and will continue through FY 1995 and FY 1996.	Sept/94 (fixed rail) Sept/95 (others)
1.2 Improve Operational Safety			
1.2.a. Require development & implementation of system safety program plans. **Project: Provide support in drug & alcohol, state safety oversight, fire life safety, risk assessment, alternative fuels safety, & the subway environmental model.**	TRI	Ongoing & will continue thru FY 95 & FY 96	9/94- fixed rail 9/95 others
1.2.b. Increase safety awareness training programs **Project: Includes Transit Safety Institute training, reasonable suspicion training module, drug and alcohol outreach substance abuse management course and alternative fuels safety**	TRI	Work on reasonable suspicion training module scheduled to begin shortly. Other activities are ongoing and occur in each fiscal year.	Ongoing
1.2.c Conduct FTA sponsored roundtable on safety. **Project: Sponsor a roundtable on safety**	TRI	Scheduled for FY 1996	Sept. 95

Exhibit

FTA FY 1995 STRATEGIC PLAN QUARTERLY TRACKING REPORT

INITIATIVE	OFC.	STATUS[1]	PLND COMP. DATE
1.3 Develop & demonstrate new, innovative safety & security technologies.			
1.3.a. Provide R&D funding to improve safety & security for the riding public. **Project: Includes a conference on building a lead-safe future, innovative security techniques demonstration, light rail crossing gates for left-turn lanes, demonstration of high-pay-off security techniques, operational test of hi-tech security system, & documentation & modeling hazards of indoor release of gaseous vehicle fuels.**	TRI	The lead-safe future conference was held in the summer of 1994.	Multiple
1.3.b. Establish a clearinghouse for safety and security technology transfer. **Project: Includes the safety and security clearinghouse, the information bulletin board, and security enhancements to the bulletin board.**	TRI	These activities are ongoing and will continue through FY 1995.	Ongoing
1.4 Improve emergency management planning 1.4.a. Require grantees to develop emergency plans & training. **Project: FTA will survey existing transit emergency management plans & conduct an analysis of state-of-the-practice. Based on the results, model emergency plans and related training modules will be developed.**	TRI	The survey will be done in FY95. The plans & related training will not begin until FY96	9/94 (fixed rail) 9/95 (others)

Economic Development Administration

Mission

"EDA's mission is to act as a catalyst to assist distressed communities in achieving their long-term competitive economic potential through strategic investment of resources." (Economic Development Administration, *Our Vision and Strategic Plan*, May 8, 1995, p. II-3)

EDA works through local Economic Development Districts, local governments, and nonprofit organizations in rural and metropolitan areas.

Strategic Planning Process

EDA was established by law in 1965. It funds and helps to build a network of local economic development institutions that do planning, community consensus building, small business financing at the local level, and assistance to local governments in meeting public infrastructure needs that induce private investment and economic development. EDA has a long history of promoting long-range programmatic planning by its clients.

For the first time in over a decade, EDA has the support of the Administration, and it has developed a strategic plan to reformulate its traditional programs into a new set of program initiatives geared to today's conditions:

- Growing internationalization of economic markets;
- Needs for post-disaster economic recovery;
- Accelerating pace of military base closings; and
- Rising economic adjustment needs resulting from downsizing defense industries and the restructuring other economic enterprises.

EDA's strategic plan is the product of "the collective thinking of EDA's management and staff as of April 28, 1995." Plans have been laid to involve EDA's stakeholders in this process and to determine customer needs and opinions.

EDA's strategic plan envisions that the agency "will become and be recognized as the national leader in economic development." EDA sees economic development as distinct from but complementary to the community development responsibilities pursued by other federal agencies. EDA sees itself as the "thought leader" in the field of economic development, and it intends to "disseminate new ideas and 'best practices' to customers and other economic development practitioners, while helping coordinate federal economic development efforts."

EDA's strategic plan links together the agency's vision, mission, goals, programmatic initiatives, milestones, and performance measures.

Goals Set

EDA's strategic plan establishes goals for:

- **Capacity Building** to enhance the effectiveness of local economic development institutions, including more than 355 economic development districts, EDA's university centers for technical assistance, revolving loan funds for business development, and trade adjustment assistance centers. (Input)
- **Infrastructure Development** through long-term planning, financial assistance to communities to build infrastructure that supports economic expansion and competitive economies, and leveraging of federal funds with other investment. (Output)
- **Economic Adjustment** tools that provide flexible assistance to communities and businesses "to recruit and develop high-growth, export-oriented industries that will create long-term, high-skill, high-wage jobs" in areas with "economic adjustment needs arising from natural disasters, defense downsizing decisions, and the gap in the availability of capital for economic development infrastructure and business investment in distressed communities." (Outcome)

These programmatic goals are in addition to a number of internal management improvement and process reengineering goals and initiatives, which are not discussed here.

Within the **Infrastructure Development** program area, the strategic plan lays out the following purposes, key program elements, priority objectives, and milestones:

Purpose: to incorporate infrastructure development initiatives in broader economic development plans for (1) national economic growth and job creation and (2) local economic benefits.

Key Program Elements: grants for public works, defense adjustment, and economic adjustment/post-disaster economic recovery.

Priority Objectives: create (1) asset base in communities that will attract new and retain existing investment and (2) assets that will maintain and add to the local tax base.

Selected Milestones: (1) Issue policy guidance for FY 1995. (2) Simplify application forms for FY 1995 grants. (3) Hold a National Economic Development Conference.

Performance Measures

Six general performance measures are specified for the **Infrastructure Development** program area. Four of them are outcomes:

- Jobs created and retained
- Private investments stimulated
- Increased standard of living for area residents
- Increased local tax base

The other two performance measures include one input measure (amount of local and state funds leveraged) and one output measure (quantity of projects that support technology development, minority development, and trade development).

The following are examples of performance measures in the process-reengineering field:

- Application processing time (Output)
- Customer satisfaction (Outcome)
- EDA staff productivity (Input/Output)

None of the performance measures in EDA's plan are specified in quantitative terms or associated with annual targets.

ENVIRONMENTAL PROTECTION AGENCY

Mission

In general, the Environmental Protection Agency (EPA) sees its mission as providing "strong public health and environmental protection by developing a system where the states and U.S. EPA work together for continuous gains in environmental quality and productivity." More specifically, EPA is driven by goals in 13 laws it administers. The following eight of those laws may affect infrastructure:

1. *The Pollution Prevention Act* provides that pollution be prevented, reduced, recycled, treated, and disposed of in an environmentally safe manner.
2. *The Clean Air Act* requires deadlines for meeting specified air quality standards.
3. *The Clean Water Act* requires restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters.
4. *The Ocean Dumping Act* prevents or strictly limits dumping into ocean waters any material which would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities.
5. *The Safe Drinking Water Act* regulates public water systems and underground injection of water to protect underground sources of drinking water.
6. *The Solid Waste Disposal Act* and *Resource Conservation and Recovery Act* require eliminating hazardous wastes. Wastes that are generated should be treated, stored, or disposed of so as to minimize the present and future threat to human health and the environment.
7. *The Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)* provides for cleanup of hazardous substances released into the environment, and cleanup on inactive hazardous waste disposal sites.
8. *The National Environmental Policy Act* requires that decisions about all federal plans, functions, programs, and resources be made only after full consideration of needs for protecting the environment.

Strategic Planning Process

EPA has a considerable history of strategic planning, supported by scientific research and data gathering. In 1994, the agency began a new strategic planning process, and in July of that year it published for public review and discussion a document entitled *Setting National Goals for Environmental Protection.* EPA noted that its programs were driven more by regulatory action requirements than by environmental results requirements and proposed that, "Measurable condition-of-the-environment goals will help provide a focus for planning and evaluating the Agency's actions."

About a year later, after extensive dialogue with senior state officials, EPA signed an agreement with representatives of the states to create a National Performance Partnership System in which the states will serve as the primary front-line delivery agents:

- Managing their own programs;
- Adapting to local conditions; and
- Testing new approaches for delivering more environmental protection for less cost.

The federal government will:

- Ensure good science and strong national health and environmental standards:
- Provide analysis of environmental and compliance trends:
- Provide expertise to and facilitate learning among the states;
- Work in collaborative and more flexible partnership with states;
- Address interstate issues; and
- Serve as a backstop to ensure that all states provide fundamental public health and environmental protection.

This new partnership will feature:

- Joint federal/state planning and priority setting;
- Increased use of environmental goals, priorities, and indicators of environmental conditions and prior year's achievements; and
- EPA oversight of each state, based on a negotiated agreement tailored to the needs and priorities of each state.

An important next step in developing this strategic plan is to involve a broader range of stakeholders in refining the new system. Federal fiscal year 1996 will be a transition time for the states to join this partnership "in a manner that is best suited to its programs' performance and needs."

Goals Set

Specific environmental goals will be set in the annual agreements negotiated with each state, consistent with the environmental laws administered by EPA and with the general principles enunciated by EPA in its 1994 draft goals statement, such as:

Integrated Focus on Ecosystem Protection: Human health and prosperity are, over the long-term, inseparably linked to the health and productivity of natural systems.

Environmental Justice in Program Implementation: Ensure that individuals and communities are treated equitably under environmental laws, policies, and regulations, and that benefits of environmental protection are shared by everyone.

Pollution Prevention: Strive to prevent pollution through market incentives and provision of useful information to producers, consumers, and communities.

Performance Measures

EPA's strategic plan does not yet contain quantified goals, performance indicators, or scheduled milestones. Nevertheless, great amounts of environmental data exist, some of it is being used to track environmental conditions, and considerable thought has been given to providing better data to inform environmental decisionmaking processes. For example:

- The annual reports of the Council on Environmental Quality have been reporting the condition of the nation's air, water, land, energy, and other environmental resources for 24 years. (See Exhibit 1 for an example.)
- Ambient water quality monitoring programs by federal, state, and local governments are receiving attention designed to improve coordination and effectiveness. (Intergovernmental Task Force on Monitoring Water Quality, *Ambient Water-Quality Monitoring in the United States*, December 1992)
- Ambient air quality monitoring programs are widespread.
- The National Biological Service in the Department of the Interior compiled vast quantities of ecosystem data from diverse sources. (*Our Living Resources: A Report to the Nation on the Distribution, Abundance, and Health of U.S. Plants, Animals, and Ecosystems*, 1995; see Exhibit 2 for the table of contents.)
- The White House Office of Environmental Policy has convened an interagency task force to develop a set of sustainable development indicators.
- EPA has been developing a conceptual framework for providing better data to environmental decisionmakers for at least the last two years. This framework relates the condition of the environment to the pressures (or stresses) that impact it, and to the mitigating forces that society marshals to protect the environment. ("A Conceptual Framework to Support Development and Use of Environmental Information in Decision-Making," April 1995; see Exhibit 3.)
- EPA's Office of Water is developing a set of 21 environmental indicators, some of which use data from the National Oceanic and Atmospheric Administration (NOAA) and share concepts with it. (NOAA, "Coastal Indicators Project," June 1995 Update)
- EPA is developing an Environmental Monitoring and Assessment Program (EMAP) to marshal data relevant to practical policy questions concerning the environment and efforts to assess and manage environmental risks. (*EMAP Program Guide*, October 1993 and *EMAP Assessment Framework*, February 1994) It will take several more years to fully implement this

system. See Exhibit 4 for the "Introduction" to the *Framework* document, which contrasts "stress" approach the "risk approach.

- The National Research Council of the National Academy of Sciences regularly provides peer review of EPA's EMAP program. (*Review of EPA's Environmental Monitoring and Assessment Program: Overall Evaluation*, 1995; see Exhibit 5.)

Although performance measures are not easy to develop, EPA appears to be well positioned to perform this task as part of the strategic planning process.

Exhibit 1

Environmental Quality

The Twenty-fourth Annual Report of the Council on Environmental Quality

PRINTED ON RECYCLED PAPER

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Our Living Resources

A Report to the Nation on the Distribution, Abundance, and Health of U.S. Plants, Animals, and Ecosystems

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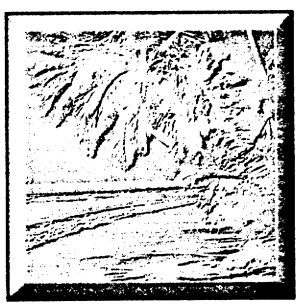


Ecoregions

Part 3 Special Issues

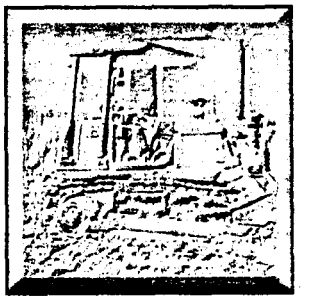


Exhibit 3

United States Environmental Protection Agency | Policy, Planning, and Evaluation (2163) | EPA 230-R-95-012 April 1995

A Conceptual Framework to Support Development and Use of Environmental Information in Decision-Making

Environmental Statistics and Information Division
Office of Policy, Planning, and Evaluation

A CONCEPTUAL FRAMEWORK TO SUPPORT DEVELOPMENT AND USE OF ENVIRONMENTAL INFORMATION IN DECISION-MAKING

Executive Summary

The Environmental Protection Agency and other government agencies spend millions of dollars each year on environmental data collection in the United States. As more monitoring programs and databases have been added over the years, it has become increasingly difficult to manage this vast array of information to the fullest advantage. The lack of coordination among some of these data and information-generating activities can result in unnecessary overlap, incompatible formats, or inconsistent quality controls – all of which make the resulting data or information less useful. These factors exacerbate the difficulty of making valid secondary uses of the information, as is increasingly necessary, due to budgetary constraints and the urgency of decision-making needs. This suggests a need for an integrated system of compatible geospatial and other data, summary statistics, indices, etc., which can facilitate secondary uses of environmental information for decision-making.

An increasingly widely-used framework for organizing environmental information is the Organization for Economic Cooperation and Development's *"pressure-state- response" (PSR)* model, in which human activities are seen as producing *pressures* (e.g., pollutant releases) which may affect the *state* of the environment, to which societies then *respond* if the resultant changes are perceived to be undesirable. This paper proposes a framework which builds on the PSR model, in the following ways:

(1) A derivative category called *"Effects"* is added, for attributed relationships between two or more Pressure, State, and/or Response variables, resulting in a "PSR/E" framework.

(2) Human driving forces of environmental change, and pressures of non-human origin are also included in the framework. Distinctions are made in terms of specific sub-categories in which the State of the environment can be measured, and the types of entities making Responses.

(3) Each sub-category is elaborated with a generic menu designed to facilitate linking environmental information collection efforts to common sets of environmental values, goals, and priorities.

(4) The framework is consistent with a hierarchical view of ecosystems, allowing for the spatial nesting of environmental information, compatible with community- or ecosystem-(place-) based approaches to environmental management.

(5) It is compatible with assessment-driven approaches to indicator selection (e.g., EMAP).

In the proposed framework, "Pressures" have been defined more broadly than by the OECD. First, we include factors of human and *non*-human origin, because of the growing synergy between the impacts of natural processes and anthropogenic forces on the environment. Second, pressures have been divided into three sub-categories: underlying, indirect, and direct

pressures. *Underlying* pressures include social and demographic forces, technological change, and policies that stimulate economic activities. *Indirect* pressures include human activities (mostly but not exclusively economic activities) intended to benefit human welfare, as well as some "natural" processes and forces, such as nutrient cycles, volcanic eruptions, earthquakes, and meteorological events and cycles. *Direct* pressures include actual biophysical stressors on the environment, such as pollutant releases, resource extraction, and exotic species introductions.

The "State" [of the Environment] category is organized to reflect the "spatial nesting" of ecosystems at *global, regional,* and *local* scales, with an additional sub-category for environment-related *human health and welfare.* Societal Responses are sub-divided by type of entity making the response: *governments, the private sector, households and individuals,* and *cooperative efforts.* Figure 3 (page 15) provides a diagrammatic summary of how the PSR/E framework is organized, with alternative schematics provided in Table 2 (page 16) and Appendix A (page 33).

Each Pressure, State, and Response sub-category is further elaborated with an illustrative menu of elements, provided in Appendix B. Within the State category, these elements are society's "valued environmental attributes" (VEAs) – the attributes of ecosystems, human health, and welfare that are considered by society to be important and potentially at risk from human activities and natural hazards (e.g., biological integrity, landscape hydrologic functions, human respiratory or neurological functions, the recreational/spiritual benefits of wilderness, etc.). Reaching agreement on an essential core set of ecological VEAs is one of the most critical needs in the framework development process.

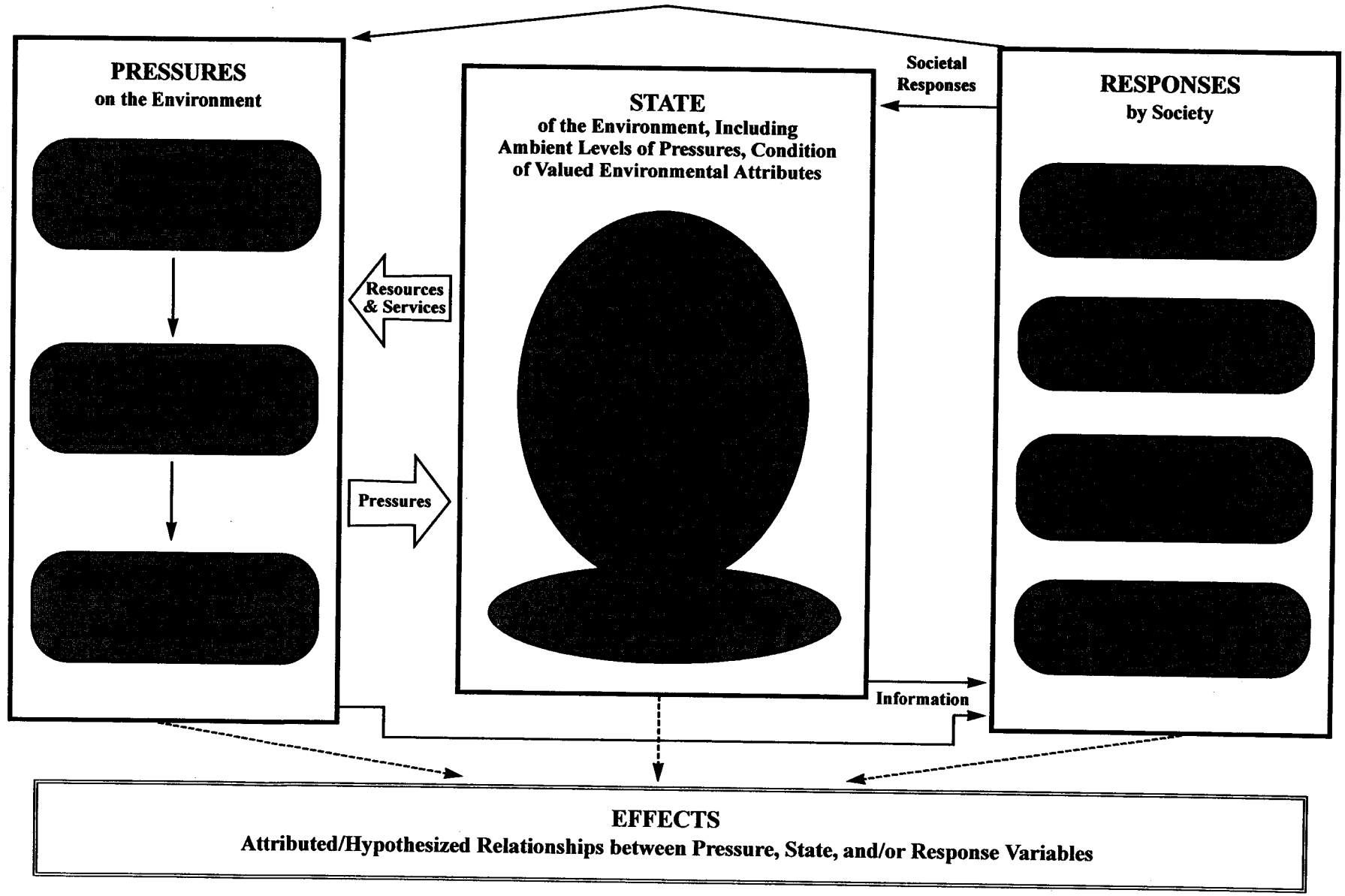
The approach proposed is consistent with emerging ecosystem or "community-based" approaches to environmental management, in which data are spatially-referenced, organized on the basis of ecologically-defined geographic units as well as administrative units. To make the framework operational, the generic menus of pressures, VEAs, and responses would need to be tailored to specific geographic units. Because an environmental information system cannot measure everything, priorities must be set – through a collaborative process with stakeholders – among the menu elements for different geographic areas and spatial scales. In addition, an ecosystem-based information system must take into account the multi-scaled nature of human-environment interactions, and permit local and regional environmental values, goals, and information needs to be *nested* and linked within national and international ones.

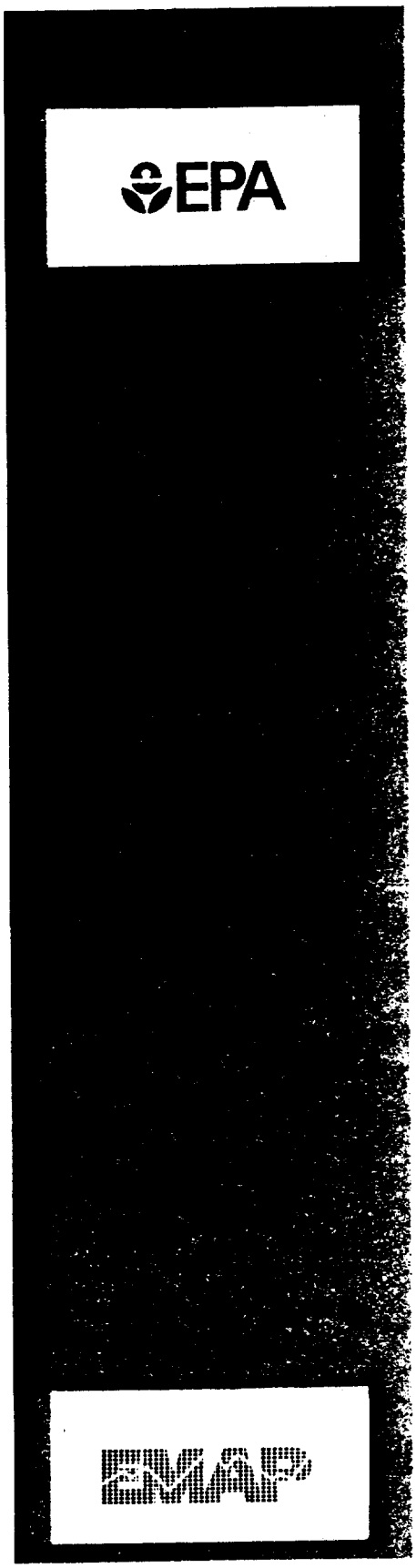
In the last section of the paper, indicator/data selection criteria and approaches for summarizing data for decision-makers (e.g., indices) are discussed. Indicators themselves should, however, be tailored to specific user needs, and are therefore not specified as part of this conceptual framework.

An environmental information framework is a tool, not a structure cast in stone. Its contents will evolve as our understanding of human-environment interactions improves and as society's environmental values evolve. Development of a framework would therefore need to be an iterative process, requiring collaboration among the numerous stakeholders in an information system, including EPA program and regional offices, states, the public, and other agencies that share environmental management responsibilities with EPA. Other programs and initiatives, including the Environmental Monitoring and Assessment Program (EMAP) and EPA's Environmental Goals Project, will also provide critical input to a framework for an environmental information system.

Figure 3

Pressure-State-Response/Effects (PSR/E) Framework





United States Environmental Protection Agency
Office of Research and Development Washington DC 20460
EPA/620/R-94/016 February 1994

Assessment Framework

Environmental Monitoring and Assessment Program

1 — Introduction

Purpose

This document presents a framework for conducting assessments in the Environmental Monitoring and Assessment Program (EMAP). The framework describes basic elements of the assessment process and provides a common foundation for conducting assessments within EMAP. Because of its general nature, the framework should be adaptable to a diverse set of assessment questions and needs. Consequently, this document is written to assist science administrators and resource managers in understanding the EMAP assessment process.

Assessment Defined

Assessment connotes different definitions and processes, depending on the discipline, agency, and audience (Table 1). Many Federal and State environmental assessments are based on legislative or regulatory requirements that dictate explicit purposes and approaches. In general, these assessments are site specific and range from addressing specific problems (e.g., the Comprehensive Environmental Responsibility, Compensation, and Liability Act [CERCLA] Natural Resources Damage Assessments) to broadly identifying or disclosing all potential environmental impacts (e.g., the

Table 1. Assessment definitions.

Source	Definition of Assessment
EMAP	**Assessment is the interpretation and evaluation of EMAP results for the purpose of answering policy-relevant questions about ecological resources including: (1) determination of the fraction of the population that meets a socially-defined value and/or (2) associations among indicators of ecological condition and stressors.**
NEPA (1969)	Assessment is the evaluation of the consequences of an action including short-term, long-term, direct, indirect, cumulative, and irreversible, irretrievable effects for the purposes of avoiding to the fullest extent practicable undesirable consequences for the environment.
Deuel and D'Aloia (1989)	Assessment is a comprehensive multifaceted investigation that includes data acquisition, evaluation, conclusions, and recommendations.
Streets (1989)	Assessment is the translation of scientific results into answers for policy-relevant questions and issues within a decision framework.
NAPAP (1991)	Assessment is an interdisciplinary activity wherein findings from diverse disciplines are coordinated to produce a better understanding of the cumulative impacts of a stressor (i.e., acidic deposition).
Webster (Ninth ed. 1991)	Assessment is the act of determining the importance, size and value of something.
Cowling (1992)	Assessment is a process by which scientific and technological evidence is marshalled for the purposes of predicting the outcomes of alternative courses of action.
Suter (1993)	Assessment is the combination of analysis with policy-related activities such as identification of issues and comparison of risks and benefits.

National Environmental Policy Act [NEPA] Environmental Assessments/Environmental Impact Statements). Just as users must understand the specific framework and elements of an environmental assessment, assessors must understand from the outset what the user needs from the assessment.

Regardless of the definition, requirements, or approaches of assessment, several features are common to almost every environmental assessment. First, there is a link with policy or regulatory questions and issues. Second, there is a value-added perspective to assessments, ranging from a formal, quantitative cost/benefit analysis of all alternatives to a qualitative improvement in our understanding of potential impacts or effects. Finally, assessments synthesize and interpret scientific information and present it in an understandable format for the intended audience. Over the past decade, environmental assessments have evolved from analyzing and comparing solely ecological effects from stressors to a wider consideration of the risks to human and ecological health associated with these stressors. A stressor is any physical, chemical, or biological entity or process that can induce adverse effects on individuals, populations, communities, or ecosystems (RAF 1992, xiv).

Risk assessment is defined as the process of assigning magnitudes and probabilities to the adverse effects of human activities or natural catastrophes (Suter 1993). Guidelines for conducting risk assessments on human health have been issued by the U.S. Environmental Protection Agency (EPA 1976, 1986) and are being revised continually. Ecological risk assessment, however, is just emerging as a process for comparing and evaluating the effects of multiple stressors on ecological resources.

EPA has embarked on a process to focus its efforts on the environmental problems that pose the greatest risks rather than those that receive the greatest public attention (Roberts 1990). This process involves conducting comparative ecological risk assessments so that the highest priority risks can be identified and addressed. The concept of comparative risk was initially proposed in *Unfinished Business: A Comparative Assessment of Environmental Problems* (EPA 1987), which indicated the greatest risks to the environment were not posed by site-specific problems such as toxic waste dump sites, but by regional and global scale problems (e.g., nonpoint source pollution, habitat alteration, loss of biodiversity, or global climate change). EPA's Science Advisory Board endorsed and expanded the call for comparative ecological risk assessment, recommending that EPA: 1) plan, implement, and sustain a long-term monitoring and research program; 2) report on the status and trends in environmental quality; 3) target its environmental protection efforts on the basis of opportunities for the greatest risk reduction; 4) improve the data and analytical methods that support the assessment, comparison, and reduction of different environmental risks; and 5) increase its efforts to integrate environmental considerations into broader aspects of public policy as fundamentally as economic considerations are included in policy analysis (SAB 1988, 1990). EPA has established a Risk Assessment Forum (EPA-RAF) that is charting a strategic direction and developing specific guidance for conducting ecological risk assessments. The *Framework for Ecological Risk Assessment* (RAF 1992) presents a basic structure and starting principles for conducting EPA's ecological risk assessments. The *Framework* initiates a process in which long-term guidelines for ecological risk assessment can be organized (RAF 1992).

Ecological Risk Assessment Framework

EPA defines ecological risk assessment as "the process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors" (RAF 1992, 37). A risk is not considered to exist unless (1) the identified stressor(s) has (have) the inherent ability to cause adverse ecological effect(s) and (2) the stressor co-occurs with or contacts an ecological component for a sufficient time and at sufficient intensity to elicit the identified effect(s). Ecological risk assessment may evaluate one or several stressors or ecological components.

In its *Framework*, EPA's Risk Assessment Forum describes a flexible structure for its ecological risk assessment with three sequential phases, namely, 1) **problem formulation**, 2) **analysis**, and 3) **risk characterization** (Figure 1).

> **Problem formulation** is a planning and scoping phase that links the regulatory or management goals to the risk assessment. It results in a conceptual model that identifies the environmental values to be protected (the assessment endpoints), the data needed, and the analyses to be used.
>
> The **Analysis** phase develops and links profiles of environmental exposure and profiles of ecological effects to stressors. "The exposure profile characterizes the ecosystems in which the stressor may occur as well as the biota that may be exposed. It also describes the magnitude and spatial/temporal pattern of exposure. The ecological effects profile summarizes data on the effects of the stressor and relates them to the assessment endpoints" (RAF 1992, xiv).
>
> "**Risk characterization** integrates the exposure and effects profiles" (RAF 1992, xiv). By comparing individual exposure and effects values, comparing the distributions of exposure and effects, or using simulation models, risks can be expressed either as qualitative or quantitative estimates. Results of risk characterization describe relations between the risks and social values or assessment endpoints; discuss ecological significance of the effects; estimate the overall confidence or uncertainty in the assessment; and suggest

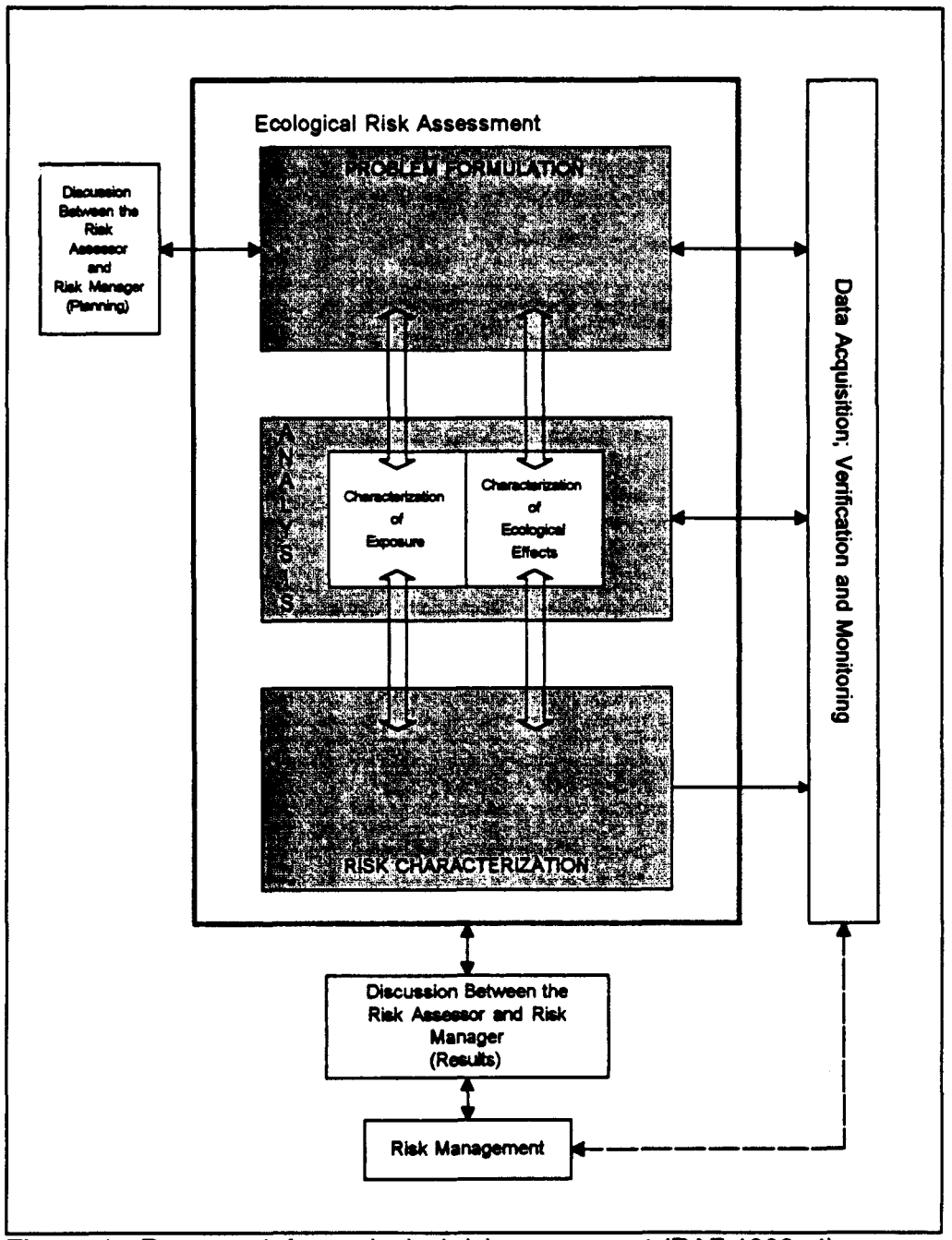


Figure 1. Framework for ecological risk assessment (RAF 1992, 4).

effective approaches for communicating these risks to the user and the risk manager.

EPA-RAF's *Framework* "also recognizes several additional activities that are integral to, but separate from, the risk assessment process" (RAF 1992, xv). First, early discussions between the risk assessor and the risk manager ensure that the assessment will provide information relevant to the decision making process, that the assessment addresses all relevant ecological concerns, and that the manager has a full and complete understanding of the conclusions, assumptions, limitations, and uncertainties associated with the assessment. Next, data acquisition, verification, and monitoring studies provide the information required for analysis, for validation of the results of a specific assessment and the overall *Framework* approach, and for improving the assessment process.

The general risk assessment paradigm (NRC 1983), the ecological risk assessment *Framework* (RAF 1992), and most of the procedures and tools developed for risk assessment are applicable for both retrospective and predictive assessments, but have been used primarily for predictive assessments (Suter 1993). Predictive assessments usually are stress-oriented, focusing on a particular stressor and then estimating future risks to the assessment endpoints (formal expressions of EMAP's condition indicators) from this stressor.

Other assessment approaches, such as epidemiological or effects-oriented assessments, begin with an observed effect and subsequently identify stressors that might have contributed to this effect; EMAP's assessment strategy follows this effects-oriented approach. EMAP's strategy complements the EPA-RAF *Framework* by contributing to problem formulation and providing corroborative information to the analysis and risk characterization phases.

Effects-Oriented Risk Assessment

The *Framework for Ecological Risk Assessment* (RAF 1992) discusses a broad approach for conducting ecological risk assessments, and it starts with a characterization of the stressor, then describes exposure pathways from the sources of the stressor to the associated ecological effects (Figure 2). While this approach is equally applicable for both predictive and retrospective analyses, it typically emphasizes prospective analyses using simulation models to predict exposure and stressor-effects profiles. Such predictive approaches are dependent upon cause-effect relationships between stressors and ecological effects.

A complementary approach to conducting ecological assessments is the strategy being developed in EMAP, a retrospective approach like that used in environmental epidemiology (NRC 1991) and the emerging area of ecosystem health (Costanza et al. 1992, Rapport 1992). Effects are observed rather than the stressors (Figure 2). Effects-oriented approaches emphasize association, weight of evidence, and process of elimination analyses to identify possible factors contributing to the observed ecological effects. Although epidemiologic methods can include predictive analyses, its initial emphasis—as well as EMAP's strategy—are based on retrospective analyses. Both these approaches—retrospective and predictive—were used in assessing the effects of acidic deposition on aquatic ecosystems in the National Acid Precipitation Program (NAPAP 1991), illustrating how these two approaches complement each other (Thornton 1993). Both approaches represent scientifically valid approaches for assessing ecological effects. In general, the predictive stress-oriented approach is used—and better understood—than the retrospective effects-oriented approach in conducting environmental assessments (Suter 1993). Effects-oriented strategies, however, will become increasingly important as

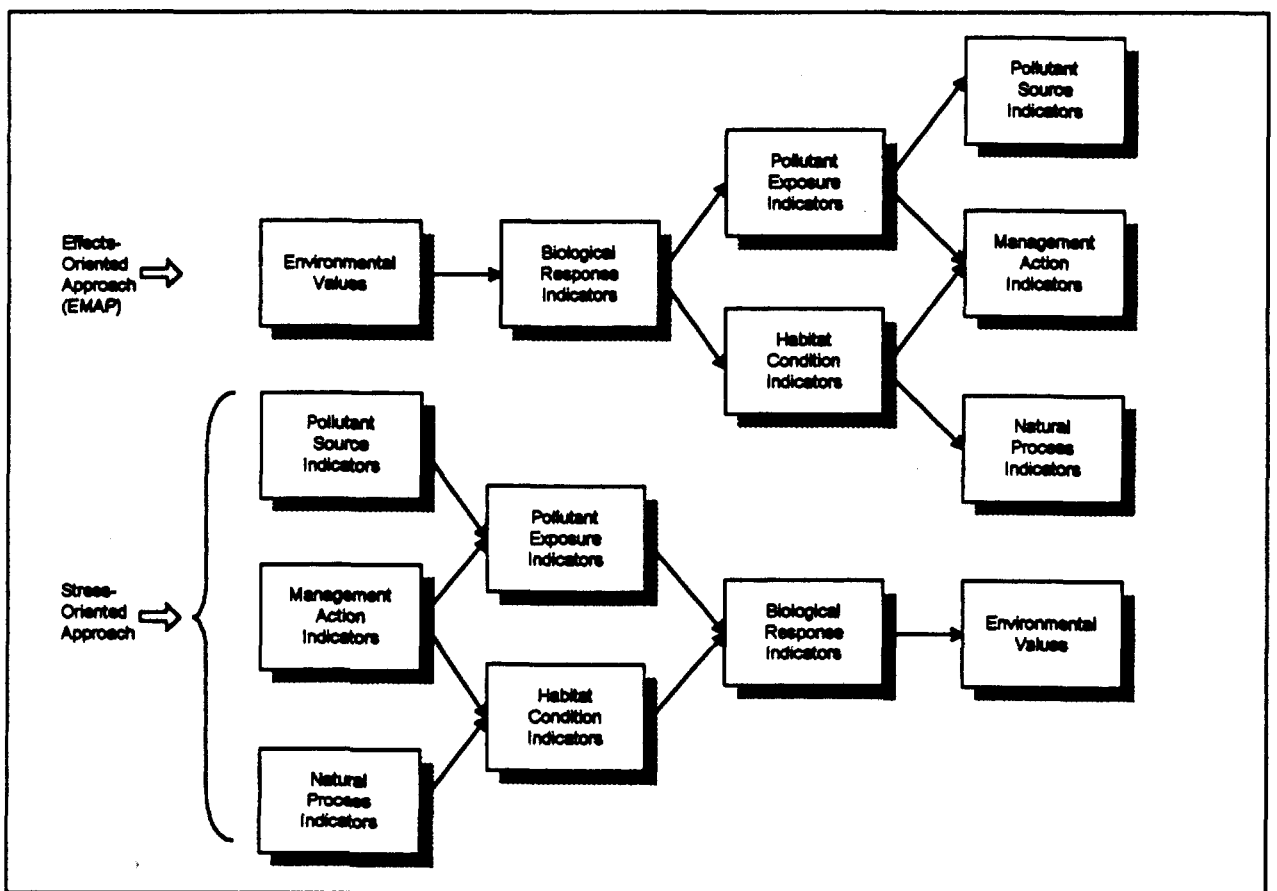


Figure 2. EMAP's effects-oriented strategy compared to a stressor-oriented approach for ecological assessments.

assessments of larger scale problems are conducted because it will become increasingly more difficult to establish specific cause-effect relationships between a stressor and an effect. Effects-oriented approaches can help eliminate possible stressors and pathways, and assist in identifying probable sources of stress and pathways for predictive ecological risk assessments. Comparing the characteristics of these two assessment approaches, a user can better understand how information from each approach contributes to ecological assessment (Table 2).

This document, EMAP's *Assessment Framework*, provides a broad outline of how EMAP contributes to ecological assessment and how it builds on the interrelationships of assessment, monitoring, and research studies being conducted in EMAP. The results of EMAP's assessment framework will complement studies being conducted in EPA's Risk Assessment Forum and elsewhere.

Table 2. Comparison of stress-oriented and effects-oriented risk assessment approaches.

Predictive, Stress-Oriented	Retrospective, Effects-Oriented
· Critical Questions	· Critical Questions
· Stressor/Problem Oriented	· Effects Oriented
· Individual Sites/Systems	· Target Populations
· Link Stressor to Possible Responses	· Link Condition to Possible Stressors
· Exposure Characterization	· Effect/Exposure Associations
· Stressor-Effect Characterization	· Effect/Stressor Associations
· *Prospective*/Retrospective	· *Retrospective*/Prospective
· Simulation Models/Causal Relationships	· Weight of Evidence/Process of Elimination
· Cause-Effect	· Association

Assessment Summary

Ecological risk assessment, clearly, is in its infancy. Currently, we do not have effective methods and programs, at regional and national scales, to monitor ecological conditions, measure and detect ecological trends, perform comparative ecological risk assessments, and effectively communicate the results to decision makers. EMAP is designed to contribute to the research and assessment activities of EPA's Risk Assessment Forum and provide essential monitoring information for comparative ecological risk assessments (Figure 3).

For example, EMAP assessments will contribute directly to the Problem Formulation phase of ecological risk assessment through activities focused on question formulation, resource characterization, and conceptual model development. In addition, EMAP can contribute to the Analysis and Risk Characterization phases by providing information which characterizes resource condition; analyses which examine associations among indicators of condition and stressors; data sets for model development, data verification or confirmation, and estimates of uncertainty. Because data acquisition and monitoring of the Nation's ecological resources is an integral part of EMAP, the Program serves a separate but extremely important role for EPA-RAF's ecological risk assessment program by providing quality assured data for performing large-scale risk assessments.

Document Organization

EMAP's *Assessment Framework*, describes the structure and strategy EMAP will use in ecological assessments.

The information in section 2 — **Environmental Monitoring and Assessment Program** explains the rationale for EMAP, its goal and objectives, program structure, and assessment products. Because EMAP's assessment framework is part of the process for achieving EMAP's goal and objectives, it is important for users of program information to understand what the program aims to accomplish and why.

Section 3 — **the Assessment Framework** explains the three phases for conducting assessments in EMAP: problem formulation, data analysis, and interpretation and communication. These phases emphasize (1) formulating and refining assessment questions and issues with EMAP users, (2) identifying indicators of condition, (3) developing conceptual models, (4) analyzing ecological resources data using effects-oriented strategies to answer the questions, and (5) interpreting and effectively communicating assessment results in a policy-relevant context for clients and other users.

The concluding section **4 — Evolving Program and Process** discusses the implementation of EMAP and the evolving assessment process.

A list of references and glossary of terms complete EMAP's *Assessment Framework.*

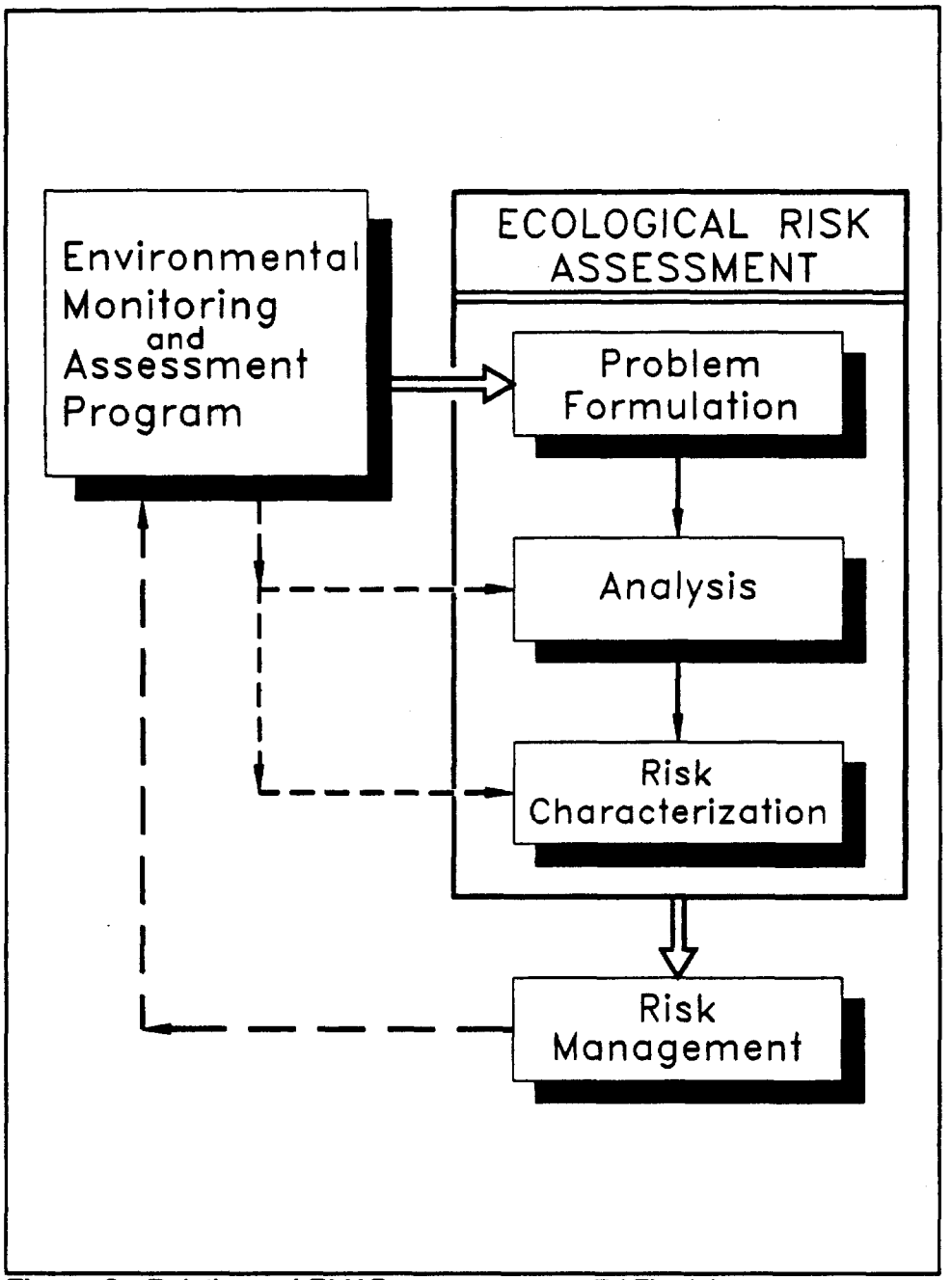


Figure 3. Relations of EMAP assessment to RAF's risk assessment framework. EMAP assessments contribute primarily to problem formulation, with more limited contributions to other phases.

Review of EPA's Environmental Monitoring and Assessment Program: Overall Evaluation

Committee to Review the EPA's Environmental Monitoring and Assessment Program

Board on Environmental Studies and Toxicology

Water Science and Technology Board

Commission on Life Sciences

Commission on Geosciences, Environment, and Resources

National Research Council
Washington, D.C. 1995

Executive Summary

EPA's Environmental Monitoring and Assessment Program (EMAP) was established to provide a comprehensive report card on the condition of the nation's ecological resources and to detect trends in the condition of those resources. At EPA's request, the National Research Council's Board on Environmental Studies and Toxicology and Water Science and Technology Board established the Committee to Review EPA's Environmental Monitoring and Assessment Program. This fourth and final report is the committee's overall evaluation of the program.

In 1988, the Science Advisory Board of the U.S. Environmental Protection Agency recommended that EPA "undertake research on techniques that can be used to help anticipate environmental problems," and that "an office be created within EPA for the purpose of evaluating environmental trends and assessing other predictors of potential environmental problems before they become acute".

Following the Science Advisory Board's advice, EPA established the Environmental Monitoring and Assessment Program (EMAP) "to monitor ecological status and trends, as well as to develop innovative methods to anticipate emerging environmental problems before they reach crisis proportions". In 1993 EMAP's stated goals were to:

1. Estimate the current status, trends, and changes in selected indicators of condition of the nation's ecological resources on a regional basis with known confidence.
2. Estimate the geographic coverage and extent of the nation's ecological resources with known confidence.
3. Seek associations between selected indicators of natural and human stresses and indicators of the condition of ecological resources.
4. Provide annual statistical summaries and periodic assessments of the nation's ecological resources.

As described by EPA, EMAP is unified by its approach to landscape characterization, the application of a coherent strategy for the choice and the development of indicators, and the use of a probability-based sampling approach that uses a hexagonal grid for identifying sampling sites. There are eight resource groups identified by the program: agroecosystems, arid (now rangeland) ecosystems, forests, the Great Lakes, estuaries, inland surface waters, wetlands (recently subsumed under surface waters and the Great Lakes), and landscape ecology. These resource groups are intended to represent ecosystem types or resources of national interest, and to provide a basis for incorporating ecological knowledge into the design of indicators and sampling programs.

The committee's reviews of other EMAP components such as forests and estuaries and surface waters were published as separate reports. The executive summaries of these reports are in Chapter 4.

After four years of review, the committee retains its belief that EMAP's goals are laudable. However, because achieving the goals of this ambitious program will require that EMAP successfully meet many difficult scientific, practical, and management challenges, the committee continues to question whether and how well all these goals can be achieved. This final report reiterates that general assessment.

As first conceived and presented to the committee in 1991, EMAP was significantly different than it is today. Several of its central features and components seem to have less importance in mid-1994 than they did in 1991. The reverse is also true: the resource groups have become much more important and are leading the program. One of the major strengths of EMAP as initially presented was that it planned to integrate information across regions and across resource types, but the nature and extent of that integration is still not clear.

Given the need for 10 years or more of data to sample regions and distinguish trends, nobody—including the members of this committee—can be certain whether, or how fully, EMAP will achieve its stated goals. This is to be expected for a large, ambitious, and novel program like EMAP. However, the program-wide concerns expressed in the committee's previous reports, in Chapter 2 of this report, and summarized below, are so important that EMAP will have little chance of achieving its goals if they are not addressed. Concerns revolve around the following issues.

- The EMAP sampling program may operate at too coarse a scale in space and time to detect meaningful changes in the condition of ecological resources.
- EMAP's success will be diminished if it does not develop reliable, scientifically defensible indicators for measuring change. The development of indicators of ecological health or integrity and of aesthetic quality appear to be particularly challenging.
- EMAP's success will be diminished if it does not select the right assessment end points (i.e., the end effect that is the goal of the monitoring program), something it has not done so far.
- EMAP's success will be diminished if the retrospective or prospective monitoring approach does not match the assessment needs and the needs of policymakers.
- EMAP needs to incorporate the best scientific advice in the design, implementation, and review of its program.
- EMAP has not yet fulfilled its promise of innovation and national comprehensiveness because the programs to integrate

information across space, time and resource types have not been developed. The most important of these are an indicator-development strategy, information management, and landscape characterization.

- EMAP's information management system must support efficient access to a large, distributed database and application of an appropriate range of information processing tools.
- Lack of continuity in staffing at EMAP has inhibited development of the program. EMAP cannot succeed unless the government (i.e., the administration and the Congress) makes a sufficient financial commitment to EMAP to support administrative and technical excellence, continuity, and efficiency in program management. That commitment is necessary for EMAP to succeed, but is not sufficient by itself.

A September 1994 letter from EMAP director Edward Martinko (Appendix A) describes EMAP's recent responses to earlier NRC reports and provides additional updates about the program. Many of the changes described appear to be in line with the earlier committee recommendations. EMAP has not provided more detailed documentation of these encouraging changes, so this report has not been substantially altered. However, recommendations in this report that deal with matters directly addressed by Dr. Martinko's letter are indicated with an asterisk.

RECOMMENDATIONS

Statistics, Sampling, and Design

- **EMAP should consider design changes that would increase the probability of detecting smaller-scale ecological changes.** Some possibilities include increasing revisitation rates at a subset of sample sites; inclusion of a set of nonrandomly selected sentinel sites with intensive data-collection, such as the Long Term Ecological Research (LTER)/Land Margin Ecosystems Research (LMER) networks; and stratified random sampling by ecoregion with data-quality objectives specified for strata. If EMAP does not adopt these design changes itself, then it should become extremely closely and explicitly coordinated with a program that has these features.

- **EMAP should consider further combining effects-oriented and stressor-oriented monitoring approaches.** Predictive, or stressor-oriented, monitoring seeks to detect the cause of an undesirable effect (a stressor) before the effect occurs or becomes serious. Retrospective, or effects-oriented, monitoring seeks to detect the effect after it has occurred. EMAP has relied mostly on the latter. Stressor-oriented monitoring will increase the probability of detecting meaningful ecological changes. As in the above point, if EMAP does not adopt these changes, it should become closely coordinated with a program that monitors in this way.
- **EMAP should undertake power analyses regarding the effectiveness of the sampling design for each resource group.*** A power analysis is an analysis of the statistical strength of an approach to detect change if a change exists. Different resource groups have adopted different sampling approaches. All the resource groups should adopt the practice of the EMAP lakes component, which has assigned teams of statisticians to assess the effectiveness of EMAP for that particular resource.
- **EMAP should reconsider its detection criterion of a 20 percent change over 10 years.** In some systems, such a large change is unlikely to occur in nature, while in other systems, a much smaller change would elicit concern. EMAP should also consider systems or indicators for which a change in the *variance*, rather than mean or median, is important.

*Recommendations marked with an asterisk are addressed in Dr. Martinko's 9/20/94 letter describing recent changes in EMAP.

Indicators

• **EMAP should initiate a major, focused research program on indicator development.*** Indicator development is at the heart of the EMAP program. Without a well-considered set of indicators for each resource group, EMAP will not fulfill its goal of presenting an evaluation of the nation's ecological resources. The difficulty and importance of indicator development requires EPA to attract the highest quality researchers in the environmental sciences to this program. The program should include a combination of internal research (by EMAP scientists) and external research involving open announcements of funding availability with peer-reviewed grants.

• **Each EMAP resource group should develop one or more *mechanistic* conceptual models of its resource, based on current scientific knowledge.*** These models should serve as explicit hypotheses about those aspects of ecosystem structure and functioning relevant to the assessment end points the group has chosen. The models must be detailed enough to include potential indicators, assessment end points, and key variables.

• **EMAP should provide program-wide guidance for numerous evaluation issues if the indicator-selection strategy is going to yield the nationally applicable set of indicators EMAP envisions.** The committee recommends as a high priority the explicit and early evaluation of the statistical properties of all potential indicators. Such evaluations should include analyses of the properties of the mean, variance, and behavior of the index in power tests. If this cannot be done analytically, then simulation analyses should be performed.

• **EMAP should carefully evaluate each potential indicator at incrementally larger spatial scales.** EMAP needs to make sure that it has information on the domains of usefulness of its indicators—at what spatial and temporal scales are they reliable, and at what scales are they less reliable? The ways in which the various resource groups deal with this problem will have important consequences for the selection of nationally implemented

indicator metrics. Program-wide strategies for dealing with this issue should be developed now, in time to be applied with some uniformity across the resource groups.

Integration

• **EMAP should develop key integration and assessment questions that cross resources.** This would help focus the program and significantly extend its value nationwide.

• **EMAP should designate resources for integration.** As EMAP now stands, there are relatively few financial or other resources directed specifically at integration. Such resources could be directed in various ways, but several important needs must be met. Individual resource programs directed at integration must have access to the information management system, and must have computer and software resources to generate and test generalizations. One approach would support a team of individuals who focus on developing and addressing the integration and assessment questions, and who either work together at one physical location or were coordinated among resource groups by a central office. Key members of this group must be participants of the Landscape Characterization, Landscape Ecology, and Indicator Development groups. The new Integration and Assessment Program is a positive step in this direction, but we do not have a good description of the activities of this program.

• **EMAP should develop coordinated sampling between terrestrial, aquatic, and atmospheric resources.**[1] Resources

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[1] *One committee member has been deeply concerned about the apparent lack of communication between senior administrators and possibly senior scientists, in the Air and Deposition Section of EMAP and those in major federal, state, and international agencies (e.g., Canada and Mexico) who are also heavily involved in ecological risk assessments and environmental protection. This* *(continued on p. 8)*

appearing to have very important ecological connections due to hydrologic linkages are now being sampled in separate locations. The design would be enhanced by a cooperative sampling scheme between resource groups in which lakes and streams were sampled in watersheds whose terrestrial systems (forests, agroecosystems, arid systems) also were being sampled. A stratified random system such as this would not compromise EMAP's ability to make regional-scale generalizations based on probability-based samples. The data sets would be considerably stronger because the spatial covariance of the data sets could be used to test hypotheses related to cause and effect relationships.

Possible examples include indicators reflecting net primary productivity, biological diversity, and aesthetic value. At present, it is unclear whether or not the assessment questions in each resource group are similar enough to lead to parallel sets of indicators. Such symmetry among resource groups, while not essential to basic EMAP objectives, would greatly enhance the scientific and analytical value of the data collected.

Appropriate Scale and Boundaries Of Regions

• **EMAP should choose ecologically meaningful units as the primary scale for summarizing and reporting data.** Ecologically meaningful units, such as Bailey's or Omernik's ecoregions, should be the primary objects of statistical analysis and data reporting rather than political units or EPA regions. In general,

member feels strongly that such inter- and indeed intra-agency interactions are essential for effective coordination of monitoring and assessment efforts involving the atmospheric transport, transformations, and deposition (as well as associated intermedia transport) of a wide range of hazardous gaseous and particulate air pollutants.

EMAP should reconsider the scale and boundaries of units for which the national program summarizes and reports data.

Coordination And Management

• **EMAP is unlikely to succeed unless EPA commits permanent, senior-level positions to the program, and recruits qualified people to fill them.** Commitment and continuity are crucial for the implementation of such an innovative national program. Too many important responsibilities in EMAP have been assigned to people on temporary Interagency Personnel Agreements (IPAs) or to contractors.

• **The committee recommends that EPA senior administrators facilitate close working relationships between EMAP and appropriate offices and divisions of EPA, including other research programs in the Office of Research and Development.** In particular, EMAP should continue in its efforts to develop close working relationships with the EPA Office of Water to capture the benefits of EPA's past experience in collecting data on surface waters. Continued reliance on the experience of such programs leverages EMAP's resources and brings complementary expertise to the program.

• **EMAP should develop and maintain an administrative structure that demands close communication and interaction among EMAP-LC (Landscape Characterization), EMAP-IM (Information Management), and each of the resource groups.** This structure could take several forms, such as locating lead personnel of each of these groups at a central office or some other mechanism that requires regular communication among these groups.

• **The committee recommends that EMAP continue its efforts to coordinate its activities with those of other agencies.** The Memorandum of Understanding, signed by National Biological Service director H. Ron Pulliam and EPA Office of Research and Development director Robert Huggett (MOU, September 30,

1994) is an excellent example of such coordination. The committee encourages further efforts with programs like the National Water Quality Assessment of the U.S. Geological Survey.

External Scientific Review

• **The current external review structure of EMAP should be modified so that its core is a permanent panel, with rotating membership, to provide continuity.** A permanent board of accomplished scientists may provide more expertise and consistency of viewpoint than EMAP has had access to heretofore. The panel should advise both at the level of resource groups, such as the forests or estuary resource level, and at the level of the entire EMAP program.

Information Management

• **While top-down planning for EMAP's information system is important, EMAP should base such planning on the viewpoint that the information system is a scientific database system, rather than an information system focused on the needs of management if the Information Management System is to function and facilitate integration among research groups as envisioned by EMAP.** In particular, the planning should focus on the design of an environment that is sensitive to user requirements and that provides excellent hardware, software, and support personnel.

FEDERAL EMERGENCY MANAGEMENT AGENCY

Mission

The Federal Emergency Management Agency's (FEMA) mission currently is stated as:

> To reduce the loss of life and property and to protect our institutions from all hazards by leading and supporting the Nation in a comprehensive, risk-based emergency management program of mitigation, preparedness, response, and recovery." (Federal Emergency Management Agency, *Partnership for a Safer Future*, December, 1994)

Since its creation under the *Disaster Relief Act of 1970*, FEMA has managed the federal government's efforts to assist states in responding to natural disasters. The characteristics of the emergency management program are defined as follows:

> **Mitigation:** Taking sustained actions to reduce or eliminate the risk or effects of disasters, by locating people and property away from, or protecting them to withstand, hazards.
>
> **Preparedness:** Getting ready to respond effectively to any hazard by making plans, training, exercising, and equipping ourselves.
>
> **Response:** Conducting emergency operations to save lives and property by positioning emergency equipment and supplies, moving people out of harm's way; providing food, water, shelter and medical care to those in need; and restoring critical public services.
>
> **Recovery:** Rebuilding communities so individuals, businesses and governments can function on their own, return to normal life, and protect against future hazards.

Strategic Planning

Throughout most of its history, FEMA focused its disaster response efforts on the relief and recovery aspects of its operations. Now it is apparent that a much more integrated approach to disaster management is required.

In 1993, FEMA reorganized and began a strategic planning process to facilitate this integrated approach. Although the strategic planning process is only two years old, FEMA's history of operational planning is as old as that of the agency. Because FEMA employs only 2,600 people, it has to mobilize much larger federal resources when it responds to a disaster. To achieve this end, it maintains Cooperative Agreements with more than 27 other federal agencies. These documents define the scope of each agency's responsibility and resources that each can provide.

The contents of all of these Cooperative Agreements have been combined into a document called "The Federal Response Plan (FRP)." The purpose of this document "is to facilitate the delivery of all types of Federal response assistance to States to help them deal with the consequences of significant disasters. The FRP outlines the planning assumptions, policies, concept of operations, organizational structures and specific assignments of responsibility to the departments and agencies in providing Federal response assistance to supplement the State and local response efforts." (FRP, April 1992, p. vii)

Based on the FRP, FEMA is actively expanding and integrating its mitigation and preparedness efforts. In this regard, FEMA is working with regions, states, and localities to develop partnership agreements. "These Performance Partnerships are joint efforts by Federal, state, and/or local governments to design programs and measure program results. Performance Partnerships strive to streamline the traditional Federal government grant system by providing increased flexibility on how a program is run, in exchange for increased accountability for results."

Goals Set

FEMA's strategic plan establishes six broad goals, five of which address aspects of intergovernmental infrastructure:

- Create an emergency management partnership with other federal agencies, state and local governments, volunteer organizations, and the private sector to better serve our customers.

- Establish, in concert with FEMA's partners, a national emergency management system that is comprehensive, risk-based, and all-hazards in approach.
- Make hazard mitigation the foundation of the national emergency management system.
- Provide a rapid and effective response to, and recovery from, disaster.
- Strengthen state and local emergency management.

Because each disaster is unique in terms of the damage that it causes, and because the needs of each state are unique, FEMA integrates the specific inputs and outputs needed to achieve its goals into its performance agreements with the states. This strategy allows FEMA to be sensitive to the needs of the states and the types of disasters that will occur in them, while facilitating a faster and more effective federal response to a disaster. (See Exhibit)

Performance Measures

There are no specific performance measures integrated into FEMA's strategic plan. Instead, those measures are being placed in the Performance Partnership agreements. One of FEMA's strategic goals is to establish Performance Partnerships with every state.

The outputs and inputs listed in the Performance Partnerships are generally measurable, much like the terms of a contract. The basic idea is that FEMA provides states with grants and training vouchers for improving and maintaining their emergency response capabilities within the guidelines of a performance partnership. The performance measures that are included are agreed on prior to the signing of the agreement, and both parties must concur on the amount of improvement that needs to be made and how progress is to be measured.

FEMA awards yearly grants to states that achieve certain objectives consistent with the goals listed in the Performance Agreements. For example, if a state is in a region that is prone to earthquakes, it might pursue retrofitting freeway overpasses in major cities to be more earthquake resistant. If a state is in a region that is prone to hurricanes, it might pursue moving a percentage of urban telephone lines underground. The types of activities that will be undertaken by any state are unique to the type of disaster that is most likely to occur there.

Exhibit

Goals, Objectives, and Activities (December 1994)

Goal 1: Create an emergency management partnership with other Federal agencies, State, and local governments, volunteer organizations, and the private sector to better serve our customers.

Objectives

- Establish mutually supportive relationships with our partners.
- Strengthen communications with and among our partners.
- Build business, industry, and labor into the partnership.
- Find creative ways to invest more resources in the partnership.
- Enhance our domestic partnership by sharing and exchanging emergency management information and technical assistance internationally.

Activities

- Build a collaborative framework for the development of policies and plans, design of training and exercises, construction of emergency operating systems, and provision of disaster assistance.
- Establish good customer-services practices in the partnership.
- Assist business, industry, and labor in developing their capabilities to protect employees and business operations in a disaster.
- Forge closer ties among emergency management professionals, elected officials, and first responders, such as firefighters, police, health and medical practitioners, and public works employees.
- Support the development of standards and improved training for emergency management professionals.

- Support the International Decade for Natural Disaster Reduction.

Goal 2: Establish, in concert with FEMA's partners, a national emergency management system that is comprehensive, risk-based, and all-hazards in approach.

Objectives

- Integrate hazard-specific programs and national security functions into a comprehensive, all-hazards approach.
- Streamline program delivery and funding systems to support an all-hazards approach.
- Prioritize the use of resources based upon risk assessments.
- Integrate hazard reduction policies and practices into the mainstream of government, business, and community activities throughout the nation.

Activities

- Identify commonalities and create linkages among hazard-specific programs and national security functions.
- Improve the use of risk analysis and Geographic Information Systems (GIS) to achieve all-hazards risk management decisions.
- Develop, with our partners, model all-hazard approaches to emergency management functions which can be shared (e.g., systems, legislation, standards, codes, and other tools).
- Develop and implement a marketing strategy for emergency management requirements and incentives.
- Develop economical ways to use commercial assets, such as satellite links or other technologies.

Goal 3: Make hazard mitigation the foundation of the national emergency management system.

Objectives

- Increase public awareness of risk and measures to reduce risk.
- Demonstrate leadership through the adoption and implementation of mitigation measures for the federal sector.
- Coordinate with other federal agencies to more effectively support mitigation in state and local jurisdictions, business, and industry.
- Institutionalize mitigation as part of all emergency management activities at the state and local level.
- Develop and apply state-of-the-art technology to maximize the use and cost-effectiveness of mitigation measures.
- Establish a sustained source of funds for hazard mitigation, both pre- and post-disaster.

Activities

- Work with our stakeholders to develop and implement a National Mitigation Strategy.
- Develop innovative ways to stimulate investment of resources in mitigation to reduce economic loss in disasters.
- Support development and implementation of state and local mitigation plans and priorities, and work with state and local governments to assist them in adopting and enforcing mitigation measures.
- Implement incentives for undertaking mitigation activities (e.g., participation in all-hazards mitigation zones and/or access to a mitigation fund).
- Complete statewide vulnerability assessments in all states, territories, and insular areas.
- Establish public awareness programs in order to develop grass roots support for mitigation.
- Provide technical support for communities to assist them in achieving a "better class rate" as property insurance companies implement rating systems.
- Develop a Mitigation Plan which coordinates available federal support for mitigation activities capitalize on mitigation opportunities during disaster response and recovery.
- Establish and train a cadre of mitigation professionals at the state and local level.

Goal 4: Provide a rapid and effective response to, and recovery from, disaster.

Objectives

- Reduce the high cost of disasters while improving the efficiency of providing short- and long-term relief.
- Strengthen coordination of federal resources in response and recovery.
- Improve the coordination between federal and state and local response operations.
- Promote all-hazards federal planning by strengthening and expanding the scope of the Federal Response Plan.
- Develop a national plan for response and recovery that combines governmental and private resources.

- Emphasize pre-disaster planning for recovery and mitigation.
- Improve internal FEMA systems and procedures for effective response and recovery operations.

Activities

- Review the criteria and process for the President declaring emergencies and disasters, and recommend improvements.
- Streamline processes and expedite delivery of assistance to disaster victims; develop customer service and program performance standards.
- Build a government/private sector rapid situation assessment capability to determine the needs of victims and assess damage.
- Expand outreach, community relations, and public information capabilities.
- Integrate response and recovery planning.
- Prepare position descriptions and qualifications, and develop and conduct in-depth training programs for temporary disaster employees.
- Train and exercise federal, state, and local and private sector emergency response personnel in joint operations.
- Expand the use of computer and communications technology to facilitate disaster operations.
- Develop mechanisms for expeditiously closing out disaster operations.
- Implement an agencywide electronic actions tracking system and improve follow-up on lessons learned.
- Ensure that agency personnel are sensitive and responsive to the equal rights concerns of diverse population groups in the delivery of service.

Goal 5: Strengthen state and local emergency management.

Objectives

- Provide leadership through development of model systems, performance measures, statutes, standards, codes, and strategies in collaboration with our partners.
- Increase flexibility of state and local emergency management agencies to develop their own programs and priorities based on their own risks.
- Increase the investment in state and local emergency management.

Activities

- Assist state and local governments in assessing the capabilities, and target resources accordingly.
- Modify the Comprehensive Cooperative Agreements with states to increase the flexibility and accountability in the use of grant funds, and reduce administrative burdens.
- Assist states in developing mutual aid agreements with adjacent states and the private sector, and in creating state disaster funds and programs to reduce the need for federal assistance.
- Develop a creative financing strategy to increase investment in state and local emergency management.
- Enhance the skill level and professional development of state and local emergency managers through expanded training exercises.
- Develop effective ways to assist state and local emergency managers in educating the public on disaster mitigation and preparedness measures.
- Update and simplify FEMA guidance to state and local governments to reflect new policies and program directions.

RURAL UTILITIES SERVICE

Mission

The Rural Utilities Service (RUS) is the primary public works infrastructure agency within the U.S. Department of Agriculture (USDA). Its mission is to "serve a leading role in improving the quality of life in rural America by administering its electrification, telecommunications, and water and waste disposal programs in a service-oriented, forward-looking, and financially responsible manner." ("Annual Work Plan," February 1995)

RUS manages financial assistance programs. It works with local and state public utilities commissions to develop agreed-on performance standards or gain compliance with federal law through other means. It does not administer physical structures.

RUS is one of three reorganized units in the Rural Economic and Community Development (RECD) mission area, with Rural Housing and Community Development Service, and Rural Business and Cooperative Development Service. The draft mission statement for RECD is:

> The new vision of the Federal role in rural development should be to assist communities, based on inclusive development initiatives, to become more competitive in a world marketplace, through creating sustainable economic opportunities for all residents. Given limited resources, the Federal Government will have three priorities for its rural development efforts, including (1) reduction of long-term poverty in the approximately 500 poorest counties in the United States; (2) increased viability of rural communities in the declining, sparsely settled regions, such as the Great Plains; and (3) assistance for those parts of rural America experiencing short-term difficulty from the rapid structural change due to shifts in public policy, the international marketplace and natural disasters.

Strategic Planning Process

The RUS strategic planning effort is in its infancy. The annual work plan establishes agency and program mission and vision statements, goals and objectives, and a time line for certain tasks. Goals and objectives are established for one year in anticipation of a department strategic planning effort.

Unlike most other federal agencies, the RUS strategic planning effort is evolving from the ground up. RUS began by establishing missions, goals, and benchmarks for its individual programs, which will be worked into an agencywide strategic plan.

Goals Set

The goals developed for FY 1995 that concern intergovernmental infrastructure are:

Electric Program Goals and Objectives

- Construction Policies and Procedures
- Contracts for the Retail Sale of Electricity
- Control of Borrower Investments, Loans, and Guarantees
- Credit Worthiness and Credit Support of Power Supply Borrowers
- Exemption of RUS Operational Controls
- Long-Range Financial Forecasts of Electric Borrowers
- Operational Controls and Procedures Task Force
- Energy Resource Conservation Section 12 Deferments

Telecommunications Program Goals and Objectives

- Discuss with each borrower local access availability of Internet and other on-line services for rural subscribers.
- Promote implementation and expansion of the information superhighway in the service areas of the rural telecommunications borrowers.
- Encourage and facilitate participation by telecommunications borrowers in the rural expansion of the weather service's hazards warning system.

- Contact staff personnel of public utilities commissions of all states to review and discuss the state telecommunications modernization plan and develop a database of positions.
- Conduct two rural telecommunications symposia.
- Establish early warning all-hazards radio system in rural America, working with the National Atmospheric and Oceanic Administration, the Federal Communications Commission, and the Federal Emergency Management Agency.
- Distance Learning and Telemedicine—to improve delivery of grant program services and ensure equitable distribution of awards.

Water and Waste Disposal Program Goals and Objectives

- Focus agency resources on priority areas to serve the most needy customers.
- Engage in outreach activities and develop partnerships to assist unserved and underserved areas.
- Maintain and build agency responsiveness and customer success through program delivery.
- Improve RUS operations and performance to enhance the effectiveness of services provided to water and waste disposal customers.

Most of these goals and objectives are input and output oriented, focusing on the internal operations of the organization.

Performance Measures

In the Annual Work Plan, each of these goals is accompanied by one or several objectives or activities, and schedules for accomplishment. The plan, at present, does not specify quantified performance measures. However, goals and objectives for tracking data better are included.

Examples of scheduled accomplishments in the Water and Waste Disposal Program are listed in Exhibit 1.

In preparation for GPRA, a conceptual framework is being developed for rural development performance measures applicable to a broad range of USDA programs. (Dyntel Corporation, "Rural Development Performance Measures: Requirements Analysis," Prepared for U.S. Department of Agriculture, February 8, 1995) This work was performed by a consultant with assistance from a task force of RECD staff from national, state, and district offices, as well as representatives of OMB and USDA's Economic Research Service. Despite use of two management information systems—the Rural Community Facilities Tracking System (RCFTS) and the Resource Management System (RMS)—it was found that the available indicators fall short of data and analysis requirements.

The "potential outcome measures" developed for five USDA rural development program areas are percentages, ratios, trends, and changes in a variety of factors including:

Employment levels
Income levels
Community health indicators
Customer success factors
Availability and quality of services
Customer satisfaction
Quality indicators
Other factors

These measures of change are conceived as indicators of program success.

The five program areas covered are:

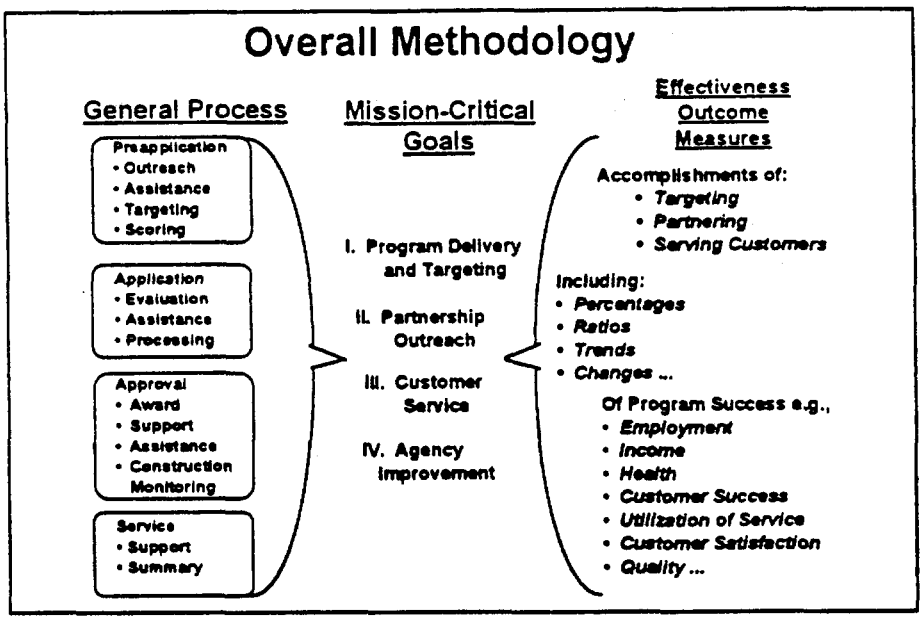
1. IRP—Intermediary Relending
2. B&I—Business and Industry Loan Guarantees
3. RBEG—Rural Business Enterprise Grant
4. WWD—Water and Waste Disposal
5. CF—Health Related Community Facilities

The overall framework links the program activities to program effectiveness (outcome) measures, through four mission-critical goals:

Program Delivery and Targeting
Partnership Outreach
Customer Service
Agency Improvement

These relationships are shown schematically in the following figure.

Exhibit 2 lists the potential outcome measures developed in the framework study for the Water and Waste Disposal (WWD) program.



Exhibit

Activity and Achievement Schedules

WATER AND WASTE DISPOSAL PROGRAM GOALS AND OBJECTIVES

Focus Agency Resources on Priority Areas to Serve the Most Needy Customers

Objectives

Identify priority areas. Identification process should be based on a comprehensive assessment of an area's needs and take into account communities that have persistent poverty, long-term population and job losses, trauma from natural disasters, basic structural change, or special needs that have not been adequately addressed, such as the Mississippi Delta region, Tribal Governments, Colonias, Empowerment Zones/Enterprise Communities, Appalachia, natural disasters, or the Pacific Northwest.

Apply additional WWD resources to identified needs of rural customers in target areas.

- Use at least 15 percent of financial resources in targeted areas.
- Utilize 100 percent of WWD funds set aside for national initiatives (Colonias, Pacific Northwest, EZ/EC, etc.)

Refer needy, low-income communities to WWD technical assistance providers such as Rural Community Assistance Program, National Rural Water Association (e.g., operation of water or sewer systems and for completion of applications for loan/grant programs).

Improve allocated fund utilization to better serve rural Americans.

- States are expected to utilize 100 percent of their FY 1995 allocation of loan and grant funds in each program to meet the WWD credit needs within their states.

Action Target Dates

January 1995: Utilize EZ/EC applications and designations to assist in identifying target areas.

April 15, 1995: Utilize pooling process to reallocate funds to targeted areas.

Engage in Outreach Activities and Develop Partnerships to Assist Unserved and Underserved Areas

Objectives

Provide program information to citizens, lenders, cooperatives, public bodies, tribal governments, and other interested groups and individuals.

- Produce a public information video.
- Update factsheets, pamphlets, and other written information materials.
- Participate in public information meetings at local, district, and state levels.

- Improve communication and cooperation through cooperatives to improve technical, education, and research services.

Action Target Dates

June 1995: Distribute video tapes to state offices.

July 1995: Complete update of written materials.

Ongoing: To actively increase all outreach activities.

Maintain and Build Agency Responsiveness and Customer Success through Program Delivery

Objectives

Analyze Customer Survey (1994) and develop action plans to improve performance in WWD customer service.

Assist customers in graduating to the private credit market where possible.

Service customer accounts promptly and carefully monitor payment schedules and collections to assure full utilization of all servicing tools.

Increase customer satisfaction through courteous, professional, and timely delivery of services encouraging growth of a proactive customer service attitude in the agency.

Conduct 10 program assistance/servicing visits during the fiscal year.

Prompt processing of loan and grant requests.

Action Target Dates

April 1995: Develop customer service action plan.

August 1995: Provide customer service training to all employees.

Improve RUS Operations and Performance to Enhance the Effectiveness of Services Provided to Water and Waste Disposal Customers

Objectives

Continue to support the National Rural Water Association Water Circuit Rider Technical Assistance Program.

Provide 7-10 Technical Assistance and Training (TAT) grants during FY 1995.

Provide 30-40 solid Waste Management (SWM) grants.

Continue to monitor FY 1994 TAT and SWM grantees.

Provide support to National Drinking Water Clearing House to provide technical assistance via the newsletter, etc.

Revise 1942-A regulations to incorporate provisions of *RUS Act of 1995*.

Action Target Dates

March 1995: Publish Final Rule on 1942-A revision to implement Solid Waste Security Changes.

September 1995: Achieve 22,000 technical assistance visits by water circuit riders during fiscal year.

September 1995: Achieve 20,000 technical assistance visits by wastewater technicians during fiscal year.

Exhibit

Potential Outcome Measures Developed for Department of Agriculture Rural Development Programs

APPENDIX A

POTENTIAL OUTCOME MEASURES

I. WWD - Mission Critical Goal: Program Delivery

Provide clean & safe water & waste disposal systems to targeted rural areas that have problems/needs.

Potential measures:

Target funds:

% of funds given to each target population category
% of funds used for projects in top 25% of priority score sheet
 # population served through WWD/#population in service area

Trends and/or % changes in availability of safe running water:

% households with safe running water (against goal)
 # violations (trends and/or % changes) (or % of borrower systems in non-compliance w/State)
 # violations - safe drinking act (SDA) rural areas/# in USA
% of systems financed and in compliance with SDA
Health measures directly related to the quality of drinking water (EPA or Public Health Standards)
Cost per 1,000 gallons of water for WWD/Cost per 1,000 gallons of water not for WWD

Trends and/or % changes in availability of safe/clean waste disposals:

% households with clean and safe systems (against goals)
 # violations (trends and/or % changes)
% of substandard systems in rural areas
% of financed systems that stay in compliance

Affordability trends for systems:

Avg $ construction cost/# users
$ monthly fees/# users (compared w/system standards)
Monthly fees as % of per household income (compared to standards and/or goals)

Viability of systems/borrowers success, include trends in:

% Payback success (of all loans in district, state and/or nation) & % non-losses
Trends in graduation (must be compared to trends in interest rates)
Total O&M costs/# of systems (trends in O&M costs by type and size of system)
% of systems that meet criteria for good maintenance (measure against criteria)
% of systems that do not break down and/or leak (e.g., per yr/5yrs/10 yrs)
% of systems where monthly fees do not increase
# of expanded systems/total # of new system (ratio of expansion Vs. new systems built)
% of systems still in operation in x number of years

Pollution measure: *Avg number of pollution related incidents per borrower (against goal)*

Technical assistance measure: *% savings from WWD technical assistance ?*
Need additional measures for technical assistance:

Secondary: *(problem: validity): economic development indicators,*
Trends in rural out-migration and population measures, changes in local tax base,
Impact assessment of construction phase (estimate job and income impact)
$ construction to local area/$ total construction costs
Trends or changes in insurance ratings

WWD - Program Delivery

II. WWD - Mission Critical Goal: Partnership Outreach

Partner with borrowers: *Create a win-win situation between communities - help them organize and work together to create more affordable water and increase likelihood of success.*

Potential measures:

Trends in Matching funds:

$ others (communities and organizations)/$ from WWD funds
$ loan/$ grants + loan
$ grants from others/$ WWD grants + loan
# of financial stakeholders/# of loans

Other Trends:

avg legal costs/$Million of WWD funds
avg engineering costs/$Million of WWD funds
# of communities involved/# of funded projects
$ debt service by type and size of system

III. WWD- Mission Critical Goal: Customer Service

Timeliness and other quality indicators, *such as friendliness and quality of assistance*

Potential measures

Timeliness:

% funds within targeted time
Timeliness of construction against target dates
Promptness in National Disaster situations (against standards and/or goals)

Customer surveys:

Timeliness, quality of assistance,
Friendly, professional, courteous, etc.

WWD - Partnership Outreach and Customer Service

Source: Dyntel Corporation, "Rural Development Performance Measures: Requirements Analysis," Appendix A, February 8, 1995.

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ACIR

The U.S. Advisory Commission on Intergovernmental Relations (ACIR) was created by the Congress in 1959 to monitor the operation of the American federal system and to recommend improvements.

ACIR is a permanent, independent, bipartisan commission composed of 26 members—nine representing the Congress and the Administration, four Governors and three State Legislators, four Mayors and three Elected County Officials, and three private citizens.

The President appoints twenty members—the private citizens and federal executive officers directly, and the state and local members from nominations by the National Governors' Association, National Conference of State Legislatures, National League of Cities, U.S. Conference of Mayors, and National Association of Counties. The U.S. Senators are appointed by the President of the Senate, and the Members of the House of Representatives by the Speaker of the House. Each Commission member serves a two-year term and may be reappointed.

As a continuing body, the Commission addresses specific issues and problems the resolution of which would produce improved cooperation among federal, state, and local governments and more effective functioning of the federal system. In addition to examining important functional and policy relationships, the Commission studies critical government finance issues.

One of the long-range efforts of the Commission has been to seek ways to improve federal, state, and local government practices and policies to achieve equitable allocation of resources, increased efficiency and equity, and better coordination and cooperation.