

A Memo on Measurement for Environmental Managers

Recommendation and Reference Manual

Environmental Compliance Consortium
Shelley Metzenbaum with Allison Watkins
and Adenike Adeyeye

First Edition September 2007
Support provided by the Joyce Foundation



This memo reflects the work, ideas, and lessons learned by ECC members over the last decade. The ECC is a consortium of state environmental agencies that work together to figure out better ways to measure and manage their programs, especially their compliance and enforcement programs.

The ECC is based at the **University of Maryland School of Public Policy** (Office of Executive Programs) with support from the **Environmental Law Institute**.

For more information, visit our website:

www.complianceconsortium.org

The ECC would like to thank the **Joyce Foundation** for its support of the ECC and of this project. This memo also builds on the work of the Harvard University Kennedy School of Government Executive Session on Public Sector Performance Management.

The ECC also thanks Industrial Economics, Incorporated, an environmental policy and economics consulting firm that supports federal, state, and local agencies in developing and measuring the results of innovative policy approaches, for providing in-kind support to produce and update this Memo. <http://www.indecon.com/>

TABLE OF CONTENTS

<u>Introduction</u>	1
<u>Goals</u>	3
<u>Power of a Goal</u>	3
<u>Goal-Setting Situations</u>	3
<u>Key Characteristics of Effective Goals</u>	4
<u>Goal Leaders and Goal Setters</u>	5
<u>Goals: Summary and Caveat</u>	5
<u>Measurement</u>	6
<u>Cautionary Considerations</u>	6
<u>Power of Measurement</u>	6
<u><i>Measurement communicates...</i></u>	6
<u><i>Measurement motivates...</i></u>	7
<u><i>Measurement illuminates...</i></u>	7
<u>Key Characteristics of Effective Measurement</u>	8
<u>What and When to Measure?</u>	9
<u>Measurement: Summary and Caveat</u>	12
<u>Use Them or Useless: Feedback & Interactive Inquiry</u>	13
<u>Communicate the Counts</u>	13
<u><i>External Communication</i></u>	13
<u><i>Internal Communication</i></u>	14
<u>Interactive Inquiry</u>	14
<u>Data Delivery</u>	15
<u>Summary</u>	15
<u>Analytical Hints: Data Presentation and Analysis</u>	16
<u>Use “Pictures” to Facilitate Review</u>	16
<u>Stories</u>	16
<u>“Slice and Dice” Data</u>	17
<u>What to Look For?</u>	17
<u>Compare, but with Care</u>	18
<u>Getting Accountability Expectations Right</u>	19

Appendix 1: Table of Examples

Appendix 2: Charles River Example

Appendix 3: Highlighted Reports and Resources

Appendix 4: State Legislative Language – Required Compliance and Enforcement Reporting

An on-line version of this memo, with appendices illustrating the concepts,
can be downloaded from <http://www.complianceconsortium.org>.

To: Environmental Agency Managers
From: Environmental Compliance Consortium
Re: Goals and Measurement: Powerful Performance Management
and Leadership Tools

Congratulations on your new management position. Have you thought about the three things you want to accomplish before you leave your new job? Perhaps there is just one. Or maybe five. This memo urges you to think about this question and to communicate your answer to your organization and the public by setting specific goals, then measuring and publicly reporting progress toward them. It will both strengthen agency accountability to the public and improve performance.

Whether you are new to your position or have been a manager for many years, this memo seeks to convince you that goals and measurement are among the most useful management tools available to you. They are more flexible and less time-constrained than budgets for influencing organizational direction and they reinforce other leadership tools such as persuasion. In addition, goals and measurement can be useful tools for you and your organization to use in communicating with those outside the organization (such as a governor, mayor, legislature, general public, regulated community, and environmental groups) – to enlist their assistance, invite ideas, clarify expectations, and debate priorities. Also, goals and measurement naturally inspire and motivate staff, especially when focused on environmental impacts and conditions.

This memo introduces you to the power of goals and measurement to improve environmental, health, and compliance conditions. It also discusses how goals and measurements can help improve the quality and speed of agency transactions, such as permit reviews and enforcement follow-up. In addition, it introduces two management practices essential to but often overlooked as a way to realize the full potential of goals and measurement: (1) frequently reviewing and analyzing performance data once collected to find problems and identify effective practices; and (2) discussing the data and the stories revealed through regular review and analysis with your team, the public, and regulated parties, not just reporting it in annual performance reports.

The memo also introduces one key caveat. Essential to tapping the performance-improving value of goals and measurement is getting accountability expectations right. Don't expect your team to meet every target or even to make progress all the time or in every location. Instead, hold managers accountable for the following **six essential practices**.

1. Outcome-emphasis and Use of Outcome-focused Targets
2. Measurement Mastery
3. Feedback
4. Interactive Inquiry to Stimulate Discovery and Learning
5. Cogent Strategies
6. Implementation

To avoid measurement manipulation and the use of timid targets, try to get others, including key elected officials and the media, to embrace these accountability expectations.

Goals and measurement are your power tools. Use them to inspire, assist, educate, and enlist assistance in order to improve performance, not to frighten.

The remainder of this memo is organized into five sections to help you harness the full power of goals and measurement to improve environmental, health, and compliance outcomes:

- I. Goals**
- II. Measurement**
- III. Use Them or Useless: Feedback and Interactive Inquiry**
- IV. Analytic Hints: Data Presentation and Analysis**
- V. Getting Accountability Expectations Right**

Each section describes key concepts to help you tap the power of goals and measurement.

Setting specific targets and reporting progress publicly can, of course, be risky. Targets can be missed and performance trends can worsen. Public data can be used in law suits or political campaigns. Why arm potential critics with ammunition? The answer is simple. Without specific goals to clarify objectives and without measurement to gauge progress, agency time and

CAUTIONARY CAVEATS

When people fear penalties for not meeting their targets, they tend to select timid targets they know they can meet and forego the innovation-stimulating power of stretch targets. They often choose as a target the number of activities they will carry out, rather than stretch to try to reach a target for improved environmental, health, and/or compliance conditions.

Goals inspire and measurement reveals what works and deserves replication and what does not that needs to be fixed. Don't base personnel or budget rewards and punishment on goal attainment or relative performance. Instead, hold people and organizational units accountable for the six essential practices discussed in this memo.

money are too easily spent trying to do more than you can reasonably do, implement questionably effective actions, and pursue less cost-effective approaches. Agencies that consistently and honestly report to the public on their goals, their measurement (progress and problems), strategies tried, and strategies intended win community confidence and trust, despite missed targets.

* * *

Underlined items in this Memo booklet are hyperlinked to a table of examples illustrating each concept in the on-line version of the Memo. The full on-line version, with hyperlinks to the examples in the appendices, is available at: www.complianceconsortium.org.

I. GOALS

Goals are a powerful management and leadership tool. Consider when President Kennedy set a goal of landing a man on the moon in a decade. He selected an obviously challenging goal. He made it specific – clarifying time (decade), place (the moon), and quantity (a man). You can use specific, challenging goals to inspire and focus your staff. Even without threat of penalty or promise of reward, Kennedy focused and motivated employees of the national space agency by setting an ambitious, but specific, goal, inviting them to apply their ingenuity to meet the goal.

Power of a Goal

Goals focus and communicate. Goals are a no-cost means for communicating organizational objectives broadly across and beyond an organization, a way to keep everyone focused on advancing key strategic priorities even while responding to never-ending queries and crises that emanate from the Administrator's, governor's or mayor's office; from Congress, the legislature or Council; from the media and elsewhere. Specific goals strengthen internal organizational alignment; they reduce confusion about organizational priorities and the possibility that different units will work toward different and even counter-productive purposes.

Talk about the goals in speeches, at management meetings, and with the governor, legislature, and media. Use them to stimulate healthy democratic debate.

Goals motivate. Cognitive psychologists have found that even without rewards, people tend to be energized by goals, especially those that are specific and challenging but realistic. Set a few stretch targets to realize the greatest motivational and innovation-stimulating potential of a goal. Whether self-set or set by others, goals motivate when challenging but realistic.

Goals enlist assistance. Goals implicitly invite those who can help advance agency priorities, both inside and outside the organization, to offer ideas and resources. Don't hesitate to make the invitation explicit and to create venues to tap ideas and assistance from those outside the agency or organizational unit.

Goals focused on outcomes can reduce regulatory resistance. Regulatory agencies can use outcome-focused goals to increase cooperation from regulated entities, especially in situations that affect the entity's reputation or well-being.

Goals support cooperation across organizational boundaries. Specific outcome-focused targets, especially when supported by data about why a target has been chosen and information about possible causal factors, can be a remarkably effective way to support intra- and inter-organizational cooperation.

Goal-Setting Situations

When You Know Your Priorities. If you already know your priorities, figure out how to articulate them as specific, challenging goals. Set targets. Think of goals as a wonderful shorthand language for concisely communicating your priorities broadly across and beyond your organization.

When You Have Not Yet Decided on Your Priorities. When you have not yet decided what your priorities are, invite the people in your organization or the public to propose specific targets or react to proposed priorities. Consider, discuss, and debate goals with the appropriate parties, including the elected executive and senior political appointees, the budget office, your management team, the public, the regulated community, the legislature, other government agencies, and others.

Some corporations use an approach they call "catch ball." Senior managers toss suggestions for specific targets to their management team and ask them to toss adjusted targets back, after considering implementation challenges and available resources.

Eventually, you will need to select and communicate your priorities. But, remember goals are never set in stone. They can be changed when new information becomes available or another problem becomes a priority.

When You Have Too Many Priorities. Environmental agencies have far more problems to tackle than funds to address them. Consider your legal obligations and environmental problems needing attention, then decide which issues to address first and which to set aside for future attention. You will inevitably have to adjust these on occasion, as when courts set new

GOALS COMMUNICATE STRATEGY

In 2006, the Minnesota PCA adopted a strategic plan that articulates specific quantitative and time targets that guide the work of the whole agency. The plan is only six pages long, summarized on one.

Agency strategy requires decisions both about what an agency will do, and what it will not do. Specific targets communicate agency strategy, and distinguish what is a priority from that which is not.

timetables. Use targets to communicate to the public how your agency will balance the trade-offs it faces and help the workforce understand where to focus its energies and what to put aside.

Use the relative ambitiousness of each target to communicate areas where significant growth is expected, modest growth is sought, steady state is acceptable, or slippage will be tolerated. Use time, quantity, population, place, and other key characteristics to specify targets.

Invite others to suggest alternate targets when they disagree with the agency's trade-off decisions. Encourage debate about appropriate targets as a natural, healthy aspect of democracy. By setting clear goals that explicitly take into account the availability of resources, agency leaders facilitate informed deliberation among the public and its elected representatives about the appropriateness of priorities and the balance among them, given available resources.

When You Need to Communicate Connections.

Use targets, mapping the linkages among them (often done using a logic model but also done through narrative describing strategies), to communicate how milestone and activity targets are expected to contribute to more ambitious, innovation-stimulating outcome-focused targets. Use targets and map the linkages among them to show how regional and local targets roll up to headquarter targets.

CASCADE DOWN AND ROLL BACK UP

The State of Virginia starts with a few high level statewide goals and cascades down to more numerous departmental goals. Natural, Cultural, and Historic Resources is one of seven general state areas of concern. Air quality, water quality, solid waste and recycling, and land preservation are monitored on a regular basis. Agencies in the Natural Resources secretariat share seven key objectives. In addition, each monitors its own more detailed list of outcome, activity, and process targets.

Key Characteristics of Effective Goals

For goals to focus, motivate, communicate, and ultimately improve the environment, they should be:

Outcome-focused. Outcome goals are those that deal with societal conditions, including health and environmental conditions. They energize agency staff far more than do activity targets, which essentially set production quotas. Environmental agencies that fail to set outcome-focused goals and instead set only activity or procedural goals often lose sight of their reason for existence.

**OUTCOME, ACTIVITY,
AND PROCESS TARGETS**

Outcome-focused goals include specific air and water quality targets for specific areas. Activity and procedural goals include inspection or permit renewal targets, project milestones, and response timeliness targets.

Outcome-focused targets also stimulate greater innovation than do activity targets. In fact, activity targets can interfere with innovation. When an organizational unit must carry out a specific number of specific activities in a specific time period and cannot adjust targets easily without layers of review, it impedes its ability to adopt more effective and cost-effective practices. Use process or activity targets to support and advance toward, but not substitute for, environmental and health targets, and allow activity targets to be adjusted easily when the evidence clearly identifies alternate practices likely to achieve better outcomes with available

resources.

In addition to energizing staff and stimulating innovation, well-framed outcome targets enlist external cooperation. The public is more likely to pay attention to agency targets they care about and understand.

Simple, resonant, understandable. To enlist and engage the public and experts from other parts of an organization, choose goals that engage people's interest and understanding. Few care about changes in BOD levels, but algae spreads, animal deformity, declining fish stocks, oil slicks, and the presence of Teflon in body tissue are likely to pique public interest. Whenever possible, select strategic priorities likely to catch public attention (e.g., a swimmable water body or reduced asthma incidents.) Support these internally with technical targets, such as BOD levels, or task milestones, such as permits renewed with more stringent limits, but keep the link between process or task targets and outcome targets explicit and prominent. Also, periodically confirm the validity of the relationship.

**OUTCOME GOAL ENLISTS ASSISTANCE AND
STIMULATES INNOVATION**

In 1998, the Alabama DEM set an *outcome-focused* goal: clean up the Flint River, newly placed on the state's 303(d) list of impaired waters. The goal was *understandable* (make the water safe for drinking, fish, and wildlife); *location-specific* (a 28-mile segment of the river was targeted); *ambitious but feasible* (water quality suffered from hard-to-control agricultural and urban runoff); and *public*. Use of an outcome-focused goal stimulated innovation and enlisted external assistance. The local news media helped with outreach efforts, volunteers significantly assisted in the stream cleanup, and local landowners agreed to try creative and challenging but feasible action.

Time, location, population specific. Specify time, place, industrial sector, or population to narrow a goal and make it manageable. It may be more reasonable to focus on reducing mercury levels 50 percent in three water bodies in ten years than in all state waters. Also, specify a target geographically to bring it alive for the public. People and their elected officials pay more attention to lead poisonings, hazardous spills, and water quality in their own neighborhoods than in the state or nation.

Ambitious but feasible. Ambitious targets spark the imagination and stimulate “out-of-the-box” thinking to accomplish a goal. When targets are too ambitious, however, they tend to discourage, so choose goals that are ambitious, but feasible.

Public. To engage the public and increase government’s accountability, articulate specific targets publicly. Announce and talk about them at events, in publications, and with the media to catch public attention.

Goal Leaders and Goal Setters

If goal attainment requires cooperation across or resources from other organizational units, designate a goal leader to coordinate work within and across organizational units. Support designated goal leaders by discussing priority goals at agency-wide meetings and reinforcing the importance of the goal and the need for everyone’s support for the goal leader. Alternatively, convene goal-focused meetings for each priority goal, making clear all potential contributing offices are expected to attend and contribute expertise and resources. At these meetings, explore progress made, problems encountered, strategy adjustments needed, and next steps.

Goals can be legislated, set by the executive, or negotiated with superiors, funders, or the public. The source of a goal is not as important as its intuitive and data-informed appeal.

Goals: Summary and Caveat

In sum, use outcome-oriented goals to focus, motivate, communicate, and ultimately improve environmental, health, and compliance conditions and to strengthen agency accountability and democracy. Use goals to enlist external assistance, encourage cooperation across organizational boundaries, and encourage discussion about strategy adjustments and priority trade-offs. Process and activity targets can be useful to improve organizational responsiveness and efficiency, but take care to align them to support the attainment of outcome-focused targets. There is little value in being more efficient when moving toward the wrong destination.

And remember: goals are just words if not used and paired with measurement, the topic of the next section.

II. MEASUREMENT

To bring goals alive, measurement is essential. Without measurement, goals are merely words. Think of measurement as an insight-generator. Measurement's greatest value derives from its usefulness in detection and diagnosis, its ability to reveal both effective interventions worth replicating and problems needing attention. Use measurement to inform priority-setting and daily decisions. Use measurement to find problems, assess their relative import, and search for preventable causal factors. Use it to identify effective interventions and ways to boost their adoption. Use it to communicate progress and problems to the public. Measurement is a powerful management and leadership tool that communicates, motivates, and illuminates. Use it or it is useless.

Cautionary Considerations

Measurement is often valued primarily as an accountability mechanism, a way to confirm target attainment and meet mandates for public reporting. Push for target attainment, but don't punish those who miss their targets unless they persistently don't try. Indeed, if all targets are met, the innovation-driving value of stretch targets has most likely been missed. Target attainment is not critical to accountable government. What is critical is the adoption of specific outcome-focused targets, the development of cogent strategies to meet them, measurement of progress toward them, and regular reporting to the public on goals, progress, and strategies. Also critical is regular use of the data to inform decisions. When that all happens, performance, efficiency, and accountability will all naturally rise.

Ignore arguments that measurement is too costly. The cost of measurement must be factored in as part of program design. Failure to measure can waste the full cost of the program itself, unless program design was based on prior evidence of program effectiveness. To tap the power of measurement, invest in information system upgrades. Hire or re-train staff to conduct analyses. Pay attention to timely reporting of inspection findings and standardize inspection checklists across inspectors and regions for the most important inspection items. Similarly standardize other measurement methods. In the long run, failure to make these investments and changes will compromise an agency's ability to tap the performance and accountability improving power of goals and measurement.

A long lag time between agency action and expected environmental effect can also complicate measurement, but is not a justification for not measuring. Measurement can provide early hints of success. It can also reveal unanticipated problems soon after new regulations, projects, and tools are adopted, allowing quick, cost-saving adjustments.

Power of Measurement

Measurement communicates...

Within an organization. Just as goals communicate, so does measurement. Measurement reinforces the message sent by a goal. Measurement says that a leader did not set goals simply to catch press attention or fulfill a strategic planning requirement. Reinforce that you are serious about organizational goals by frequently discussing what measurements say about progress toward priority targets, problems encountered, and strategies tried. When you don't, you signal that agency goals are not really important. Also, use measurement and questions about progress and problems to signal acceptance of goals set by someone else (including your predecessor.)

Across organizations. Measurement also supports cooperation across organizational units working on the same problem. It helps people working toward a common goal come together to analyze the evidence and their collective experience and, using that information, plan future action. Support this by clearly designating a goal leader, requiring cooperation from beyond the leader's own organization, and securing resources and in-kind assistance from multiple sources as needed.

To the public. When measurements are made public, government accountability increases. Talk openly to the public about areas where progress is being made and where problems remain. Invite ideas and assistance. Share data to inform democratic debate about agency priorities and targets.

From the public. A lack of adequate data often inhibits government's assessment of the relative importance of a problem and decisions about whether and how to deal with it. Use data generated by non-governmental parties if of adequate quality. NGO and private sector data can point to previously unrecognized problems, such as poor drinking water quality, and

EARLY RETURNS

Although it did not expect to see environmental effects from its incinerator rule for twenty years, Massachusetts began to see changes in fish tissue mercury levels within four. It would never have seen these early effects had it delayed measurement.

NON-STATE DATA USED WHEN STATE DATA UNAVAILABLE

Washington, Oregon, Virginia, and several other states use water quality data from sources other than the state, including universities and volunteer monitoring groups, when their data meet state data quality requirements.

inform specific government decisions, such as TMDL determinations. It can stimulate healthy discussion about whether government is paying attention to the right problems and has sufficient funds to study them.

Measurement motivates...

As with goals, cognitive psychologists have found that measurement can motivate even without reward because people like to do well. Use measurement to unleash internal inspiration among people in your organization personally committed to environmental improvement or just proud of doing a good job. Make it easy for them to use measurement to assess whether their actions are working and to adjust them when they are not.

Measurement functions as a form of feedback that motivates people. It reinforces the importance of a goal and managerial priorities. It helps an organization gauge how well prior actions worked and when adjustments are needed. Discuss data implications and interpretations with your organization to reinforce the importance of what is measured and the desire to make progress in those areas.

Measurement illuminates...

Measurement's greatest power comes from its ability to illuminate problems and promising solutions. Use measurement to identify problems that need attention and assess their relative seriousness. Use it to find factors that can be prevented or promoted to influence outcomes. Use it to find effective and cost-effective practices. Use it to find effective ways to promote their adoption.

Don't expect measurement to reveal problems and progress all the time. Often, it simply triggers focused follow-up questions leading to a better understanding of problems and their causes, leading eventually to more precisely crafted, often lower cost, solutions. Look for sudden or significant changes in direction or size, anomalies, clusters, and missed targets. Then examine why they are happening.

ILLUMINATE PROBLEMS AND SOLUTIONS

The CDC releases an annual report on human exposure to environmental chemicals, measuring chemical levels in people's blood or urine. The data help CDC *find problems* by counting the number of people with levels above known toxicity levels, and noting which are widespread or high enough to cause concern. The data help CDC *set priorities* for research on human health effects and *assess the effectiveness of efforts* to reduce exposure, by showing how exposure levels change over time.

To Find Problems. Measure to detect environmental, health, and compliance problems, as well as weaknesses in agency responsiveness. Use measurement to detect when and where problems exist. When problems are found, measure key characteristics such as the type of equipment, operator training, or time of day when the problem occurred. This will aid the search for preventable causal factors.

To Determine Relative Import. Build measurement systems that capture key characteristics of problems, not just their presence or absence, but frequency, magnitude and characteristics. Use that information, along with information about budget availability, spending flexibility, other problems needing attention, knowledge of effective interventions, and community values, to inform priority-setting.

To Find Effective Actions. Use measurement to detect promising environmental, health, and compliance trends and actions influencing those trends. Measurement can reveal when and where problems exist, but it can also point to promising interventions and confirm their effectiveness. Try new

interventions and measure their effect to determine if they warrant doing again.

When you find what seems like an effective practice, try it and measure its effect in a different location. If outcomes continue to move in a promising direction, keep going. When they don't, stop, ask questions, and adjust.

Variations in conditions or context, such as business size and weather conditions, can affect outcomes. Build measurement systems that allow you to segment analysis to distinguish these effects. For example, note rain conditions when measuring water and temperature when measuring air quality, then look at trends under each condition separately.

To Find Increasingly Cost-effective Approaches. Measurement can answer both effectiveness and cost-effectiveness questions. After effective interventions have been identified, search for comparably effective, less costly approaches. For example, numerous analyses have shown that inspections tend to increase compliance. When considering less costly approaches, such as partial inspections or self-certifications, measure to assess if they are comparably effective. Another way to increase program cost-effectiveness is to shift staff to more serious problems. Several states have shifted

COST-EFFECTIVE APPROACHES

Massachusetts shifted staff from reviewing wetland permits to enforcement activities after it discovered that wetlands loss at non-permitted sites (where construction work was being done illegally) overwhelmed loss at permitted sites. Previously, ninety percent of staff time had been devoted to permit reviews.

inspection staff from monitoring consistently compliant facilities to less-compliant or seldom inspected facilities or to non-regulated problems.

Note that this memo does not recommend the use of efficiency metrics, calculating cost-per-transaction or cost-per-unit of pollution-reduced. “Cost per” measures tend to work best when applied to similar transactions, but environmental agencies conduct few transactions similar enough in nature to warrant “cost-per” measurements, at least not with the current level of measurement sophistication. Since sharing findings with colleagues across media programs and with colleagues in other states is an important aspect of measurement, “cost per” measures are not the most effective way to determine cost-effective approaches. Even permits are highly varied in the environmental world. Before attempting “cost-per” calculations, ask first, “Are the activities we are implementing effective?” If the answer is yes, then ask the cost-effectiveness question, “Can we achieve the same beneficial effect for a lower cost?”

To Increase Adoption of Effective Actions. When effective agency interventions are found, replicate them. When others (industry, the public, government) need to adopt interventions, test and measure the effects of adoption campaigns. Adoption efforts can take many forms, including technical assistance, training, industry outreach, a campaign, well-publicized enforcement, or a combination of these tools. If possible, compare changes in environmental conditions, impacts, or behavioral practice where these interventions were adopted to changes where they were not. If conditions, impacts, and behavioral practices are hard to measure, at least measure awareness and understanding of environmental problems and compliance obligations, knowledge of solutions, and sales of pollution prevention/control equipment and services. (See “What and When to Measure,” below.)

To Predict in Order to Prevent and Prepare. Measure and analyze past conditions and events to find patterns that help predict unwanted environmental problems, either to prevent them or to prepare quick and effective treatment and recovery responses. Government has long built its capacity to measure and predict the weather. It can also use measurement to predict and prevent unwanted environmental incidents.

Key Characteristics of Effective Measurement

For measurement to communicate, motivate, and illuminate, it should be:

Outcome-focused. You will hear many logical reasons why outcome measures are not appropriate or obtainable for your organization. Listen carefully, but insist on the clarity of purpose outcome measurement reveals. If your agency only tracks activities without measuring current conditions and trends, organizational attention will naturally focus on the activities whether or not they are the most effective and cost-effective practices. Even when activities have been demonstrated to be effective, counting activities instead of outcomes gets an agency stuck in a rut doing what it has always done, constraining innovation. Share information and evidence about practices, but try hard to measure and share outcome information whenever possible to stay focused on them.

Fresh (current). The older the data, the harder it is to recall events, such as extreme weather events, power outages, supply shortages, or even a mini-flu epidemic, that might have caused performance variation. “Old” data complicate identification of possible causal factors, detection of recurring problems, and the effects of prevention and correction actions. Insist on fresh data and support their delivery with technology to make it easier for inspectors and others to supply and retrieve data when out of the office.

Geographically and temporally frequent. Data that are frequent, both in time and space, reveal variations that lead to the discovery of contributors to poor performance and ultimately, to their removal and prevention.

POWER OF FREQUENT DATA

Fresh, frequent data helped EPA find previously unknown pollution problems contaminating the Charles River in Boston. When a downstream monitoring point had a worse water quality reading than an upstream one, it naturally raised the question, “Why?” The search for an answer led EPA to the discovery of blocked sanitary sewer lines, clogged with grease balls, and illicit connections to municipal sewer systems. The freshness and frequency of the data also enabled EPA to get fast feedback on the effectiveness of the interventions it tried.

Credible and fact-based. Measurement has to be firmly rooted in reality to be perceived as credible by your agency and others. Treat measurement accuracy as essential and integral to good management. Take care, though, not to require perfect information. Match accuracy levels to intended use. Even imperfect data can reveal informative variation. Measurement to detect possible violators or system malfunctions, such as grease balls, need not be as accurate as measurement to win an enforcement case.

Audience-appropriate (multiple measures for multiple users). Present data so key audiences will pay attention to, use, and want to invest in information. Legislators want data about their districts. Residents want data about water they drink, air

they breathe, and places they live and play. Inspectors need data about a facility’s permit conditions and history, including past permit exceedances, accidents, and non-compliant practices.

Readily available to meet user needs. Make performance information visible and readily available through a variety of means, such as the agency’s website, news reports, and the generation of other media coverage. Write it clearly. Distribute it widely. Post it so it prompts people, including those inside the organization, to talk about it. Place it so people can easily find it when making personal or policy decisions.

What and When to Measure?

Useful measurements pertaining to various aspects of agency operations come in many shapes and sizes. You don’t need to measure everything all the time, but it helps to measure a limited number of key indicators consistently over time. There are similar sorts of measurement most environmental agencies can collect. It should eventually be feasible and affordable for most environmental agencies to track and report trends for the following indicators, some on an ongoing basis and others on occasion, by investing wisely when upgrading information management capacity. If your organization does not already track, organize, use, and report current conditions and trends in the following areas, figure out how and when to start.

Ongoing Measurement Opportunities? Most agencies can assemble measurement in the following categories once leadership makes it an operational priority. Some of the data will be produced by the agency and some borrowed from others.

Human, animal, and plant health. History has demonstrated the enormous power of using human health data – morbidity, mortality, chronic illness, deformity, size, body content – to inform environmental decisions. Work with public and private health organizations to gather and study human health data more systematically and frequently. Work with public and private natural resource organizations to gather and study animal and plant health. Resist the tendency to think it is too hard to use health data or that the effects will take too long to be apparent. Make a commitment now to measure or obtain health outcome data. If you don’t, your organization and community may never reap its potential value.

HEALTH DATA AND THE ENVIRONMENT

John Snow demonstrated the power of counting health problems in the 19th century when his instincts led him to map cholera cases in London. He found most cases clustered around a single water pump. After removing the handle of the pump, the number of new cholera cases plummeted.

Ambient conditions. Environmental agencies can and do monitor numerous aspects of environmental conditions. All states measure some aspects of water quality, water adequacy, and air quality. Most coastal states measure coastal conditions. Some also measure open space, wetlands loss, and the condition of selected plants and animals. If you don’t monitor key environmental indicators enough to provide a complete picture across a state, use what you have and build on it. It is better to track and report trends for specific parameters at specific places than not know trends for any parameter at any location. Choose a few indicators of environmental conditions and stick with them. Then, invite assistance from those outside the agency to measure additional indicators and trends and share them with the government and public.

Environmental impacts. Environmental impacts, including wastewater discharges, toxic air emissions, and solid waste disposed, stress the environment and increase risks to human health. Permitted releases, e.g., from major wastewater dischargers and air emission permit holders, are regularly reported to government agencies. Track and report permitted and actual discharge and emission trends by facility, industrial sector, location, and statewide. If you have not already done it, create electronic filing capacity for regulated parties to submit their water discharge and air emissions data. This will make it easier and more affordable to track trends and analyze the data. Invest in information systems and in assuring reporting accuracy.

Unwanted incidents and risks. Most states collect information about significant and problematic environmental incidents, such as exceedances of permitted allowances. Many, for example, are starting to track combined or sanitary sewer overflows (CSOs and SSOs), spills, flaring incidents, and accidents. Track the frequency, magnitude, and duration of these problems. Determine which are preventable, then test and assess prevention practices and promote those that are effective. Look for patterns to try to predict unwanted events, prevent them, and support rapid response, treatment, remediation, and recovery.

TRACK TIMING CHARACTERISTICS

A study of flaring incidents at a petroleum refinery revealed that most occurred during start-up and shut-down. With this information, the facility was able to focus on fixing problems in these two key periods and successfully reduce flaring incidents. Knowing this, an environmental agency could tailor a compliance assistance effort to address this problem.

Several laws require facilities to report unwanted incidents to local emergency response officials, the state, and sometime EPA. Work with local fire, transportation, and Coast Guard offices to track and study fires, traffic accidents, oil spills, and

other major incidents involving hazards. Work with energy facilities to count and reduce flaring events. Work with chemical facilities to reduce chemical spills and near-misses.

Complaints, too, indicate unwanted incidents. Track and study these as well, in order to understand unwanted problems and determine which ones need attention.

Compliance and other behavior change. Environmental agencies can measure several aspects of the behavior of regulated parties needed to achieve environmental gains. Every agency that conducts inspections should be able to measure compliance and the nature of non-compliance in programs with high inspection rates. To do so, however, requires attention to information management and, often, greater standardization of inspection reviews and reporting practices. Agencies can also measure beyond-compliance behavior among both regulated

and unregulated parties, such as purchases of less harmful technologies and materials. Historically, few environmental agencies have routinely measured compliance over time. A number of factors complicate compliance measurement and interpretation. Inspectors often look at different compliance obligations during an inspection and exercise discretion in determining non-compliance. Agencies lack staff to inspect every regulated facility every year or even every few years. Some agencies' information systems cannot calculate the percentage of non-compliant facilities, only the percentage of inspections where non-compliance was found. Inspections conducted for varied purposes (e.g., follow-up on prior problems, targeting because of high

likelihood of problems, regularly scheduled, or randomly sampled) result in very different compliance rates. And, pre-announced inspections are likely to have different findings than unannounced ones.

FILING INSPECTION REPORTS FROM THE FIELD

Broward County equipped all inspectors with laptops that “synch” via wireless with the central database. This makes it easy to keep data fresh and allows inspectors to retrieve data easily in their homes or at local “hot spots.” Inspectors can easily update the database once a day or every time they access it. Inspectors keep the database up-to-date because they want accurate data for their scheduling and inspections. Field-based data retrieval-and-entry also saves the County the cost of office space for inspectors (who come into the office only for meetings.) In addition, the inspection rate increased 14 percent, inspection errors dropped 40 percent, and performance variations among inspectors declined.

Environmental agencies are increasingly starting to tackle these complications to gain a better understanding of their compliance problems and compliance levels. To measure compliance, they are standardizing key aspects of their inspections, building information systems that link inspections to facilities, supporting electronic filing and information retrieval by both field staff and regulated parties, and strengthening their capacity to analyze data in their systems. Agencies reap great value when they supply inspectors with handheld devices that make it easy for them to access facility data from the field and deliver reports to regulated parties and the agency. Handheld devices reduce inspectors' travel time by allowing them to conduct multiple inspections without returning to the office, if they even have an office. Field-based electronic entry of inspection findings has convinced many

ECC COMPLIANCE RATE TEMPLATE

The ECC has developed a template to help states organize and share inspection and compliance rate information. Connecticut, New Jersey, Maryland and Delaware adopted and adapted the template and have reported inspection and compliance rates annually by program for many years to the extent their data systems allow. *To get a copy of the template and several articles describing its use, check this section of the on-line version of this Memo. It will lead you to the relevant web links.*

agencies to bite the bullet and standardize their inspection practices, which makes analysis of compliance data more accurate. It also helps them capture variations among inspectors, enabling more accurate data interpretation.

If your organization has not already done so, build your capacity to measure and publicly report compliance levels and the nature of non-compliance. Don't insist on 100 percent accuracy. Just try to learn more than you now know. Start by calculating compliance rates in programs where agencies inspect all or nearly all facilities. When it is infeasible to inspect the whole universe or a statistically valid random sample of facilities, report inspection rates together with compliance rates for every program, sector, and location. It will provide valuable insights.

Once you decide to measure compliance, build the capacity to measure its different dimensions, including: the percentage of facilities with compliance or non-compliance; percentage of facilities with significant non-compliance; duration of non-compliance; recidivism rate; number of non-compliant findings per inspection; and types of non-compliance found during inspections, especially for the most serious non-compliance problems. Share current and trend information with the public

ANALYSIS OF STATE COMPLAINT MANAGEMENT

Pennsylvania DEP conducted a review of complaint management practices in all 50 states. It also analyzed ten years of its own complaints to assess their value. It discovered that, contrary to the assumption of skeptics, complaints often led inspectors to more serious problems than did regularly scheduled inspections. *To see the PA studies, check this section of the on-line version of this Memo. It will lead you to the relevant web links.*

Also, figure out how to measure changes in non-regulated environmental practices, such as the adoption of pollution prevention practices, the purchase of more environmentally benign inputs, the use of risk-counting-and-reducing management systems, and public reporting on a facility's environmental impacts.

Awareness and Understanding. If regulated entities are not even aware of their regulatory obligations, how can they comply with them? Environmental agencies have begun to make significant strides in measuring awareness and understanding. Analyzing the content of the trade press can also reveal valuable insights about awareness, understanding of regulatory obligations, and interest in environmentally responsible practices.

Agency Activities and Characteristics. Prepare annual reports that provide a comprehensive picture of agency obligations, such as the universe of regulated facilities, agency activities, and resources (budget and FTEs.) Many states, including Maryland, Delaware, and North Carolina, have done this for several years, allowing a useful look at trends.

In addition, report on the characteristics of agency activities. Use customer feedback and complaint data to determine what matters to those who interact with the agency. Use data on response time trends to identify administrative processes working well and those that need fixing. Response time tracking works for a variety of activities, including permit applications, complaint responses, and penalty payments. Many states already track permit and complaint responses. Use it to measure enforcement timeliness, too, especially given EPA's interest in timely and appropriate enforcement.

RESPONSE TIME MEASUREMENT

Connecticut tracks average processing times for each stage in its permitting process, as well as the percentage of transactions on schedule. Ohio has tracked enforcement response times to drive them down. *To get an ECC management note on environmental agencies measuring and managing response times, check this section of the on-line version of this Memo.*

AWARENESS, UNDERSTANDING, AND BEHAVIOR CHANGE

King County, Washington has twice surveyed its residents to measure household adoption rates of key environmental behaviors the County has promoted, including yard care, recycling, safe disposal, and environmentally friendly purchasing. In its survey, King County measures awareness of environmentally responsible behaviors, adoption rates, and whether or not residents are thinking about adopting the practices even if they have not yet done so.

Oregon conducted a statistically valid survey of companies to measure their perceptions of penalties and inspections and to determine whether enforcement actions are effective in stimulating compliance.

Causal, Precursor, and Correlated Indicators. If possible, include data on the characteristics of measured unwanted incidents to identify likely causal factors, especially those likely to do harm that can be prevented and those with beneficial effects that can be promoted. Geo-code data, for example, and record the date, day, and time a measurement is collected.

Track precursor indicators known to precede or contribute to more serious events, such as toxics use and even water and energy consumption levels, especially in the context of available resources.

Similarly, look for possible correlated indicators (e.g., workdays lost due to accident or injury) if already measured or easier to measure than indicators of concern. Use them to find and prevent problems.

Occasional Measurement and Measured Experiments. Measure some things all of the time and some things—such as the effectiveness of an agency rule, pollution prevention assistance, or a campaign to change awareness and behavior—some of the time. Clarify an intervention's objectives before trying to measure its effectiveness. If the objective of an outreach campaign is to increase awareness, measure whether or not it did. If it seeks to change behavior, measure that.

If possible, start measuring before a new action begins, after it is well underway, and again when it is completed. If you have already started a program but neglected to measure, start measuring as soon as possible.

Seek opportunities for controlled, measured experiments. It might be feasible, for example, to enlist two dozen communities in a measured experiment to compare the effectiveness of stormwater management methods, getting half the communities to try one method and the other half to try a second, measuring water quality before-and-after the changes are introduced. Or try an industry outreach program in some regional offices but not all, measuring changes in both.

Measurement: Summary and Caveat

In sum, use measurement to communicate, motivate, and illuminate. Measurement has enormous detection and diagnostic value. Focus first on data that measures progress toward your strategic priorities and build from there. Use measurement to find problems, assess their relative import, identify effective interventions, and identify effective methods to promote their adoption. Support outcome measurement with measurement of causal factors, process efficiency and responsiveness, and resource use. Use measurement to encourage learning and performance improvement, not for punishment. Of course, no agency can measure everything at once. Don't worry about it. Just get started and get better.

Be wary about linking measurement to reward or punishment, lest those being measured feel tempted to manipulate the measurement, dismantle the measurement system, or opt for timid targets. Sometime, as with regulatory or intergovernmental obligations, the threat of a punishment helps to win attention to and investment in goal attainment. Exercise the punishment option primarily when those threatened are repeatedly recalcitrant and refuse to develop and implement a cogent strategy. Use rewards (e.g., grants and bonuses) to motivate breakthrough performance or stimulate cooperation when it did not previously exist.

III. USE THEM OR USELESS: FEEDBACK AND INTERACTIVE INQUIRY

Goals and measurement are, of course, useless if they are not used. If you want your agency to pay attention to priority goals, communicate the goals and reinforce them by sharing and discussing the counts. You will find it a powerful way to provide effective and appreciated leadership.

But don't stop there. It is not enough to assemble data in reports for management, legislative bodies, and the public.

To reap the performance-improving, democracy-enhancing value of goals and measurement, organizations need to use the data. They need to discuss the data to identify and explore lessons revealed.

Engage your organization and the public in data-rich discussions to discover previously unknown progress and problems. Facilitate inquiry among those who can affect change to understand what made it happen and brainstorm how to prevent risky causes and promote promising ones in the future. Do it in a way that makes people feel safe to challenge assumptions, examine mistakes, propose new approaches, and drive to action. Discuss goals and measurements not just in strategic plans and performance reports, but in management meetings, speeches, and one-on-one conversations.

Also, think carefully about the audience that needs data. Who are the users and how and where do they need data to inform actions that improve health and environmental conditions? When do they need it for democratic debate about priorities? Distribute information so it reaches target audiences where and when they need it. Present data so they understand it.

Communicate the Counts

Use goals and measurement to communicate “actionable information” inside and outside government – with the regulated community, non-regulated parties whose behavior needs to change to achieve environment gains, the public, and elected officials. Treat communication as an essential component of agency strategy that must be deliberately included in action plans.

External Communication. For external communication...

Goals, Long-Term Strategies, Annual Plans, and Past Performance. Communicate long- and short-term goals in public plans and reports. Use the plans, don't just write them, revising them as needed. Communicate them together with trends; information about strategies tried and whether or not they worked, and future strategies planned. Whenever possible, report performance both for the whole jurisdiction and for geographic sub-units. Build the capacity to compare local trends to statewide trends and to compare across similar communities, accounting for community differences, to find replicable lessons and those in need of assistance. Use goals and measurement in plans and reports not just to inform, but to enlist assistance and establish realistic expectations relative to available resources and knowledge. Use goals and measurement in plans and reports to support public debate and deliberation about priorities.

On-Line Databases. Make databases (scrubbed of confidential business, personal, and personnel information) easy for the public to find and access. To engage others in analyses, make data easy to find and download. Make it easy to find and compare trends by building report generators.

Report Generators and Analyses. Organize and analyze information so it is “actionable,” with a level of specificity that suggests to the public and others in government where action is needed and stimulates decisions about strategy and next steps. It is nice to know whether or not the nation's or a state's waters are getting cleaner, but that knowledge is not actionable. Actionable information would also reveal which waters are getting cleaner and which dirtier so attention can be focused on those getting dirtier and lessons learned from those getting cleaner. Or, actionable information would identify the biggest contaminants and their sources to focus attention on them.

Report trends for key indicators and make them easy to find. Show comparisons across states, localities, and regions to lead to the discovery of promising practices, as well as problems needing attention.

Develop on-line query tools and report generators so the public and others in government can easily generate analyses and reports that present current information and allow them to see trends, make relevant comparisons, and discover likely successes and possible problems.

Updates on Specific Goals for Specific Places and Problems. Frame a few priority goals to catch high levels of public attention. To do that, set and regularly report on specific goals for specific places, such as water quality targets in the Puget Sound, and the Chesapeake Bay, air quality targets in the Houston Metropolitan's area, and tree health targets in the Shenandoah National Park. Set and report on goals for specific populations, such as children and pregnant mothers. Develop and share action plans for reaching these goals, and invite local elected officials, goal allies, and the media to join goal announcements, discuss strategies, and get regular progress reports. Be open about which actions worked, which need adjustment, and plans for the future. Pick a similar time each year to announce progress reports, preferably linked to an event,

such as Earth Day, Arbor Day, or a local festival. Hold the announcement at the target location. Involve the target population. Promise (and deliver) an update the same time next year to keep internal motivation high.

Internal Communication. For internal communication...

Monthly or Quarterly Reports. Develop monthly or quarterly management reports that provide faster feedback than annual reports. Use graphs to show changes in direction, magnitude, or rate that might trigger concern. Add brief narrative to explain the unexpected. Try short graphical summaries, sometimes referred to as dashboards, to provide an at-a-glance warning of trouble spots needing attention and a sense of the distance toward a target.

On-line Databases with Query Capacity. Build data systems that allow agency staff to retrieve information when and where they need it, whether prior to a facility inspection, to schedule work for the upcoming quarter, or to formulate budget recommendations.

Warning and Exceptions Reports. Agencies set many kinds of targets as maximums or minimums, such as permit response times (max), agency expenditure levels (max), or water quality standards (min). Generate “warning reports” that alert when minimum or maximum targets are about to be trespassed. Use warning reports to trigger action that can prevent a problem.

Generate exceptions reports, counting and characterizing individual events where targets were not met. Study exception reports to understand the causes of missed targets so they can be prevented in the future.

Interactive Inquiry

After adopting priority targets, start holding goal-focused, data-rich discussions to inform the selection of agency targets and strategies, to assess their effects, and to adjust them based on the evidence. Involve decision-makers from offices with needed skills, ideas, expertise, and resources to help in examining experience and devising strategies. Engage those outside the agency in the discussion, as appropriate to the problem, their knowledge, interests, likely implementation role, and resources. Meet regularly to review results, brainstorm if and how strategy adjustments are needed, and decide who needs to do what by when. Then implement, assess, and replicate or adjust.

Goal-focused, data-rich meetings aid coordination across organizational units. Almost all significant organizational goals require contributions from multiple parts of an agency. Improvements in air quality, for example, depend on scientists, permit reviewers, inspectors, enforcers, communications staff, the contract office, IT, human resources, and budget. Data-rich, goal-focused meetings align efforts across programs. They also keep activities essential to accomplishing an objective but not assigned to any one from falling through the cracks.

Designate a goal leader for each goal, especially for priority goals. If goal attainment does not fall neatly within the jurisdiction of a single manager and requires frequent interoffice coordination, help the goal leader assemble necessary support from other offices.

Adopt a constructive tone for interactive inquiry meetings. Resist finger-pointing and show-and-tell. Use the meetings to share evidence, ask questions about what worked and what did not, and brainstorm strategy and tactical adjustments. Conduct no-fault autopsies.

Consider creating an organizational unit to conduct analysis prior to each meeting, but make sure the analytic team adopts an insight-generating attitude, not a “gotcha” mentality. The unit should see its role as aiding understanding of data and supporting the search for relevant evidence from others about effective interventions.

INTERACTIVE INQUIRY: COMPSTAT

The most well-known example of government using “interactive inquiry” is known as CompStat (short for computerized statistics), pioneered by the New York City Police Department. CompStat involves management meetings where precinct captains stand in the front of a room facing department leaders, including the police chief and borough commanders. Key staff office managers, including the budget, human resources, and legal department managers, also attend. Precinct goals and measurement, on spreadsheets and mapped, are projected on a screen behind the precinct captain as he or she explains progress, problems, likely causes, and strategies for moving forward. Notebooks with the information projected on screens are distributed to all meeting attendees. CompStat meetings are held frequently to stimulate continual review of timely data and critical assessment of strategies and tactics.

The CompStat approach has been successfully replicated by other agencies in New York City, other police departments around the world, and for entire cities, helping them improve both outcomes and efficiency. In 2006, Washington was the first state to adopt the CompStat approach, called GMAP. While many adopters adapt the CompStat approach to fit their own organizational culture, all require the use of outcome-focused targets, timely measurement and mapping, ongoing interactive inquiry, and data-driven strategy discussion.

Don't limit interactive inquiry to in-house meetings. Periodically engage the regulated community and the public in reviewing the evidence and brainstorming sensible next steps.

Data Delivery

Deliver data to people so data are easy for them to find and use. Think about the kinds of decisions the data can inform and who the decision-makers are. Then figure out how to get them the information they need when and where they need it. Consider language, location, and timing.

Don't forget agency staff as a target audience. Inspectors are more motivated to enter inspection data when they can immediately retrieve the data they submit from the field in a format useful to them. In developing specific problem-reduction strategies that require behavioral change, consider explicitly who the target audience is, what they read and watch, and who or what influences them. Design your information delivery systems to tap existing channels of communication and influence. Then measure to confirm that target audiences have received, understood, and heeded the message. If they have not, test and measure different data and message delivery approaches.

Summary

In sum, goals and measurement are useless if they are not used. Communicate the counts, not just raw data but analyses. Talk about and analyze available information on an ongoing basis, openly examining positive and negative experiences. Conduct analyses to convert data into actionable information that suggests specific problems needing attention and opportunities worth pursuing. Consider carefully who the potential audience for information is and figure out how to deliver information effectively to them so they not only pay attention to and understand it but, if decisions or behavioral changes are needed, act wisely after receiving the information.

IV. ANALYTIC HINTS: DATA PRESENTATION AND ANALYSIS

Most environmental agencies collect reams of data about activities, environmental impacts, environmental conditions, and commitments of regulated parties but tap only a smidgen of its value. Harvest the value of collected data through analysis, audience-focused presentation, and dissemination.

Study change. Look for communities or facilities with significant gains in environmental conditions or dramatic drops in negative environmental impacts, controlling for key background variables such as industrial and demographic change if possible, to find replication-worthy successes.

Study the lack of change. Look for communities without changes in environmental conditions even though improvements were expected and try to understand why change did not occur.

Look for communities with the worst conditions and operators with the greatest impacts or worst compliance to focus assistance and external motivation.

Use “Pictures” to Facilitate Review

Useful analysis need not be complicated. It does, however, need to catch the attention of key decision makers and those who need to change behavior. Treat data presentation as an essential and core agency capacity. Use maps, tables, graphs, and photos to tell the story better. For most people, databases and spreadsheets are unintelligible. Build your organization’s capacity to translate data into pictures – graphs, maps, and photographs – and into stories that successfully capture the attention of key audiences.

Graphs. Graphs come in many forms, including line charts, bar charts, and pie charts. There are no rules for the form of graph to use. Consider the situation and use your best judgment to convey the story.

Line charts show trends over time and make it easy to compare year-to-year trends, trends of different programs or facilities, and trends compared to targets. Changes in direction and slope that would be hard to detect in a table jump off the page with a trend line.

Bar charts work well for showing the comparative incidence of problems for specific time periods. They can also be used to show how component parts of annual trends change over time, but are not as good as pie charts for showing the percentage each component comprises of the whole.

Pie charts are a useful way to convey how the universe of what is being considered breaks down into component parts; pie charts for different time periods can be used to convey how the composition of that universe is changing over time or varies in different places. Pie charts show percentages more intuitively than do bar charts, although percentages can be noted as numbers on a bar chart.

Graphs are also an easy way to convey, simultaneously, distinct but related pieces of information. Agencies often want to track environmental impacts, but also take into account how local economic conditions might affect those impacts. Showing actual and normalized data on the same graph is one way to show this relationship simply.

Maps. Individual maps make it easier to see possible relationships between causal factors and conditions and variations across space for a specific time period. Multiple maps for different time periods succinctly convey spatial and temporal variation.

Photos. Photos capture and communicate multiple aspects of change too complicated to convey concisely with numbers or even with graphs. Convert photos to mathematical values through digitization so the computer can analyze them to detect change. Massachusetts used a computer to compare digitized photos of areas mapped as wetlands in the early 1990s to more recent photos, for example, to find illegal construction in wetlands not visible from the road.

Combine Presentation Formats. New technologies and hyperlinks make it feasible to connect maps and photos with graphs and underlying numbers. Tap these technologies to help staff and the public drill down to see problems more clearly, understand their possible causes, and tailor solutions more precisely.

Stories

Use stories to bring data alive. Whenever possible, use stories to give data a face, illustrating potential consequences of an environmental danger with a story about a person at risk or actually harmed. Feature children to grab public attention. In addition to bringing attention to problems, use data-supported stories to promote promising practices. Also, use stories to share local successes and build confidence in agency competence.

“Slice and Dice” Data

“Slice and dice” data to see if outcome variations are associated with differences in circumstances (location, weather, time, sector, source, operator.) Break data down geographically whenever possible – by watershed, airshed, regional office, water body, locality, or even neighborhood – to see differences and make the information more relevant to citizens and elected officials. Experiment with useful ways to aggregate and disaggregate the data.

What to Look For?

Data analysis gets easier with experience. Don’t expect data to answer all your questions once it is collected. Use it to trigger focused follow-up questions to understand where, why, and when something happens, then “drill down” to find preventable causes and promotable opportunities.

Here are a few hints to get started:

Look for Anomalies - sudden or unexpected change in size or direction.

Look for anomalies and try to understand why they occurred. Some are simply statistical aberrations and others can be caused by variations in measurement methods, such as those that occur when measurement personnel change. Put those aside but pay close attention to the others. Ask “Why?” The search for the answer will lead to a better understanding of problems and the discovery of solutions.

Look for Highs and Lows. Identify those with the worst and best relative performance and then try to identify the variables correlated with their performance and whether those variables can be influenced (prevented or promoted) or are natural events not subject to human influence.

Look for Trends. Show current year trends on the same graph as prior-year trends and agency targets when they exist. Look for seasonal variations as well as changes over time. When significant agency actions have been shown to influence outcomes, show their occurrence on the same graph.

Look for Differences and Change. Analyze data to look for differences and changes. Let changes in direction, rate, slope of the curve, and differences among similar entities that should have similar performance trigger focused-follow up questions to find promising practices and problems. For example, examine significant declines in discharge and emissions trends from individual facilities or improvements in ambient conditions in a community to search for promising underlying changes in pollution control or prevention actions. When those changes occur, check if a facility or local government has done something to bring about the change and ask if it is willing to share its experience. Conversely, significant declines in a community or facility should send a warning of the need for follow-up to reverse an unfavorable turn.

Look for Patterns and Clusters. Look for patterns, such as repeat violators, facilities with repeat accidents, and repeat complainants. Look for patterns in the causes of problems, such as operator change or sudden and significant increases in product demand of regulated parties. If eighty percent of sudden declines in facility performance are preceded by staff changes, for example, it should focus agency action on finding ways to mitigate turnover problems. Detecting a seasonal pattern in unwanted incidents, such as complaints or spills, could suggest opportunities for a preemptive strike. Brainstorm agency actions to prevent problem recurrence, test them, and measure whether or not they worked.

Look for Relationships. Look for relationships to find causal factors that influence outcomes of concern which government, in turn, can influence to prevent or reduce future problems, as John Snow did by mapping cholera cases to detect clustering around one pump and having the suspect pump’s handle removed.

After slicing and dicing data, check if patterns and performance varies by characteristic. Use maps to see spatial relationships that may reveal causal effects and exposure potential. Show trends in a spatial context. Look for connections between environmental and health (human, animal, and plant) problems. Look for connections between complaints, compliance, and problems with serious environmental consequence.

FINDING PATTERNS OF PAST PROBLEMS TO PREVENT THEM

The City of Boston sent a few landlords a warning letter after it detected a recurring pattern of complaints about a lack of heat at the beginning of each heating season. The City warned the landlords that future incidents would no longer be treated as a first complaint and would be immediately punishable. Renter complaints about inadequate heat quickly plummeted.

Compare, but with Care

Comparison to peers and to past performance can be useful because best performance compared to peers or the past can function as a *de facto* goal, provided the peer comparison is done fairly, accurately, and in a way that places the emphasis on identifying replication-worthy practices, not embarrassing poor performers. Peer comparisons are most useful when used constructively to find strong performers and determine if their experience is replicable. Comparison can also be used constructively to find problems not previously recognized and the most serious problems needing the most immediate attention.

Facilitate learning across local governments by studying the level of change in each community, controlling for non-controllable background variables. Comparing the magnitude, rate, and direction of change across states, regions, or communities is often more useful for finding promising practices and problems than comparing absolute performance levels. Identify communities with the greatest or fastest gains and then determine if their experience offers lessons for others. EPA should facilitate cross-state, cross-local, and cross-tribal learning. States should similarly facilitate learning across their localities.

EPA FACILITATES CROSS-STATE LEARNING

With EPA financial support, Michigan, Delaware, and several other states have documented and exchanged useful lessons about their permit expediting efforts, including sharing information about changes in permit review times.

Comparison can also motivate poor performers that have the means and knowledge to improve, but persistently refuse to make needed changes. In that situation, public comparison, especially when combined with the threat of punishment, can motivate improvement. Compare with care, however, so as not to embarrass low performers who hold that position because of factors beyond their influence. Always start with inspirational value of comparison to help others learn before using the threat of embarrassment or penalty. Comparing to embarrass often backfires, too, frustrating and infuriating the low performer rather than motivating performance improvement. Use comparison primarily to find replication-worthy practices and those needing help, not to embarrass or penalize.

V. GETTING ACCOUNTABILITY EXPECTATIONS RIGHT

Resist the temptation to link explicit incentives, especially financial ones, with measurement except when unprecedented performance gains are sought or when poor performers persistently refuse to apply effort, available intelligence, or, in the case of regulated parties, needed expenditures. Promising reward for target attainment or strong comparative performance and threatening punishment for non-attainment or poor relative position can motivate, but they can also frustrate and trigger dysfunctional responses.

Instead, tap into people's internal motivation to do well and improve the environment. Use explicit rewards, especially financial ones, primarily for one-time contests to achieve record-breaking performance levels or to identify those willing to participate in measured experiments. Use the threat of punishment for the particularly recalcitrant who refuse to make a serious effort to tackle known problems posing a serious threat. Also, use punishment threats to compel attention to problems.

What does this imply for setting appropriate accountability expectations in your organization and for your organization? Hold government managers accountable for **six essential practices**:

1. **Outcome-emphasis and use of outcome-focused targets.** Focus on outcomes and set outcome-focused goals if they have not already been set. Targets can be relative or absolute. They can be stretch, steady gain, or even steady state. Include a few stretch targets, where appropriate.
2. **Measurement mastery.** Gather data to build understanding of progress and problems to improve outcomes. Learn from experience by measuring and studying experience and engaging others in the learning process and strategy development.
3. **Feedback.** Regularly use available data to inform internal and external discussions, decision-making, and communication.
4. **Interactive inquiry.** Regularly convene relevant parties (those with knowledge, responsibility, resources) to examine the evidence, gather lessons from experience, and sort out implications for future action.
5. **Cogent Strategy.** Based on the best available evidence, available resources, and current political priorities, develop strategies to reduce problems and improve outcomes. Cogent strategies can include plans for improving data collection. They can also include activity-focused targets, when an activity has been shown to improve outcomes, or measured experiments, to search for effective and cost-effective actions.
6. **Implementation.** Implement the strategies. Revise practices and targets as evidence and understanding increase.

Make clear to your organization that missing a target or even failing to make progress is not a problem, but that failure to understand why progress is not being made and have a cogent strategy to deal with it is.

Of course, setting specific goals, measuring progress and sharing measurement information with the public are not without risk. Targets will inevitably be missed and performance declines will occur, arming critics with ammunition. Experience suggests that these risks often subside over time when agencies are transparent about:

1. the reasons for goal selection,
2. the rationale for selecting specific implementation strategies,
3. progress even if slow,
4. problems encountered,
5. strategies tried, and
6. new strategies to be tested.

When this information is consistently shared, trust in the organization will grow. That is not to suggest that agencies will fully escape attack, or that strategies will not be debated. What it does suggest is that the agency can manage attack or debate more readily if it is transparent about its experience, what it plans to do, and why.

In sum, goals and measurement are useless unless used. When they are used, though, wonderful changes start to happen. Set specific targets, talk about them, measure progress, and pay attention to the data. Manage with outcome-focused goals and measurement to celebrate success, devise better solutions, and tackle persistent problems. Goals and measurement are your power tools. Use them to lead, inspire, assist, educate, and enlist assistance to improve performance and boost public accountability. Undoubtedly, you will not be able to do all that is described in this Memo at once. Don't worry about that and don't let it be a cause for delay. Get started and continually get better.

Appendix 1: Page 1 of Table of Examples
[The full appendix is available online.]

Appendix 1: Table of Examples³

Wherever possible, a web link is provided to the original site, so readers can browse for more relevant information. We have also tried to download to the ECC website so the item does not get lost if an URL changes. The words in brackets indicate the example's origin [i.e. federal government, state government, NGOs, etc].

I. Goals

Power of a Goal	
<p>- Goals focus and communicate</p>	<p>[State] In 2006, <u>Minnesota</u> clearly articulated its priorities in a six-page strategic plan that identifies specific quantitative and time targets for the agency. See http://www.pca.state.mn.us/publications/reports/strategicplan-2006.pdf or http://www.complianceconsortium.org/StoredDocuments/State/MNstrategicplan2006.pdf.</p> <p>[State, Local] In 2007, the Governor of New York set a specific target for reducing state electricity use: fifteen percent by 2015. Separately, the Mayor of New York City set a goal of reducing carbon emissions 30 percent by 2030. Governors in several other states have set similar goals. In September 2006, California's Governor signed an act that would cap the state's greenhouse gas emissions at 1990 levels by 2020. New Jersey, Hawaii, and numerous other states have adopted laws requiring significant reductions of greenhouse gas emissions.</p> <p>[State] In 2003, the Virginia General Assembly created the Council on Virginia's Future (COVF.) Chaired by the Governor with Cabinet members, senior General Assembly members and business leaders, the Council provides a vision for Virginia's future and a governing system to support its achievement. The Council develops, monitors, and publishes performance indicators tracking productivity, service performance and progress in achieving long-term objectives. The Council recognizes that the state cannot do everything, and uses the targets to focus state government. "As with any high-performing system, priorities must be set to make improvements in the quality of life for Virginians, including how state government is managed." See http://www.future.virginia.gov/aboutVAPerforms.php</p> <p>[State] In its 2007-2009 Strategic Plan, WA Department of Ecology distinguishes strategic priorities and core work, identifying an action plan with specific milestones for the strategic priorities and the goals and the measures that will be used to gauge progress for core programs. See http://www.complianceconsortium.org/StoredDocuments/State/WA_07to09StrategicPlan.pdf. In its 2005-2007 report, the WA Department of Ecology not only reports on the objectives for its core programs. It also presents some of the results. See http://www.complianceconsortium.org/StoredDocuments/State/WA_05to07StrategicPlan.pdf. Both reports also assess external conditions, such as population growth, and internal capacity, such as workforce characteristics, key components of a well-considered strategic plan.</p> <p>[State] In 2000, the director of the Ohio EPA set several enforcement timeliness goals, including that all administrative enforcement cases older than two years must be resolved by the end of 2001. Focusing agency efforts in this way stimulated attention to the backlog problem. Within one year, the number of cases on the administrative docket over two years old dropped 74 percent, from 100 to 29. Within two, only five cases over two years remained. After setting a specific quantitative target and a deadline, the average age of cases fell from 475 days to 325 days. Ohio EPA also set a goal of reducing time to respond to verified complaints. In 1999, 59 verified complaints were pending in the Agency. By the end of 2001, despite a continued influx of new complaints, only nine complaints</p>

³ Note to reviewers: Two studies are yet to be added. They are the King County performance report (http://www.complianceconsortium.org/StoredDocuments/Other/KingCounty_MeasuringforResults.pdf) and the 2005 Oregon Performance Benchmarks Report (<http://www.oregon.gov/DAS/OPB/docs/2005report/05BPR.pdf>).

Appendix 2: Page 1 of the Charles River Example
[The full case is available online.]

Appendix 2: Charles River Example

Case
Cleaning Up the Charles River¹

Goals

The Goal. In October 1995, on the eve of the “Head of the Charles” regatta which brings a quarter million people to the banks of the Charles River, the US EPA Regional Administrator for New England announced a place-specific and time-specific water quality goal: the Lower Charles River would be swimmable in ten years. This was an ambitious goal for a river so notoriously filthy it had inspired the 60’s song, “Love that Dirty Water.” When boaters on the river fell in, they required hepatitis shots.

Ten years after setting the goal, the Lower Charles River was clean enough for boating 96 percent of the time, up from 39 percent in 1995. In 2006, it was safe for swimming 60 percent of the time, compared to 19 percent in 1995; in 2004, the most intensely used sections of the river were swimmable 100 percent of the time. In the summer of 2007, local enthusiasts enjoyed their first swim race.

EPA was not discouraged by its failure to meet the 2005 target. It achieved significant progress improving water quality of the Charles. Most of the gain occurred in the first five years, arising from the discovery and removal of previously unknown illicit connections to storm sewer pipes and of blockages that kept water from flowing into the waste water pipes instead of the storm sewer pipes (which were then discharged, untreated, directly into the river.)

Still, more clean-up work is needed to make the river safe for swimming all the time. Acknowledging this, in May 2005, the EPA Regional Administrator (the third, since the target was initially set) recommitted to the goal of making the Lower Charles swimmable, with a new attainment date: 2010. EPA continues to report annually on progress, strategies tried, remaining problems, and planned future strategies. Also, in 2007, EPA adopted a specific target for another Massachusetts river, the Mystic: to make it safe for fishing and swimming by 2013.

Goals Focus and Communicate. Choosing a time and place-specific goal focused EPA. The agency did not try to clean the whole Charles River within 10 years. It focused on water quality in the lower ten miles of the river. Articulating specific targets communicates an important message to the public that government cannot do everything at once. The Lower Charles target implicitly indicated that EPA was not prepared to commit to cleaning every river to swimmable levels in the same time period, nor even the whole Charles River. EPA had to decide where to focus attention, and what to put aside for future attention. If elected officials or the public disagree with EPA’s decision, they can use the political process to redirect resources to other priorities.

Some have argued that the Charles River is an exception and that goal-setting will not work for less-popular water bodies that don’t inspire song writers. EPA’s decision to set a goal for the Mystic River suggests that EPA New England does not accept that premise. Massachusetts made similar progress when it focused on the Neponset River. And the fact that, the City of Detroit threw its first ever International River Days festival in June 2007 suggests that even in the most industrialized areas, government can strengthen the connection people feel to their local water bodies if they do not already have one.

Goals Motivate. Agency employees have responded enthusiastically to the Charles River goal. The head of the EPA Charles River team observed: “People are charged up about getting to results. They are willing to take risks and feel empowered to get things done. It is more challenging and more productive. It gets into psychology rather than management.”

Goals Stimulate Innovation. Outcome-focused goals and measurement, fed by more accurate and precise understanding of the river’s problems, catalyzed creative approaches to cleaning the Charles. The need to meet the swimmable target in 10 years drove EPA to find water quality data. It found it in a monitoring report newly produced by the non-profit Charles River Watershed Association providing water quality data for two key parameters, fecal coliform and BOD, for 37 points along the 80-mile stretch of the river once a month.

Appendix 3: Page 1 of Highlighted Reports & Resources
[The full appendix is available online.]

Appendix 3: Highlighted Reports & Resources

The following reports/resources exemplify noteworthy practices that we feel deserve special attention. The information included in this table is also included in the master table above.

Model Report/Resource	Noteworthy Elements
<p>Protecting and Restoring our Environment: Connecticut Annual Report 2006 http://www.ct.gov/dep/lib/dep/enforcement/reports/2006annualreport.pdf or http://www.complianceconsortium.org/StoredDocuments/State/CT2006annualreport.pdf</p>	<p>The 2006 annual report contains information about four new CTDEP initiatives addressing issues such as regulatory compliance, land use & development ("Landscape Stewardship Initiative"), environmental education ("No Child Left Inside"), and non-traditional sources of pollution. Each of the initiatives clearly states its goals and objectives, and employs innovative approaches toward achieving said goals (ex: donating free park passes to foster families to encourage state park visits as part of No Child Left Inside). As in the 2005 annual report, graphs and charts mark departmental progress toward its long term goals and highlight current trends (ex: "Connecticut Air Quality as a Percent of the National Standard"; "Acres of Coastal Wetlands Restored"). This annual report illustrates the power of a comprehensive report in communicating goals and priorities to the agency and to the public. Additionally, it showcases the power of measurement in identifying trends and noting progress.</p>
<p>Protecting and Restoring our Environment: Connecticut Annual Report 2005 http://www.ct.gov/dep/lib/dep/enforcement/reports/2005annualreport.pdf or http://www.complianceconsortium.org/StoredDocuments/State/CT_2005annualreport.pdf</p>	<p>This departmental annual report contains trend data on emissions and compliance, including compliance rates. Descriptions of programs, problems, and actions are organized by departmental goal (ex: "maintain and further enhance environmental protection in Connecticut by using permitting, assistance and enforcement resources in an integrated manner to solve the environmental problems identified as priorities"). Graphs and charts display important trend measurements (ex: number of 8-hour ozone standard exceedance days vs. "hot" days; tons of SO₂ emissions per year), showing departmental progress.</p> <p>The 2005 annual report particularly serves as a noteworthy example of a new agency commissioner setting goals. In the 2005 report, the new CTDEP commissioner set four initiatives for the department. These initiatives were developed after the Commissioner held a series of meetings with constituents, from the environmental community to the business community, to develop a proactive agency agenda. The initiatives focused the agency's work and provided a framework for a more efficient use of resources and increased collaboration with partners.</p>
<p>Delaware Enforcement and Compliance Annual Report http://www.dnrec.state.de.us/DNREC2000/Admin/Enforcement/EnforcementReport.pdf or http://www.complianceconsortium.org/StoredDocuments/State/DE_EnforcementReport2002-2003.pdf</p>	<p>Delaware's first environmental and compliance report covers two fiscal years: 2002 and 2003. Publishing two years of data allows readers to assess progress. The report provides statistics and examples of how the agency has used the Compliance and Enforcement Response Guide's (CERG) framework and guidance to encourage environmental stewardship, promote compliance, and resolve environmental violations. The CERG was designed with public input to assist DNREC managers and staff in developing comprehensive compliance assurance strategies. The CERG also informs the regulated community, elected officials and the general public about how DNREC conducts its compliance and enforcement activities. The CERG establishes the goals, principles and processes that managers and staff follow daily.</p>
<p>Measuring for Results: King County Department of Natural Resources and Parks Fourth Annual Performance Measure Report – 2005 http://www.metrokc.gov/budget/2007/proposed/ALMs.pdf</p>	<p>The King County, Washington annual performance report uses indicators and performance measures, displayed in stacked bar charts, to track its progress and to note where more resources are needed. Each bar has three color-coded sections that indicate whether the county is meeting its goal for that indicator or performance measure (green), close to meeting its goal (yellow), or in need of new strategies and additional attention in order to reach its goal (red). The indicators and performance measures cover all aspects of the King County DNRP's work, and are grouped under the following headings: Environmental Quality, Waste to Resource, Community Investment, Leadership, Price of Service, Customer Satisfaction, and Employee Involvement and Morale. The report emphasizes King County's commitment to performance measurement as a way to achieve results in spite of limited</p>

Appendix 4: Page 1 of State Legislative Language – Required Compliance and Enforcement Reporting
[The full appendix is available online.]

Appendix 4: State Legislative Language – Required Compliance and Enforcement Reporting

The following legislation requires regular environmental or compliance and enforcement reporting from state environmental agencies. These examples are offered for consideration by other state legislatures seeking to enact similar environmental reporting requirements.

<p>Colorado [Annual Air Pollution Report] Colorado Revised Statutes § 25-7-105 http://198.187.128.12/colorado/lpext.dll?f=templates&fn=fs-main.htm</p>	<p>The Colorado Air Quality Control Commission is required to prepare a report that explains pollution problems, identifies sources of pollution in highly polluted areas, enumerates alleged emission control violations, and describes the status of control procedures with respect to the alleged violations.</p>
<p>Connecticut [Annual Report on Permitting Efforts] Connecticut General Statutes § 22a-6r http://www.cga.ct.gov/2001/pub/Chap439.htm#sec22a-6r.htm</p>	<p>The commissioner of the Connecticut Department of Environmental Protection (DEP) must submit an annual permitting report to the Governor, the joint standing committees of the General Assembly, and the Department of Economic and Community Development.</p> <p>“Such report shall include, but not be limited to: An identification of revenues received from permit application fees and any revenues derived from the processing of such applications as set forth in this chapter and the department's appropriation from the General Fund for permitting activities; the number and amount of permit applications received; the number of permit decisions issued and the number of permits pending; the number and amount of permit application fees refunded; the number of permit applications requiring alternative timely action schedules pursuant to section 22a-6q; and a summary of the significant improvements the department has made in its permitting programs.”</p>
<p>Hawai'i [Environmental Quality Control Annual Report] Hawai'i Revised Statutes § 341-6 http://www.capitol.hawaii.gov/hrscurrent/Vol06_Ch0321-0344/HRS0341/HRS_0341-0006.HTM and http://www.capitol.hawaii.gov/hrscurrent/Vol06_Ch0321-0344/HRS0341/HRS_0341-.HTM</p>	<p>The Environmental Council and the director of Environmental Quality Control release an annual report to the governor, the legislature, and the public by January 31 of each year. The report should reflect the Council's monitoring of the state's progress in achieving its environmental goals and policies and offer recommendations for improvement. State and county agencies are obligated to respond to any requests for information that the Council makes while preparing the annual report and the Council may give another party any power and authority necessary to complete the report or to otherwise administer HRS § 341-6 effectively.</p>
<p>Maryland [Annual Report on the Enforcement Activities] Environment Article § 1-301(d) http://michie.lexisnexis.com/maryland/lpext.dll?f=templates&fn=main-h.htm&cp=</p>	<p>The Secretary of the Environment, with the Attorney General, must submit a report detailing all enforcement actions from the previous fiscal year to the Legislative Policy Committee by October 1 of each year; the report must be made available to the public when it is submitted to the Committee. The report must include information on: permits and licenses; compliance consultations with businesses; the total amount of money received from enforcement actions; how much of the money from enforcement actions is deposited in each of the state funds; and specific information about final permits, licenses, stop work orders, injunctions, inspections, penalties, etc. in ten programs within the Maryland Department of the Environment.</p>

Environmental Compliance Consortium

The ECC is a consortium of state environmental agencies that work together to figure out better ways to measure and manage their programs, especially their compliance and enforcement programs.

The ECC is based at the
University of Maryland School of Public Policy
(Office of Executive Programs)
with support from the
Environmental Law Institute.

For more information, visit: www.complianceconsortium.org
