The United States Geological Survey

A Vision for the 21st Century

The United States Geological Survey: A Vision for the 21st Century

November 15, 1993

Front Cover: A view of the Grand Canyon from an original lithograph by William Henry Holmes and a computer-generated view of Yosemite Valley created from satellite and digital elevation data.

United States Department of the Interior
GEOLOGICAL SURVEY
RESTON, VA 22092

OFFICE OF THE DIRECTOR

Robert Hirsch, Acting Director
Bonnie McGregor, Acting Associate Director
U.S. Geological Survey MS 101
12201 Sunrise Valley Drive
Reston, VA 22092

November 15, 1993

Dear Bob and Bonnie,

The Transition Team report, an intensive two-month study of the U.S. Geological Survey that you requested, is enclosed. This report represents the beginning of what must be a long-term commitment to change. The report presents a vision for the next century and options that might be taken to achieve it.

Approximately one third of Survey employees contributed to this report, bringing their experience and insight to this task. We sought ideas and input from across the breadth and depth of the Bureau. This report benefited greatly from their involvement.

Included in this report are many options that can serve as catalysts for change. In this regard, we believe that some action must take place in order for a positive reaction to occur. USGS employees are anxious to see change happen and are enthusiastic about being involved in the process.

Sincerely yours,

Dave Houseknecht

David W. Houseknecht
Chair, Transition Team

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The U.S. Geological Survey: A Vision for the 21st Century

VISION

Leadership in Earth science for sustained global health, welfare, and prosperity.

We envision a U.S. Geological Survey that is a global leader in relevant, innovative, and interdisciplinary Earth science. We shall conduct collaborative, impartial, multi-scale scientific investigations into the Earth's systems and conditions through a spectrum of basic to applied research on the environment, hazards, resources, and information management, all in support of present and future societal needs. We envision an organization that serves the public by sharing Earth-science data and information and by promoting its dissemination, understanding, and application. We shall be a flexible organization that values its employees and works in concert with them for attainment of both institutional and individual goals.

"I have a vision of a future Federal Earth science agency which is staffed by enthusiastic, motivated employees who share two commitments: to achieve the highest quality in scientific understanding, and to communicate that understanding to every citizen."

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INTRODUCTION

The U.S. Geological Survey is at a crossroads. During its first century, the mission of the USGS mostly involved surveying the Nation's lands and assessing the quantity of mineral, energy, and water resources that were used to build the Nation. The mission is evolving rapidly to include a greater emphasis on integrated analyses of the Earth's environment, hazards, and resources to assure sustained global health, welfare, and prosperity.

"The Earth is our origin, our sustenance, and our future. Therefore there is no collective social responsibility that is more important than stewardship of the Earth."

GSIdeas

Geological surveys around the world are suffering a loss of visibility, prestige, and funds, in part because of an historical focus on resource discovery and utilization that is not wholly consistent with current societal needs. Society is increasingly aware that it must come to terms with limits to growth and that it must reduce or eliminate the deleterious impacts of human activity on the life-sustaining systems of the Earth. Geological surveys must adapt to meet these new challenges. In this regard, and unlike most other geological surveys, *the USGS is unique in having broad expertise in geology, hydrology, cartography, geography, and information management within a single organization.* With this unique expertise and diversity, and the implied command of spatial data essential to addressing the needs of society in the next century, the USGS is well positioned to assert global leadership in the Earth sciences. *With vigorous leadership, judicious redirection of its mission, and concerted application of its collective expertise, the USGS has a vital role to play in the Nation's future*, helping to provide sufficient water, energy, and mineral resources for an Earth rapidly filling to capacity with people. In addition, it will be instrumental in helping to mitigate geologic and hydrologic hazards, to anticipate environmental and climatological changes, and to avoid harmful perturbations of the Earth's geosphere and biosphere. The Bureau is also in a unique position to manage spatial data and to develop and promote a framework for a spatial data infrastructure.

"The USGS was founded to achieve, as an organization, those things which the individual scientists could not hope to achieve alone."

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This report represents the distillation of ideas from about one-third of the workforce of the USGS, contacted directly through face-to-face discussions or indirectly through solicited and unsolicited written messages, including the GSIdeas computer database. Amid much thoughtful, passionate, and enthusiastic discus-

sion, numerous themes emerged repeatedly throughout the breadth and depth of the Bureau. First and foremost, employees expressed affection for, and dedication to, the USGS. Other common themes included issues of the institution's vision, mission, leadership and leadership philosophy, programs and funding, operational structures and systems, and human resources. Recurrent discussions regarding leadership focused on communication and evaluation, to and from all directions. Participants cited deficiencies in the following: delegation of authority and responsibility, levels of trust in one another, courage to make decisions, mission relevance, and a Bureau-wide perspective to programmatic activities. Frustration over the inability to respond quickly to the needs of our clients was also expressed. Finally, concerns about the need for coordinated maintenance, promotion, and dissemination of information, and the balance between applied and basic research were vigorously discussed.

> *"We want our friends and neighbors to know that we work for a fine organization that works for them."*
>
> GSIdeas

The presence of barriers within the organization was cited as adversely affecting the breadth of our programs and the coherence of the Bureau. Operating systems (assessments, procurement, travel, and publications) suffer from burdensome control-oriented paperwork and a lack of authority delegated to the lowest effective levels. Disincentives, rather than incentives, exist for interdivisional work. Across the Bureau, employees wanted to increase the visibility of USGS activities but felt the lack of institutional support to do so. Human-resource issues included the value of employees as individuals and as members of teams, the need for more avenues for upward mobility, improved performance-appraisal procedures and recognition systems, restructured career ladders, and workforce diversity.

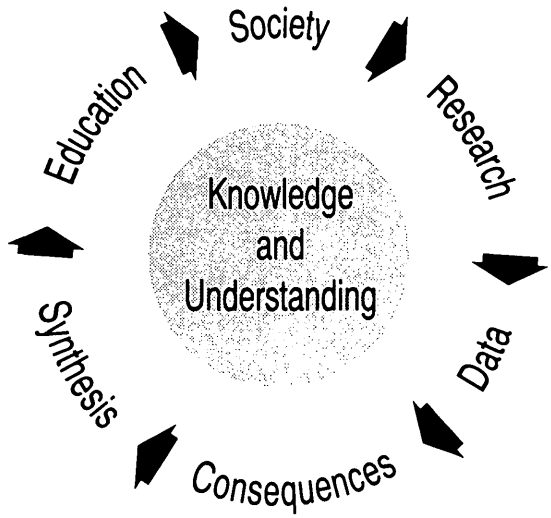
This report marks the beginning of a lengthy process of molding the future of the USGS so that it is better prepared to address an evolving mission as we approach and enter the 21st century. The values that should guide the Bureau in its mission are articulated and affirmed. Included are guidelines and options for enhancing Bureau leadership, for optimizing the effectiveness of our human resources, for developing and evaluating programs, and for enhancing the performance of organizational and operational systems.

> *"The more we know, the more we are involved, the better we serve the mission of the USGS."*
>
> GSIdeas

OBLIGATIONS TO SOCIETY

Leadership in Earth science binds us to a course of action to respond to society's needs and to provide impartial information to the global community. Our obligation is to understand the potential and limits of the Earth's assets and the carrying capacity of its systems. Through collaboration and partnerships with others in the broader scientific community we must anticipate, articulate, and address scientific issues. We are obligated to provide for the education of society through dissemination of Earth-science information, and discussion of the logical implications of data and the consequences for public policy.

Without society's needs, we have no reason to undertake the process. Without expertise gained through Earth-science research, we are not qualified to address the issues. Without data, we have no basis for assessing consequences. Without synthesis, we cannot improve understanding. Without dissemination of the knowledge and ideas, we might as well not have bothered.



Obligations Continuum

MISSION

The mission of the USGS is to excel at the timely provision of impartial Earth-science information to current and future generations. Through innovative, interdisciplinary, and collaborative scientific inquiry, information is acquired on the past, present, and future conditions of the Earth's environment, hazards, and resources. Information, essential for the stewardship of Earth's life-sustaining assets, is communicated in forms effective for users.

GOALS

- To enhance understanding of Earth systems and their mutual interactions so that knowledge is available to address emerging and future societal needs.

- To evaluate the influence of Earth systems and human activities on the global environment so that scientifically sound decisions can be made to avoid harmful perturbations of the Earth's geosphere and biosphere.

- To characterize, assess, and predict chronic and catastrophic hydrologic and geologic hazards (e.g., natural and synthetic pollutants, floods, and earthquakes) for sustained global health and welfare.

- To provide Earth-science data and information that enhance the availability of sufficient resources (land, water, mineral, and energy) to support the Nation's infrastructure for the prosperity of future generations.

- To develop and implement state-of-the-art Earth-science data and information systems (e.g., the National Spatial Data Infrastructure) coordinated through Federal, State, local, academic, and private partnerships for the enhanced availability of spatial and other types of data.

- To educate society on the Earth's systems, environment, hazards, and resources so that Earth-science information will be fundamentally intertwined with public policy.

CHARTING A COURSE

The degree to which an organization realizes its vision and achieves success is determined by the interaction of leadership, organizational values, human resources, strategy, systems, and organizational structure. Although positive action in any one of these elements contributes towards attainment of goals, the greatest success is realized when all of these elements are aligned and operating synergistically. *Every part of the organization must support, enhance, and reinforce every other part.* This report offers options that individually may improve the performance of the USGS. However, implementation of options that align all of the elements discussed in the following sections will greatly contribute to the realization of the Bureau's vision.

"Everything working together: people with people, people with systems, systems with systems."

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As new leadership assumes the helm, it is imperative that recurring strategic planning becomes an integral part of preparing the USGS for the future. The USGS needs to develop a long-term, forward-looking strategic plan that includes criteria for measurement of progress toward Bureau goals. The plan must be articulated frequently and widely so that all employees clearly understand the Bureau's direction. We encourage the new Director to involve individuals and teams from across the USGS in strategic planning and to include input from a spectrum of clients, including other government agencies, academia, and the private sector. The resultant plan should chart the future course of the Bureau, thereby providing a long-term framework within which shorter-term mission activities can be planned and accomplished.

"Good strategic planning is crucial to the effective operation and survival of national geological surveys. Strategic planning must seek to ensure the availability of the knowledge and the expertise that will be required to address the policy issues that will emerge in the future."

Ray Price, Former Director
Geological Survey of Canada

LEADERSHIP PHILOSOPHY

Strong leadership at all levels is required for the USGS to be flexible and responsive in the 21st century. *The leadership philosophy of the USGS should be founded on a firm belief of shared vision, shared values, and shared mission.* The mission of the institution is most efficiently facilitated by honest and open communications in both a participatory and consultative leadership style. This style is based upon mutual trust and encourages the delegation of authority and responsibility to enhance proactive and forward-thinking decision making, with a result that individuals throughout the institution can and will act in its best interest. This implies that *all employees are valued and will act professionally and ethically in concert with the Bureau's vision and mission.* The values implicit and explicit in this philosophy will guide employees' actions, especially when courageous and difficult decisions on controversial or compelling issues must be made.

"The expressions 'professionals, support staff, etc.' should be dropped. Members should be referred to as scientists, engineers, mathematicians, technicians, secretaries, etc. All members of the USGS are professionals."

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Each USGS employee is a valuable team member as well as an individual with a complex set of needs, all of which are important. As a consequence, the institution is best cared for when its employees are cared for. When the organization provides a positive work environment in which tasks are matched with talents and interests, employees are better able to develop to their full potential. Likewise, employees have the responsibility to respond to the mission and needs of the organization.

Through a combination of proactive leadership and investment in people, the USGS will continue to develop a diverse, flexible, creative, dedicated, and productive workforce that will allow for the optimal use of Bureau resources in meeting the needs of its clients.

"The success of an organization depends on each individual employee, regardless of their area of expertise or grade level. We need to be more appreciative of each other. Each employee deserves the opportunity to work in an environment that promotes growth, support, fairness, and equality to all."

GSIdeas

HUMAN RESOURCES

> ***"It has become obvious over the past few years that people will in fact work more creatively and more productively if they are trusted and empowered, and if they know that what they are doing means something."***
>
> Jack Welch, Jr.
> Chairman and CEO,
> General Electric Company

A high quality and effective workforce is the most important asset for ensuring the success of mission and programmatic activities. As such, it is essential that significant planning and preparation provide for a workforce that is *flexible, diverse in the broadest sense, creative, and productive.*

Many employees of the USGS view the Bureau as an inspiring place to work. The challenge is to leverage this enthusiasm into a more effective workforce by implementing consistent and fair human-resource policies. In return, employees must reaffirm their commitment to public service and take ownership in the vision and mission of the Bureau.

Human-resource management can be organized as a continuum that includes workforce planning, recruitment, career development, productivity and separation. We discuss human-resource goals and options as they relate to this continuum. As a basis for initiation of the continuum, the Bureau and each individual must form a partnership, from the first day of employment through retirement, to promote both the Bureau's mission and the personal development of the individual.

Human Resources Continuum

WORKFORCE PLANNING

Workforce planning must be an integral part of Bureau-wide strategic planning. It allows for the optimization of the effectiveness, quality, and timeliness of response to program needs. *The need for workforce planning greatly increases as resources diminish.* Workforce planning is the inventory of the physical locations and skills of scientific, technical, and support staff, and the identification and analysis of present and future program needs, followed by the appropriate allocation of resources to programs. Successful planning gives the Bureau the flexibility to identify individuals who already fit the required needs, identify those who can be trained to fit defined needs, and identify areas where new recruitment is needed. This process results in a workforce wherein the skills of the employees are well matched to the assignment and where future needs are anticipated and planned for. A broad spectrum of ages, ethnicity and race, experience, educational and cultural backgrounds, physical abilities, and career disciplines, as well as gender diversity within the workforce stimulates creative thinking, effective teamwork, innovation, and lifetime learning, all of which contribute to a highly motivated and productive workforce.

> *"The USGS workforce diversity plan is not exclusively an affirmative employment plan, but is rather a broader vision of valuing and empowering all employees... Because of our roots and culture, substantial continual education and training of the entire workforce will be required to communicate an understanding of and a buy into the process of change."*
>
> Draft Plan for Achieving and Maintaining Diversity in the USGS

— Options —

- Incorporate workforce planning at all levels in the Bureau. Short- and long-term staffing plans should be implemented by managers in all organizational units.

- Educate managers and employees about workforce diversity, emphasizing the value and effective use of diverse experiences, ideas, and opinions in accomplishing our mission.

- Implement the Bureau's draft 1993 workforce diversity plan for achieving and maintaining diversity in the USGS.

- Develop and maintain a complete Bureau-wide inventory of skills and workforce characteristics.

RECRUITMENT

Recruitment follows from staffing requirements that are consistent with the Bureau staffing plan. Well planned and effective recruitment results in identification of the best and brightest candidates for placement in positions, whether recruited from within or outside the current workforce. Proper recruiting ensures the merging of new and vital talents required to maintain a healthy distribution of age, grade, and skills. Potential sources of high quality candidates should be identified before the need exists. Such proactive recruiting is critical when opportunities for hiring are minimal.

This discussion presupposes that a plan will be developed to allow for the hiring of new, young workers. Some segments of the USGS currently are suffering from an aging, high-grade workforce that has limited the organization's financial flexibility and restricted the influx of new ideas and talents. An aging workforce is a critical problem that must be addressed earnestly and creatively before any strategic recruitment plan can be implemented.

— Options —

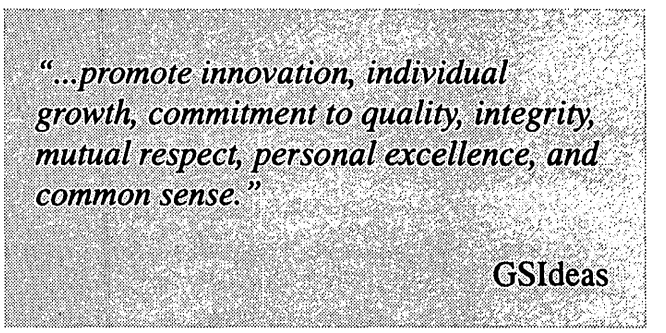
- Develop and implement an ongoing Nationwide recruitment program that supports the goals of a Bureau workforce plan.
- Educate first-line supervisors and managers on policies, procedures, authorities and programs for hiring students and others on either a permanent or temporary basis.
- Continue the use of short-term appointments (e.g., students, postdoctoral guest researchers, etc.) to allow for a healthy influx of ideas, enthusiasm, and youth into the organization.
- Provide for wider internal and external distribution of vacancy information.
- In all recruiting efforts, include a clear explanation of the roles and responsibilities inherent in the position to be filled.

CAREER DEVELOPMENT

The USGS has maintained a tradition of excellence in programs, products, and people. In order to continue this legacy and to accomplish the Bureau's mission, we must be proactive in the development of our employees. We must

stimulate creative thinking, innovation, and problem solving within the workforce. Specifically, career-development activities must provide all employees with new learning opportunities in the form of short-term assignments and participation on appropriate committees, teams, and projects. Experience gained through such career-development opportunities will provide a diverse workforce with the skills needed to address relevant Earth-science problems.

Because of evolving societal needs for Earth-science data and information and rapid technological advances, employees cannot assume that their formal education and experience will ensure their continued relevance to the Bureau's mission. For these reasons, training and career development are essential to maintaining a flexible workforce. *It is an individual's responsibility to be adaptable, relevant, and flexible, and it is the organization's responsibility to provide training and development opportunities.*



— Options —

- Develop orientation programs to introduce employees to the organization's culture, including the USGS vision, mission, values, leadership philosophy, and career-development opportunities.
- Identify successful career-development programs in the Bureau and use them as models.
- Establish career-development plans for each employee that are updated annually. Development plans should include current performance evaluation, recommendations for improvement, list of future training and experience needs, and short- and long-term career goals.
- Provide career guidance and support through mentoring programs.
- Provide workforce diversity training to managers and employees.
- Implement recommendations for improving supervisory and managerial training as identified by the 1990 USGS Supervisory-Managerial Task Force.
- Implement the 1991 USGS Executive-Managerial-Supervisory Development Program.

WORKFORCE PRODUCTIVITY

As an organization, we strive to create an environment of excellence in which our employees are motivated by clear, worthwhile, and challenging goals, practical standards, useful feedback, sufficient autonomy, necessary support, and appropriate recognition. In turn, all employees must recognize the context of their job, what program they contribute to, where they fit into the organization, what goals are established, what products are expected, what is the intended life-span of their positions, and what types of future positions match their skills and interests. The responsibility for individual productivity ultimately remains with each employee, although increased productivity can be facilitated by Bureau policies. As poor productivity adversely affects our mission, management needs the policies, procedures, and courage to penalize or terminate employees who do not meet performance expectations.

"Every employee should know their job and take personal responsibility to do it. Supervisors should expect their employees to do their jobs and help them grow in knowledge and responsibility for their next job. Leaders must lead by example and by commitment to ideals. They should set goals, inspire their employees to high levels of performance, and provide them with the resources to accomplish their jobs."

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— Options —

- Implement the leadership philosophy through clear communication of organizational goals.
- Ensure that all organizational values, including teamwork, outreach efforts, leadership, etc., are reflected in performance, recognition, and reward systems.
- Compose position descriptions and associated employee work plans that accurately reflect actual job responsibilities, complexities, and goals for advancement.
- Revise, strengthen, and balance evaluation systems to identify, measure, and track employee performance and require managers to take appropriate action that follows from the evaluation.

- Implement evaluation systems that incorporate feedback from the employee's superiors, subordinates, and peers.

- Educate supervisors about personnel procedures that provide for the fair and just demotion or termination of individuals who do not perform adequately.

- Implement flexible work schedules and locations where appropriate.

SEPARATION

Employee separation occurs through retirement, resignation, and involuntary dismissal. An atmosphere needs to be created in which employees retiring or resigning from the USGS leave with a strong sense of career fulfillment and meaningful contribution to the Bureau.

— Options —

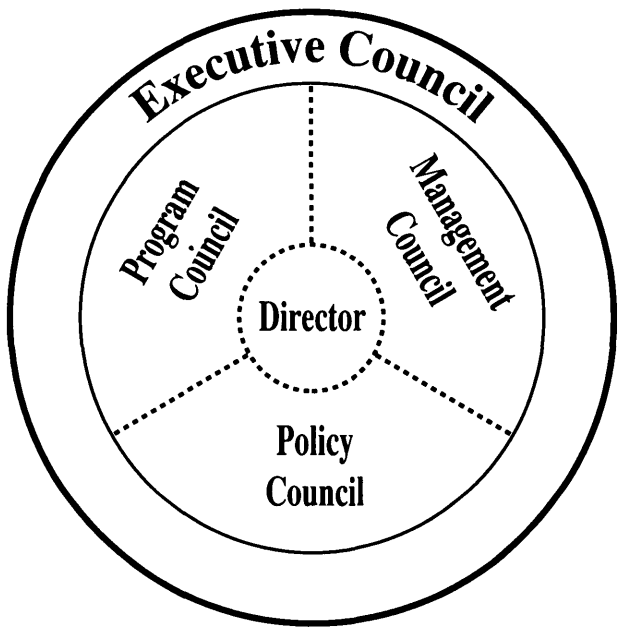
- Conduct a survey to determine what incentives would foster retirement in organizational units where it is needed.

- Strengthen emeritus and mentoring programs. Provide contracts for continued support of research and opportunities for continued mentoring beyond formal retirement, as many retirees still have much to offer the institution.

- Conduct effective exit surveys to determine why employees who resign are leaving the Bureau and how to prevent future loss.

OPERATING PHILOSOPHY

Implementation of the Bureau values and leadership philosophy requires that all parts of the organization participate in decision making. To this end, we present a leadership-implementation option in which councils representing science, management, and Bureau-wide functions are integrated for decision making. Although we focus on the highest level of decision making at the USGS, the same model can be implemented at all levels.



This example comprises five interactive and collaborative elements: the Director, a program council, a management council, a policy council, and an executive council. At the focal point of the agency is the Director, who sits on all four councils and provides leadership in science, management, and policy. The Director must be a strong leader, committed to participatory and consultative management. The Director, however, is not solely responsible for Bureau leadership. The four councils, and nested teams that underlie them at all levels, collectively share in the leadership and decision-making process.

"No matter what the textbooks and organization charts say, well-managed companies do not have a one-man 'chief executive.' They have an executive team."

Peter Drucker, 1954

The *program council* is composed of the Director and coordinators of the major Bureau programs. This team is responsible for charting the scientific direction of the Bureau through strategic planning, recommendations for funding, and coordination of science input for the development of initiatives. Program coordinators ideally are scientists on rotational appointments who are selected on the basis of scientific vision and leadership. It is essential that program coordinators maintain strong and active communication linkages to the scientific community, both within and outside the Bureau. They also must possess a commitment to teamwork that transcends program and organizational boundaries.

The *management council* consists of the Director and organizational unit leaders. This team is responsible for program implementation, line management, financial accountability, and communication within the Bureau and with external counterparts. Unit leaders are ideally career managers with demonstrated leadership and management capabilities. It is essential that unit leaders possess a commitment to teamwork that transcends organizational and program boundaries.

"I once heard Tom Peters (author of: In Search of Excellence) ask a CEO of a successful steel mill, 'what is your management strategy that makes this place work?' The CEO answered, 'Its a new management technique not often used--we talk to each other."

GSIdeas

The *policy council* includes the Director and leaders of the Bureau-wide functions. This team is responsible for setting, implementing, and coordinating Bureau policies on support services, information management, human resources coordination, external coordination, education and outreach, and scientific infrastructure. Leaders of Bureau-wide functions are ideally career managers with demonstrated management and leadership capabilities and proven success in teamwork.

The *executive council* is the main decision-making body at the Bureau level. Ideally it comprises the Director and the program, management, and policy councils. This team is responsible for Bureau-level strategic planning, prioritization of programs and initiatives, promotion of programs and initiatives, and funding decisions. Representation of the policy council on the executive council elevates the importance of Bureau-wide functions and recognizes the need for consistency in organizational policies and guidance.

This option integrates science, management, and policy within one decision-making body and acknowledges and values both the scientific and managerial aspects of leadership. In addition, it integrates scientific motivation and societal motivation by providing an interface between long-term scientific goals and short-term political realities.

PROGRAMS

Programs articulate the mission of the USGS. They represent the Bureau's response to society's needs and arise as a consequence of economic, political, and cultural forces. Given these political and economic realities, the USGS must strive to develop programs that are consistent with our vision and mission, attractive to the Department of the Interior, Office of Management and Budget, the President, and the Congress and that meet the needs of the public.

Programs should be an outgrowth of Bureau-wide strategic planning because strategic plans must be the first step in articulating long-term goals and in developing the programs necessary to attain them. Within the context of strategic plans that consider current, emerging, and future societal needs, new programs should be formulated and their potential value judged against objective criteria that include relevance, technical merit, timeliness, and duration. Moreover, the feasibility of new programs should be evaluated in terms of financial, human, and technical resources required for a spectrum of research, development, application, and dissemination activities. As with institutional strategic planning, criteria must be developed that measure progress toward program goals, and program assessment should be an ongoing process that involves scientists, managers, and clients.

In reality it is likely that some programs might be developed in response to political, economic, and societal needs that arise suddenly. As a result, the Bureau's strategic plans must accommodate the varied time scales over which programs might be developed, mindful that *success occurs at the intersection of preparation and opportunity.*

The principles and processes noted above are essential ingredients of program development. The same could be applied to an assessment of current programmatic activities. The Transition Team considered an objective analysis of existing programs to be beyond its capabilities in terms of both time and expertise. However, in concert with the judicious redirection of the Bureau's vision and mission, we encourage the development of objective criteria for Bureau-wide program evaluation followed by a comprehensive review of current programs. This process should involve participation by a broad cross section of employees, academics, clients, etc. The results of such a review should be used for Bureau-wide prioritization of programs with the full realization that programs should have beginnings and endings as the mission of the USGS evolves.

A Bureau-wide programmatic review also should include an evaluation of activities supported by non-appropriated funds. It is imperative that projects supported by such funds be critically evaluated to ensure that the work contributes to Bureau mission and that a healthy balance is maintained between long- and short-term research, and between permanent and non-permanent employees.

— Options —

- Develop programmatic criteria that address relevance, technical merit, timeliness and duration. These should be consistent with the strategic plan and can then be used to initiate, assess, and measure the achievement of programs.

- Conduct a critical review of current programs using teams composed of a cross section of employees, clients, and academics.

- Evaluate activities supported by non-appropriated funds to ensure that the work is consistent with the Bureau's vision and mission and that there is a planned relationship among appropriated and non-appropriated funding, permanent and non-permanent employees, and long- and short-term research goals.

FUTURE THRUSTS

In the next several decades, it is likely that major societal needs related to the Earth sciences will focus around four issues: the environment, geologic and hydrologic hazards, resources (water, energy, and minerals), and integrated data and information systems.

The USGS should assume the lead in evaluating the influence of Earth's natural systems and the impact of human activities on the global environment. These endeavors should include application of the Bureau's unique knowledge and capabilities to geologic and hydrologic aspects of Earth's life-sustaining systems, in collaboration with other agencies (e.g., National Biological Survey, NOAA, DOE, etc.).

USGS achievements in characterizing and predicting hydrologic and geologic hazards place the Bureau in a position to continue leadership in understanding Earth-system processes that pose chronic or catastrophic hazards to human activities. The potential for developing capabilities to provide real-time warnings of life-threatening dangers should ensure close ties to societal issues for decades to come, especially in the areas of hydrology, coastal geology, volcanology, and earthquake seismology.

The traditional strength of the USGS in resource assessment provides a firm foundation from which to expand activities into future issues of societal relevance. The quality and quantity of water resources will continue to hold center stage as the demand for pure water continues to grow. Energy- and mineral-resource activities likely will evolve toward a greater emphasis on quality, environmental consequences of development and utilization, and economic implications of global resource abundance and distribution.

A leadership role exists for the USGS in developing a national spatial data infrastructure. With specific directed programmatic efforts, the USGS can assure digital data accessibility to the public and establish itself as the recognized clearinghouse for Earth-science data and information collected by the Bureau and other Federal and non-Federal institutions.

These general program thrusts are consistent with topics identified in *Solid-Earth Sciences and Society*, a 1993 report by the National Research Council of the National Academy of Sciences, and with themes expressed by individuals inside and outside the Bureau during preparation of this report.

> ***"...in partnership with state and local governments and private companies, we will create a National Spatial Data Infrastructure."***
>
> **NationalPerformance Review Report**

BUDGET STRUCTURE

The USGS budget for Federal appropriations is the primary means by which the Bureau presents its mission and priorities to the Department of the Interior, to the Office of Management and Budget, to the Congress, and to Bureau employees. As such, it is at once the vehicle through which the Bureau requests Federal funding to carry out its mission and the guidance by which employees formulate, propose, and implement specific scientific endeavors to achieve mission goals. In essence, *the budget is the image of the USGS mission to those who support the Bureau* and to those who carry out the Bureau's primary functions. Therefore, the USGS budget ideally should represent accurately the mission and priorities of the Bureau and should facilitate activities that contribute to the achievement of mission goals.

Historically, the mission of the USGS has been divided into three distinct issues of national importance: mapping the topography and geography of the Nation, characterizing the geology and assessing the mineral resources of the Nation, and characterizing the surface- and ground-water resources of the Nation. The current budget structure for appropriated funding reflects this tripartite mission, which also begat a corresponding tripartite organizational structure. Through the years, the budget structure has become so strongly aligned with organizational structure that it now is perceived widely that the latter controls the former, and that the budget is a vehicle for perpetuating organizational units rather than directly supporting the Bureau's mission.

— Options —

- The USGS budget structure could be reorganized so that the main budget categories (activities) represent accurately the mission of the Bureau. For example, environment, hazards, resources, and Earth-science data and information are four broadly defined Earth-science issues that are currently major mission thrusts of the Bureau and are likely to remain so well into the future. Budget activities that represent these four issues would permit the Bureau to clearly articulate its mission and priorities and would reaffirm to clients and employees alike that the Bureau exists to achieve a mission rather than to perpetuate an organizational structure.

- The USGS budget structure could be reorganized so that the main budget categories (activities) represent the three endeavors historically addressed by the Bureau and for which unique capabilities exist within organizational units (e.g., mapping, geology, and water) plus issues that are more appropriately addressed by Bureau-wide activities (e.g., Global Environmental Change and Ecosystems).

If the Bureau recasts its budget into issue-oriented activities, a carefully coordinated effort must be implemented to educate the Department of the Interior, the Office of Management and Budget, the Congress, and Bureau employees on the rationale for such a change. Relationships between new and old line items in the budget must be explained in terms of our mission and specific research endeavors.

"The purpose of budget structure is to foster understanding of the relevance of programs to prevailing national priorities and to facilitate justification of the resources needed to support these programs in a way that convinces the keepers of the public purse to fund them. When budget structure ceases to serve the defined purpose, it is time for change."

GSIdeas

BUREAU-WIDE FUNCTIONS

Bureau-wide functions such as support services, information management, human-resource coordination, external coordination, education and outreach, and scientific infrastructure are critical to continued success. The policies, standards, and coordination of these functions should be brought to the Bureau level while authority and implementation should be delegated to the lowest effective level. This would help eliminate duplication of efforts, reduce costs, and create a seamless institution in which administrative, information, and personnel services directly support and enhance programmatic efforts. Delegation implies a fundamental change from the current orientation of *command, control, regulation, and aversion to risk to one of facilitation, simplification, service, and support.* As a consequence, a relatively small staff would be active in coordination of these Bureau-wide activities and would ensure a service orientation that demonstrates the addition of value for actions taken.

There is considerable confusion on the assessment process and external overhead charges, including determination of percentages, inter- and intra-unit variability, and an understanding of what services they pay for. A thorough review of assessments and overhead charges associated with Bureau-wide functions is needed. Employees and clients (if appropriate) should understand how and why assessment or overhead funds are being used. Funding for support functions should be derived by a consistent Bureau-wide assessment process or possibly by a line item in the Bureau's budget. To ensure accountability, program coordinators, unit managers, and clients (if appropriate) would all be included in reviews and evaluations not only of plans, procedures, accomplishments and future directions, but of assessment(s) as well. *A fundamental goal at the Bureau level should be to provide essential services at the lowest possible cost.*

SUPPORT SERVICES

A variety of support services is needed by every organizational unit and employee. Many services are handled currently by the Administrative Division. These include personnel, procurement, property and facilities management, travel, and contracting, as well as financial planning, tracking, and cost accounting.

We note that numerous recommendations applicable to the USGS are outlined in the National Performance Review, including the elimination of 50% of internal regulations and the reduction of administrative and supervisory staff. Such issues are not addressed below because the types and amounts of work handled by support services will be influenced greatly by the implementation of measures recommended in the National Performance Review. Similarly, recommendations from the Chief Financial Officers (CFO) Council also should be evaluated for possible implementation.

— Options —

- Develop a Bureau-level support service activity that aids in the development of policies and standards that directly support the mission and programs of the USGS.

- Develop a single-point electronic entry of commonly used USGS, Department of the Interior, and Federal forms along with a standardized, Bureau-wide accounting system with uniform assessment formulae and reporting criteria.

- Ensure that Bureau regulations are no more restrictive than those at higher levels.

- Work with the Department of the Interior to reduce regulations and further streamline support operations. Reduce the number of approvals needed at the Department (e.g., foreign travel, non-official expression).

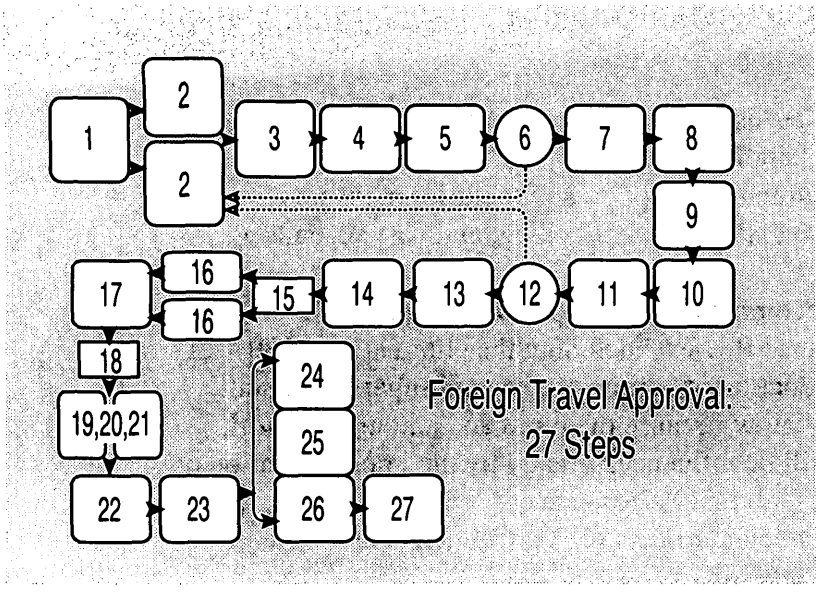
- Review pilot studies and initiatives that target improved support services in the context of Bureau-wide applicability. Examples of such initiatives already underway are:

    1. IDEAS (Interior Department Electronic Acquisition System).

    2. Paperless time and attendance.

    3. AVADS (Automated Vacancy Announcement Distribution System).

    4. Electronic processing of personnel actions.



INFORMATION MANAGEMENT

Information is the life blood of the USGS and must be managed comprehensively so it can be accessed readily by users inside and outside the Bureau. The rapid rise of computing and networking capabilities as well as the formation of a national information infrastructure and an international information highway require a new approach to information. Success of USGS programs in the 21st century will require the existence of a Bureau-wide function that provides basic services of computer infrastructure, support, and security, as well as telecommunications and electronic mail. This function must coordinate end-to-end planning and management of data and information and must ensure that the system is characterized by universal access, high reliability, transparency, and ease of use.

— Options —

- Develop a systematic, integrated, Bureau-wide function to coordinate all aspects of information, including standards and protocols for data transfer and communication to facilitate exchange of information between dissimilar hardware and software.

- Emphasize the importance of coordinating information management and education and outreach by requesting line-item support for coordination of these activities.

- Provide universal access to networked computing services with electronic mail, on-line bulletin boards, standardized Bureau forms, and databases.

- Promote use of the electronic Bureau-wide telephone directory that contains e-mail addresses, job title, fax access, and related information to facilitate inter-unit communication.

- Construct an on-line employee capability index listing current projects and a self-defined list of key interests and skills. This index could be used to foster informal internal communication, to aid in identifying people with needed expertise, and to help direct members of the public.

- Develop an electronic Bureau-wide newsletter to increase inter-unit communication.

- Implement recommendations of the 1993 National Performance Review: *Information and Product Distribution.*

HUMAN-RESOURCE COORDINATION

"The strength of the USGS, past, present and future, is in the people."

GSIdeas

Human resources have been discussed elsewhere in the report. We simply note here that institutional goals for the future, such as the identification of skill needs and increased diversity of the workforce, need to be coordinated at the Bureau level.

— Options —

- Develop a Bureau-level human-resources activity for personnel and EEO functions. This activity should be led by a coordinator who has line authority and reports to the Director.
- Coordinate special emphasis programs (e.g., Ethnic Minority Advisory Committee, Federal Women's Program, etc.) at the Bureau level. Ensure adequate representation from field and regional levels and across organizational units.
- Work with the Department of the Interior and Office of Personnel Management to eliminate burdensome policies, rules, regulations, and paperwork.
- Identify individuals at the Bureau level and at the regional centers who would serve as mediators in conflict resolution.

EXTERNAL COORDINATION

"Developing clients requires several steps. One key step is to LISTEN to them. We are NOT the best judge of what the client needs—THEY are."

GSIdeas

Emerging Earth-science issues are increasingly interdisciplinary in nature and require that the USGS work closely with other Federal, State, and local agencies, universities, and the private sector. In addition, the Bureau needs to improve its coordination and communication with policy makers at the international, national and state levels to best serve the public. Although the responsibility to carry out external-coordination activities occurs at all levels, there are recurring contacts with outside organizations that require day-to-day attention at the Bureau level. These include coordination with

the U.S. Department of the Interior (including sister bureaus), liaison with the U.S. Congress, interagency program coordination (including FEMA, DOE, EPA, NASA, NOAA, DOD, NSF, etc.), and coordination of international programs (e.g., the Office of Foreign Disaster Assistance, U.S. Agency for International Development, the Scientific Committee on Antarctic Research, the International Geosphere-Biosphere Programme, etc.). The primary objective of this activity would be to identify potential new collaborators and new funding opportunities for the Bureau.

"A Federal earth science agency cannot work alone. We need to build profound relationships and joint ventures with others who are expert in related fields, such as biology, ecology, health and medicine, the socio-economic sciences to help integrate the crucial environmental information needed by society."

GSIdeas

— Options —

- Develop a Bureau-level external coordination group that could serve as a link between the USGS and its many diverse clients. This team could combine the activities currently handled by the Assistant Director for Research, Assistant Director for Intergovernmental Affairs, the Office of Congressional Liaison, and the Assistant Director for Engineering Geology.

- Promote effective internal communication to and from all organizational units in the USGS concerning potential new opportunities for cooperation with outside agencies and organizations.

EDUCATION AND OUTREACH

Education of the public on the significance of Earth-science issues and the timely distribution of USGS products to a wide variety of interested parties are of fundamental importance to the Bureau's mission and future. Despite current publication and outreach efforts that reach millions of people each year, the contributions of the USGS are still not widely recognized or publicized. It is therefore imperative that the Bureau expands its efforts to educate the public and make its products and information more readily available and understandable.

"Earth science is our business...information is our product."

GSIdeas

— Options —

- Establish a new education and outreach activity at the Bureau level with primary responsibility for Bureau-wide coordination and initiation of outreach in all efforts and products including: news media services, exhibits, events, speaker requests, education outreach, audio-visual productions, and publications. Establish a team to examine how this new activity should be coordinated and how the regional outreach activities could be consolidated, coordinated, and funded.

- Increase the flow of Earth-science information and educational materials from the Bureau to the wide range of audiences that can and should benefit from USGS activities. This should include materials and information that address an Earth-science curriculum for grades K-12.

- Streamline the publication process to take advantage of desktop publication technology and to reduce the time for product delivery by creating on-line templates for every formal USGS publication series and recommend formats for illustrations.

- Consolidate and oversee all public information offices (Earth Science Information Center, Mineral Information Office, Office of Water Data Coordination, Federal Geographic Data Committee, etc.) at the Bureau level. Link each center into a single information network with several access options (toll-free number, Internet access, etc.).

- Improve Bureau-wide coordination of public education and outreach activities by stationing a public education-outreach coordinator at each major regional center. This individual also would serve in a circuit capacity by periodically visiting all USGS offices within the geographic region.

- Monitor USGS products with a modern, efficient inventory system that allows for innovative marketing strategies.

- Develop a USGS marketing strategy for information. Implement one-stop shopping at information centers. Assemble and install an on-line USGS product catalog and install Internet and toll-free ordering capabilities. Develop the capability to sell products off-site at information booths. Reinvest receipts from product sales into printing and reprinting of best sellers. List USGS books in *Books in Print.*

"USGS scientists were an integral part of the successful prediction of the catastrophic eruption in 1991 of Pinatubo in the Philippine Islands, thereby saving thousands of lives. A video documentary has been broadcast repeatedly on the NOVA series and provides a powerful example of the practical application of results from decades of USGS volcanological research."

GSIdeas

- From the Department of the Interior's Office of Communications, seek delegation of the formal authority and accountability for outreach products.

SCIENTIFIC INFRASTRUCTURE

The scientific infrastructure of the USGS includes a broad range of facilities that could be more efficiently and effectively shared, especially in the regional and larger field centers. Examples of common use facilities are as follows:

- Libraries
- Analytical laboratories (e.g., National Water Quality Laboratory, stable isotope laboratories)
- Large scientific instrumentation facilities (e.g., ion probe facility, Hydrologic Instrumentation Facility)
- Training centers (e.g., National Training Center, Technology Information Centers)
- Geographic Information Systems/digital cartographic/scientific visualization/remote sensing analysis/image processing laboratories
- Core storage facilities (e.g., Core Research Center, National Ice Core Laboratory)
- Computing centers
- Scientific photographic laboratories
- Multidisciplinary field research centers

Some of the most successful field research centers of the USGS have a geographic or topical focus that involves collaboration and cooperation with a wide range of organizations. The USGS should strive, wherever feasible, to implement partnerships with other agencies and institutions working on the same or related topics.

— Options —

- Conduct a complete analysis of the scientific infrastructure of the Bureau to identify opportunities for consolidation and cost savings.

- Develop a strategic, long-range plan for Bureau-level purchase, operation, maintenance, and periodic replacement of high-cost computers, scientific instruments, storage facilities, libraries, laboratories, etc.

- Make recommendations for upgrading, establishing, or consolidating existing facilities nationwide to serve as multidisciplinary research centers. These centers may have a geographic and/or topical focus, and may serve as a scientific knowledge bank.

PROGRAM - ORGANIZATIONAL RELATIONSHIPS

Relationships between programs and organizational units either may facilitate or impede achievement of Bureau mission. As noted above, the current program and organizational structures reflect the historical tripartite mission of the USGS. Through the years the organizational units have become increasingly autonomous. As a consequence, the perception has developed that programs belong to these organizational units rather than to the Bureau.

"Encourage workers to cross organizational boundaries."

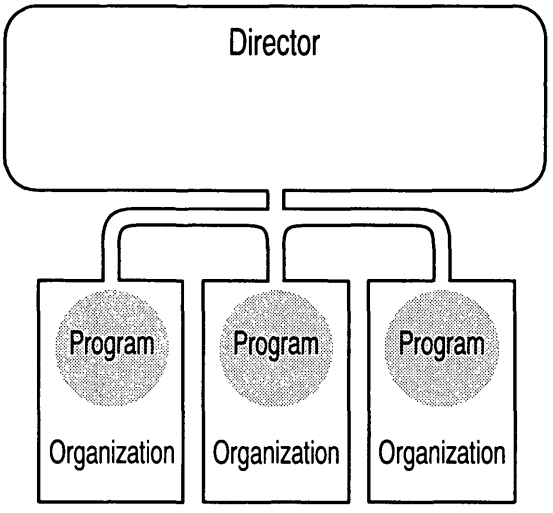
GSIdeas

Recently, many Earth-science issues have emerged whose study clearly would benefit from an interdisciplinary approach (e.g., global environmental change, disposal of nuclear waste, ecosystems, etc.). The same is likely to be true of issues that will emerge in the future. It is appropriate, therefore, to examine the relationship between program and organization to determine if options exist that would better facilitate an interdisciplinary response of the USGS to Earth-science issues that are important parts of our mission now and in the foreseeable future.

Three options for program-organizational relationships presented below are shown schematically to aid conceptualization of similarities and differences. In each schematic, circles are used to represent program functions, which include development of scientific initiatives, strategic planning of scientific direction, recommendations for funding, communication with organizational units, and external science coordination. Rectangles are used to represent organizational functions, which include implementation of projects selected to achieve program goals, line management, communication with program staff, and communication and coordination with external counterparts (e.g., other Federal and State agencies). It is important to note that these options are equally applicable to all levels of the Bureau.

— Options —

- Option 1: Program authority resides within individual organizational units (essentially present status). Programs could represent current budget activities (National Mapping, Geography, and Surveys; Geologic and Mineral Resource Surveys and Mapping; and Water Resources Investigations) or recast activities (e.g., environment, hazards, resources, and Earth-science data and information). Organizational units could be current units (divisions) or newly constituted units.



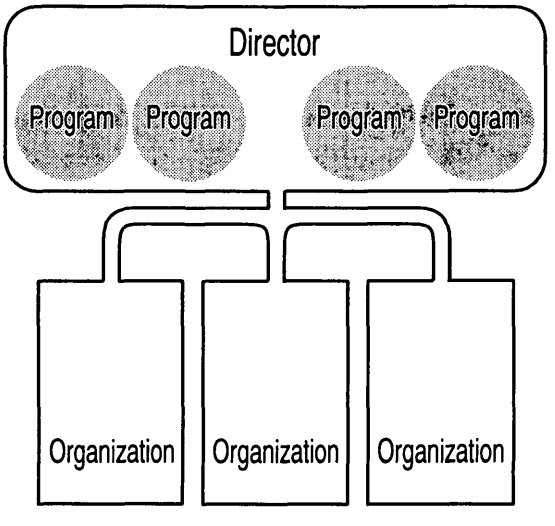
Potential Positive Attributes

- Strong unit program advocacy
- Strong loyalty to unit programs
- Strong mission orientation within unit
- Direct linkage between program funds & line management (accountability)
- Administratively efficient
- Strong grass roots input to all functions

Potential Negative Attributes

- Few incentives for interdisciplinary cooperation
- Competition among units on broad & overlapping issues and funding
- Barriers to inter-unit communication and resource sharing
- Bureaucracy may be duplicated at multiple levels
- Lack of Bureau flexibility
- Autonomous character of units

- Option 2: Program authority resides at Bureau level (executive council). Programs could be new budget activities formed to reflect elements of mission related to significant Earth-science issues (e.g., environment; hazards; resources; Earth-science data and information). Organizational units could be current units, newly constituted units, or regional entities.



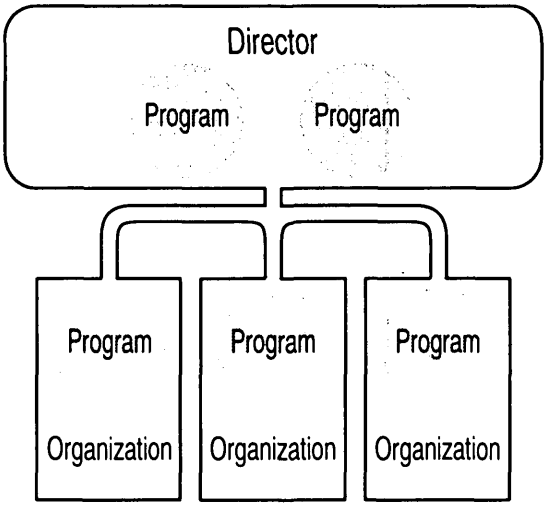
Potential Positive Attributes

- Incentives exist for interdisciplinary collaboration (Program funds available throughout Bureau)
- Program prioritization performed at Bureau level
- Program coordinators reside at Bureau level (promotes inter-program communication)
- Director more directly involved in program leadership
- Bureau more capable of responding to issues in effective manner
- Smaller program staff required within units

Potential Negative Attributes

- Indirect linkage between program funds & line management (accountability)
- Larger program staff required at Bureau level (more bureaucracy)
- Greater distance between program and operational staff
- Less loyalty to unit
- Fewer options for unit management
- Reduced focused capabilities of units

- Option 3: Program authority resides within individual organizational units for issues that would benefit from focused attention and/or specialized capabilities. Unit programs might include current budget subactivities such as National Map and Digital Data Production. Program authority resides at Bureau level for broader issues that would benefit from interdisciplinary approach. Examples of Bureau programs might include Ecosystems and Global Environmental Change. Organizational units could be current units (divisions), newly constituted units, or regional entities.



Programs that reside within units

Potential Positive Attributes

- Strong unit program advocacy
- Strong loyalty to unit program
- Strong mission orientation within unit
- Direct linkage between program funds & line management (accountability)
- Strong grass roots input to all functions

Potential Negative Attributes

- Few incentives for interdisciplinary cooperation
- Barriers to inter-unit communication and resource sharing

Programs that reside at Bureau level

Potential Positive Attributes

- Incentives exist for interdisciplinary collaboration (Program funds available throughout Bureau)
- Program prioritization performed at Bureau level
- Program coordinators reside at Bureau level (promotes inter-program communication)
- Director more directly involved in program leadership
- Bureau more capable of responding to emerging issues in effective manner
- Smaller program staff required within units

Potential Negative Attributes

- Indirect linkage between program funds & line management (accountability)
- Larger program staff required at Bureau level (more bureaucracy)
- Greater distance between program and operational staff
- Less loyalty to program & unit
- Fewer options for unit management

ORGANIZATIONAL STRUCTURE

The structure of the USGS should facilitate achievement of its mission. Over time, increasing division autonomy has generated barriers to interdivisional cooperation and collaboration. In reviewing the mission of the USGS, it is also appropriate to review its structure with the guiding principle that modification of structure should be suggested only if it clearly benefits achievement of mission. The current structure has served the Bureau mission for several decades and remains a viable paradigm, particularly if the options outlined elsewhere in this document are implemented to improve the cooperative effectiveness and efficiency of the organization, but other organizational structures are possible.

Any proposed review of organizational structure should be comprehensive, detailed, and conducted in a participatory manner that involves the broadest possible representation of USGS employees. A review of organizational structure must necessarily follow any modifications in Bureau mission and program structure that might be implemented by the new USGS leadership. The options listed below represent a sampling of the suggestions submitted to us by employees during the past two months; these should stimulate thoughtful discussions and serve as a starting point for a comprehensive review if requested by the new leadership. In addition, documents on organizational structure prepared by numerous ad hoc teams are available. These, together with ideas submitted to GSIdeas during the transition process, could serve as background material for a comprehensive review. In all cases, the following suggestions are applicable at all levels of the organization.

— Options —

- Program-aligned structure: Organization of the Bureau along program lines equates to the current structure if program alignment is not modified. If programs are realigned (e.g., environment, hazards, resources, and Earth-science data and information), then reorganization along those lines is an alternative to the current structure.

- Regionalized structure: Organizational units would correspond to geographic regions (e.g., major regional centers with field centers, field offices, and field stations within the region) and a diversity of disciplines would reside in each region, regardless of programmatic alignment. However, the geographic regions may or may not correspond to the current Eastern, Central, and Western regions.

- Functional structure: Organizational units would correspond to nature of function, regardless of programmatic alignment. For example, units might be strategic, tactical, operational, monitoring, production, etc.

- Disciplinary structure: Organizational units would represent concentrations of closely related disciplines, regardless of programmatic alignment.

CHALLENGES

We have alluded to numerous challenges, distilled from the recurrent themes expressed by employees across the Bureau. These must be addressed if the USGS is to flourish in the 21st century. We also have presented options for charting a new course to address them. None of the challenges is insurmountable, but they require that our leadership capture the vigor and dedication of a workforce that is remarkably motivated and exceptionally competent. Indeed, it is the high quality of the workforce that will propel the institution into the future by overcoming existing barriers and meeting new challenges that will inevitably arise from the delicate but dynamic equilibrium between societal and political realities.

Looking outwardly, the USGS must assert its leadership in the Earth sciences within the Federal government and in the public arena. In so doing we need to integrate, utilize, and press to our advantage our unique combination of expertise in geology, hydrology, cartography, geography, and spatial data systems. We must raise our visibility within the Department both as a partner and collaborator with other bureaus and as a leader in providing critical, timely information and products that help shape the debates concerning public policy in a global environment. We must become more responsive to the needs of our clients by improving integration and productivity throughout the continuum of research, development, application, and dissemination, and by utilizing emergent technologies to improve the quality and availability of our products. By so doing we shall promote the value and significance of our mission, which is a prerequisite for a brighter future.

> *"The challenge we face is the movement into the next century. We do this one day at a time. When we deal with earth science we must move with care. We must maintain the data collection network that has brought us to this point in time and build new lines of communication to other agencies and the private sector. We need to locate the young and bright minds of the work force and train or educate them where necessary and focus them on the future of our population..."*
>
> GSIdeas

Looking inwardly, we must create an organization wherein all employees are trusted to act in its best interest and are given the authority and the means by

which to do so. We must integrate and coordinate the activities of the *entire* Bureau in a much more coherent fashion to address the complex, multifaceted issues in the Earth sciences that are of significance to society. Such integration and coordination demand improved Bureau-wide communications and a participatory and consultative leadership style that can maximize the benefit of a workforce whose talents and dimensions could be improved with greater diversity. We must find a way to guide the institution and its people more efficiently so that our mission can be enhanced through increased programmatic productivity.

Finally, we must envision the future boldly, plan carefully and comprehensively to attain our goals, and act decisively to achieve *Leadership in Earth science for sustained global health, welfare, and prosperity.*

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