Science Work Processes: Considerations and Recommendations for Improving U.S. Geological Survey Science and Achieving Cost Efficiencies

By the ACES Science Work Processes Sub-Team

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Executive Summary of Recommendations

Our findings indicate a wide degree of variation across all Mission Areas for science proposals, work plans, and project management. The systems, processes, and budgeting in use today are sometimes legacy products evolved from the precursor divisions to the current USGS Mission Areas. The current hodgepodge of systems, processes and budgeting methods contribute to inefficiencies in carrying out work, inequities in funding and a highly complicated and antiquated overhead calculation process. The current processes do not lend themselves to the generation and support of new initiatives and make it difficult to sunset mature programs/projects in order to free up funds for critical new science endeavors.

In order to address high priority USGS science, partner and customer science needs, and large-scale societal issues, the USGS must improve and expand its culture of customer service, align science with Administration, Department of the Interior (DOI) and USGS priorities, foster employee skills development, and continuously improve science work processes (SWP).

Listed below are eight recommendations from the report organized under five headings:

I. Assemble and periodically assess the USGS Science Portfolio for partner and customer relevance, societal impact, and alignment with science priorities. This recommendation is of the highest priority and should be started as soon as possible.

II A. Work towards standardized science work practices and processes across the USGS by developing a suite of shared USGS organizational practices, processes, (work plans, proposal and project management) and budgeting tools related to science to support efficient and flexible implementation of high-priority science. Adopting standard science work processes will be difficult but is of the highest priority and should be started as soon as possible.

II B. Evaluate project management and supervisory workload of scientists. Scientists' workload should be a key consideration as standard work processes are developed. Once implementation of II A is well underway, work on II B should begin.

II C. Ensure the USGS has innovative and cost-effective ways to deliver scientific information products to customers. The review of information products is already underway with the Office of Communications and Publishing (OCAP) leading the discussion.

III A. Ensure the USGS proposal/initiative review and approval process includes USGS Science Priorities and societal relevance by developing a standard review process that identifies key weighted criteria that evaluate proposals and initiatives for adding value to the Science Portfolio. This recommendation should be scoped out in 2014.

III B. Enable increased collaboration and efficiency in conducting interdisciplinary science through structured relationships. This recommendation should be scoped out in 2014.

IV. Foster comprehensive employee skills development as a keystone for efficient science production and science leadership. For example efforts are already underway with the Office of Organizational and Employee Development (OED) and the Midwest Region (MWR). Future development and an action plan should be in keeping with the ongoing OED Advisory Council review recommendations and directions.

V. Develop a future state vision for the Science Centers. The final recommendation on a Center Future State is central to long term efforts to promote the Portfolio and should begin in 2014.

Introduction

The USGS Regional and Mission Area organizational structure is now better aligned to address the DOI Science Plan and the USGS *2007-17 Strategic Science Plan* (referred to in this report as the USGS Strategic Plan). In addition, strategic science planning teams have completed forward-looking reports (referred to as the Strategic Science Reports) for each Science Theme and crosscuts which address issues among and between the Mission Areas and Regions. These reports outline the many science needs for the next 10 years (USGS Circular 1383, A- G).

Purposeful Steps and Forward-Looking Planning

"The USGS has taken several purposeful steps in order to position itself for the future and reduce vulnerability to external threats. The first was to realign our organization along our main mission areas (Water, Ecosystems, Hazards, Energy and Minerals, Environmental Health, Climate and Land Use Change, Core Science Systems) rather than disciplines. There are several reasons for this change – one being that it aligns the organization to the 2007 USGS strategic plan and our goals.

Under the earlier disciplinary structure, important mission areas such as climate change, hazards, energy and minerals, etc., were not represented at the Associate Director level, and in fact it was not clear to external stakeholders where in the organization those topics were addressed. I used to hear from some members of Congress that they had difficulty distinguishing the USGS from a university with departments like "Geology," "Biology," "Geography," etc., and wondered whether universities in their districts couldn't do the work.

More recent steps to position us for the future are to update the USGS strategic plan by commissioning forward-looking plans for each of the mission areas through the SSPTs (Science Strategy Planning Teams) and to look for cost savings through the ACES (Achieving Cost Efficiencies for Science) teams to ensure we have the resources we need." ***—Marcia K. McNutt, Director, U.S. Geological Survey, 26 Nov. 2012***

Unfortunately, as indicated in the *ACES Charter*, the USGS annual, inflation corrected budgets have been static or declining for more than a decade, with a few exceptions. The current practice of distributing reduced funding throughout our organization creates a default policy of shrinking in place and leads to challenges in effectively addressing the Strategic Science Reports and high priority partner science needs. Within the context of static or shrinking budgets, redirection of funds to USGS priorities is one possibility. However, we also have seen significant targeted budget increases in areas such as Hazards, WaterSMART, Ecosystem priorities (Asian Carp and Chesapeake Bay), and Hydraulic Fracturing -as proposed in the President's 2014 and 2015 Budgets. Targeted increases are an indication of Administration and

Congressional support for science to address large-scale societal natural resource issues and an opportunity for USGS to provide new science to its partners and fulfill major components of the Strategic Science Reports in a general climate of static or declining appropriated funding.

Congressional interest in USGS pursuing key societal issues

"The USGS programs address increasingly complex societal issues such as the development of alternative and unconventional energy resources, management of critical ecosystems, understanding and adaptation to climate change, and responses to natural and human-induced hazards. For more than a century, the diversity of scientific expertise has enabled the USGS to carry out large-scale, multi-disciplinary investigations and provide impartial scientific information to resource managers, planners, policymakers, and the public…"--2nd Session HOUSE OF REPRESENTATIVES 112–DEPARTMENT OF THE INTERIOR, ENVIRONMENT, AND RELATED AGENCIES APPROPRIATION BILL, 2013

Mission Area-oriented Science Centers predominate in the Bureau. The Centers provide science to fulfill the USGS Science Priorities and the needs of USGS partners and customers. Maintaining core capabilities in pertinent disciplines is critically important for the future of USGS science to address individual partner needs and provide the varied expertise needed to address large-scale societal issues. The organizational shift to Mission Areas was, in part, undertaken to support increased development of interdisciplinary initiatives as called for in the USGS Strategic Plan. The Regional Offices work with the Mission Areas, Centers and partners to effectively bring together USGS expertise to address key issues that require an integrated approach. This report recognizes static or reduced appropriated budgets, the need to support Mission Area-oriented science and the need for strategic direction and integration of disciplines to support interdisciplinary, large-scale science.

How the Considerations and Recommendations Were Developed

ACES Team and the Science Work Processes Sub-Team Charter

The USGS chartered the Achieving Cost Efficiencies for Science (ACES) Team in mid-2011. The purpose of the ACES Team is to identify and suggest efficiencies at Headquarters, Regions and Science Centers that produce cost-effective science and quantify their potential impact. The ACES effort is focused on those activities typically classified as overhead. However, the USGS has a scientific mission and, therefore, it is also appropriate that science work processes (SWP) be examined so that scientific progress is not unnecessarily impeded by administrative requirements and that best practices are used to ensure scientific success while maintaining scientific integrity. An important question the SWP sub-team addressed is "what changes to science work processes would help us efficiently and effectively meet our partners' and customers' needs through our core competencies, and address large-scale complex societal issues?" A related question is "what should the USGS science workforce look like and what skill sets will be needed to address these issues?"

For this report, science work practices and processes are defined as:

- Science project and Portfolio development, execution and coordination;
- Personnel and technological capabilities assessment and development;
- Alignment of organizational structure and function with science goals; and
- Efficient and effective communication of science to our partners and the public.

Approach and Survey Methods Used by the Science Work Processes Sub-Team

The members of the SWP sub-team, listed in Appendix 1, conducted interviews with Region and Mission Area personnel to gain a sense of what works well, identify obstacles and solicit ideas for improvement. In the course of six weeks, 31 USGS managers were interviewed. The complete survey instrument and a summary of the responses are listed Appendix 2.

In addition, the USGS results from the 2012 Federal Employee Viewpoint Survey (FEVS) were examined. The FEVS is a comprehensive, annual survey of all federal employees.

We chose 25 questions (Appendix 3) that are relevant to USGS Leadership, science work processes or employee skill sets. We then examined the results for high or low USGS scores and deviation (+/-) from DOI or Federal Employee averages. Summary findings from the FEVS are then discussed in relation to the report recommendations.

Five ACES reports have been produced to date. The first, on Regional Realignment, resulted in a consolidation of geographic areas and a reduction in the number of Regions. Recommendations from the other four reports—Center Efficiencies, Facilities, Administration and Headquarters are being implemented. A few recommendations from these reports overlap with what we have heard from employees in writing this report. For example, one of these reports includes a recommendation on finding cost efficiencies in the Science Publishing Network. To avoid duplication with the other ACES Reports, we concentrate on global efficiencies related to science work processes and workforce needs across Mission Areas and within organizational units which could require a deeper exploration of procedural or staffing efficiency. In general, we note where overlap occurs with earlier ACES reports.

We first discuss our major finding on a USGS Science Portfolio followed by discussion of changes in science work processes, interdisciplinary science and skills development needed to achieve a strategic and effective Portfolio. Lastly, we discuss the Science Center future state.

Findings and Recommendations

I. The Science Portfolio: Strategic Positioning and Periodic Reassessment

The USGS budget submission to Congress (the *Greenbook)* is one of the few places where the majority of the USGS Science Portfolio (a list of USGS science work) is described in detail in one document. However it does not describe the entire breadth of activities funded by appropriated and reimbursable sources. A Science Portfolio developed from the USGS Science Strategy, core expertise, societal relevance and customer needs is critical to efficiently manage and meet our science mission. Delineating all our science funded by all sources in a Portfolio is necessary for efficiency, accountability and transparency but difficult because there is variation across Mission Areas, Regions and Centers on the approval, funding and tracking of science projects. Science work, whether appropriated or reimbursable, should be closely tied to its priority contribution and relevance to our mission as outlined in the USGS Strategic Plan and subsequent Strategic Science Reports (USGS Circular 1383 A-G) and prioritized in Mission Area guidance. Having appropriated funds tied up in waning science efforts can be just as much a concern as having cutting edge or emerging science funded by unpredictable or short-term reimbursable funds.

It is critical that we assemble, maintain and adapt the USGS Science Portfolio so that it meets partner and customer needs, is societally relevant and is cost effective. Accountability is a keystone, and part of the answer is adopting industry standards and metrics to measure how well the USGS is performing and whether it is creating relevant, effective and efficient projects that deliver value and build a strong overall Portfolio. Effectively delivering USGS science to a changing world requires more collaboration, standardization, continuous improvement, a "service or customer mindset" for all employees, ongoing guidance and leadership at all levels to maintain the Portfolio and focus.

Recommendation I: Assemble and periodically assess the USGS Science Portfolio for partner and customer relevance, societal impact and alignment with science priorities.

The following steps are required for implementation of Recommendation I:

1. Assemble and organize the USGS Science Portfolio including work funded both by the appropriations process and through reimbursable agreements.
2. Maintain accountability for the Portfolio by developing performance metrics (e.g. those used in USGS Budget Office) and by clearly assigning senior management responsibilities (Mission Area and Regional) for major elements. Reassess the major elements of the Science Portfolio at regular intervals for priority, cohesiveness and relevance.
3. Hold scientists and managers accountable for their contributions by regularly reviewing ongoing science for relevance to USGS science direction, partner needs and Portfolio performance. Ensure strong performance management by supervisors, retain strong work and sunset work that is complete or that does not meet current relevance and (or) performance criteria.
4. Establish a timely, transparent and effective process to develop the USGS's annual science priorities. The process should be championed by science managers and scientists with Executive Leadership Team review for submission to DOI for consideration in the President's Budget to ensure relevance and added value to the Portfolio. A useful starting point for implementing step 4 may be the Midwest Region multiyear practice for supporting new science initiatives with Regional Science Flex Funds.

II. Shared Business and Science Work Practices and Processes

Shared Science Business Practices

Many interviewees mentioned that there has been substantial consternation and confusion among Centers, Regions and Mission Areas about different business models across the

organization acting as a barrier to effective cross-program collaboration. The SWP sub-team recognizes the need for simplification and agreement on elements of a shared business model. For each Cost Center there are two types of funding:

Appropriated - such as that in National Water-Quality Assessment Program, Energy Resources Program, and Ecosystems Mission Area.

Reimbursable - a cooperator or partner funds the project.

On many science projects both appropriated and reimbursable funds are used in a *mixed* funding model. For example, in the Water Cooperative Program (Coop) appropriated funds are 'matched' with reimbursable funds. However, this type of mixed funding occurs in all Mission Areas where science is produced with both outside funding sources and USGS appropriated funds (e.g. salaries and facilities).

Individual Science Centers have differing proportions of appropriated, reimbursable, and mixed funding work or projects. More importantly, the science business practices (how a Cost Center does business) and processes (written instructions or forms that are transactional in nature) that are followed by the Mission Areas and Science Centers differ significantly across the USGS. This has led to difficulty when different Mission Areas and Centers work together on science projects and initiatives and to confused partners who see a single USGS with very different business practices and procedures or processes. For example, some Science Centers have historically operated with a majority of mixed and reimbursable funding (in other words, highly leveraged). For these centers, the requirements to charge for salary and overhead support on each project present financial challenges to collaboration with Centers that function predominantly under the appropriated funding structure, where the funds for permanent salary and overhead for a project may be appropriated. A recent change of science business practice in the way the Cooperative Water Program funding (Cooperative Water Program is the Water Mission Area Centers' main source of appropriated funds) is allocated at the Center level allows Centers more flexibility in funding science with appropriated funds. For example, a Center may choose to decrease the partner match on a Coop project of great importance to Administration, DOI or USGS priorities (e.g. Annual Mission Area guidance based on prioritized Strategic Science Report goals) and balance it across other Coop projects at the Center. Changes like this have the potential to break down roadblocks and facilitate greater science collaboration by

creating common, consistent funding approaches where the practice could be to use substantial appropriated funds as a cost share across all Centers working on a common effort.

Business practices can be standardized at the USGS level in order for all Centers (whether highly leveraged or predominantly appropriated) to effectively collaborate (level playing field) on science initiatives. An example of a common business practice would be a USGS-wide common services overhead charge for science planning related to Cross-Center or Mission Area proposal development. This would clearly identify the cost of development and put Centers on a more equal footing. A second example would be facilitating collaboration by offering Science Flex Funds for salaries and operations to highly leveraged Centers and only operating funds to predominantly base funded Centers. These Centers would work together to develop societally-relevant projects or initiatives that address important aspects of the USGS priorities (e.g. Portfolio relevance) and work with regional, state and (or) local agencies.

Another USGS business practice would be to ensure that the USGS Science Portfolio provides a mix of cutting-edge, Mission/partner-driven and emerging-issue science. Each part of the mix may meet different science needs and lends balance to the Portfolio. Mission/partner-driven science such as flood inundation mapping may be funded by reimbursable or mixed funding sources while other emerging issues such as a new strain of avian influenza might be explored with appropriated funds.

Shared business practices, with predictable outcomes and well-understood processes, are important to facilitate efficient and relevant science. Although our organizational structure is complex and can be challenging to manage, it is imperative that we resolve or mitigate the disparate business practices without disrupting the science.

Shared Science Work Processes

Our survey respondents indicated that there is substantial variation in the science work processes within and across the Mission Areas. Much of the appropriated funding and many approaches are a legacy of the discipline-based structure in place before the Mission Areas were organized. Some of these legacy approaches go back decades, while others have been updated, or undergo frequent changes. The proposal, work plan and project management processes lack standardization in format, origination, approval process and timelines. This has led to confusion among staff and with partners and has created inefficiencies in cross-Center science endeavors.

Shared science organizational processes that are clearly understood across the USGS are needed to facilitate improved cooperation among units and to achieve cost efficiencies for science. A planning process developed for the Cooperative Water Program [Water Mission Area (WMA) Memo 13.01, "Programs and Plans - Guidelines for Preparation, Submission and Approval of Water Science Center Project Proposals,"] or the Program Council concept used by Energy and Mineral Resources Programs are excellent models and could provide the foundation for changes needed USGS-wide.

As USGS manages to reduce costs and continually improve its science quality, it will benefit from a "business-like" approach in the managerial and administrative aspects of performing its science. Adopting a *process management approach* through the development of a common language requires processes and tools to be used across the organization and with collaborators. In the business world this is commonly seen as having a "continuous improvement" philosophy and the utilization of a common problem-solving approach. It includes the adoption of industry best practices such as project management and process mapping.

Recommendation II A: Work towards standardized science work practices and processes across the USGS by developing a suite of shared USGS organizational practices and processes (work plans, proposal and project management) and budgeting tools related to science to support efficient and flexible implementation of high-priority science.

These are the suggested next steps for implementing Recommendation IIA:

1. Articulate and evaluate business practices in use in the USGS. Determine the best and adopt as USGS Best Management practices.
2. Develop a standard "problem solving" approach based on the concept of "continuous improvement" and industry standards.
3. Develop a standard business language, standard terms and common processes across the Mission Areas. These would be tools separate from the science aspects of USGS and not disrupt the science programs.

4. Develop guidance that ensures all Cost Centers utilize a comparable approach when populating the categories in the USGS overhead workbook.
5. Stabilize and enhance the process for carry-over funding. Uncertainty on carrying over funds can lead to inefficiencies in usage.
6. Review the funding processes to better correlate when funds become available with planning and payment (e.g. Avoid "found" funds distributed near end of fiscal year).
7. Review the existing proposal, work plan and project management templates, tools, and approaches that are in current use across the USGS.
8. Based on previous recommendation, develop either an all-encompassing standard proposal template that can serve as a proposal/work plan/project plan or develop individual templates (e.g. funding source) for each process and standardize their use across USGS.
9. Develop shared budget/ project management and tracking processes, that include the following elements/tools:
    a. "Cost" elements would include a budgeting tool to consistently estimate salaries and other costs of doing business with appropriated and reimbursable funding for science activities, particularly for indirect charges, across all Centers. This element would have common business practices as part of a uniform budgeting system for multi-year projects (BASIS+ is not a workable budgeting tool but should be improved to function as such or replaced).
    b. "Data Disposition and Repository and Information Management" element to establish uniform standards to plan for and track data and information management and data archiving in the USGS science planning process.
    c. "Skill Sets" element, as called for in the USGS Strategic Plan, which documents skill sets available and skill set gaps.
    d. "Technical Reviewers" element that links with the Office of Science Quality and Integrity (OSQI) and the Skill Sets module to make the tasks of securing qualified reviewers for proposals, work plans, and information products more efficient.

e. "Information Product Planning" element to estimate costs of information products.

10. Develop standard tools, templates and training for program/project coordinators.
11. Build a joint process between Headquarters and the Regions for Program and peer review that provides guidance, feedback and accountability on current projects.
12. Clearly define organizational roles for planning and implementation and build performance goals in Associate, Regional and Center Director performance plans that stress the need to incorporate and adhere to these common business practices and processes across USGS Cost Centers.
13. Build transparent and consistent communications (among Mission Areas, Programs, Regions and Centers) for core and integrated science.

Project Management and Supervisory Tasks

Survey respondents identified the growing workload associated with the management, tracking and reporting for programs and projects. Many comments reflected the need to delegate more authority to the Center to reduce duplication of administrative work for common or routine tasks (identified in the ACES Administration Report). Another concern was removing the "managerial distractions" from scientists so that more resources could be devoted to conducting science. Respondents noted the need to develop clearer roles, responsibilities and career development requirements to maximize the scarce science resources while managing programs and projects in the most effective manner. The new Information Product Data System implemented in July, 2013 is an example of a process change that appears to be reducing the administration workload of scientists. It is important to note that recommendation II B should be a key consideration as recommendation II A is carried out. Once implementation of II A is well underway, step 1 under recommendation II B should begin.

Recommendation II B: Evaluate the project management and supervisory workload of scientists.

These are the next steps in implementing Recommendation II B:

1. Evaluate for cost and effectiveness, a process to assess and determine the workload associated with the size and complexity of science programs, projects and proposals. Develop a threshold that sets a standard for program/project management remaining with the scientist or moving to a formal program/project coordinator.
2. Enhance the user interface and functionality of BASIS+ and develop training materials to reduce learning curve and increase ease of use for scientists and managers.

Delivery of Science Products

Survey respondents urged that we reexamine the ways we deliver our products and the cost model for funding the science publishing enterprise in USGS. The USGS needs cost-effective report products as an archival mechanism for non-standard data from USGS research. It also needs report products that afford scientists a low-cost, high-impact outlet for their scientific discoveries data, and methods to augment the publication of USGS work in scientific journals.

In addition to affordable publication services, USGS scientists are demanding new series publication options such as interpretive products that allow the reader to customize the presentation to individual needs. Web-based products with interactive features and social media may define the future of product delivery. USGS needs to be fully aware of and take advantage of these innovative methods when disseminating our findings. Using an adaptive and continuous improvement approach will help the USGS find the right mix of products to get its diversity of science products to key partners. It is important to note that the OCAP-SPN is leading a review of recommendation II C.

Recommendation II C: Ensure the USGS has innovative and cost-effective ways to deliver scientific information products to customers.

These are the next steps in implementing recommendation II C:

1. Examine web-based products and social media for suitability in communicating our science.
2. Develop or adopt web analytics on views, downloads, citations, etc. to develop metrics on scientific impact of our scientific products and on a regular basis compare communication outlets such as USGS Report Series, formal journal articles, web-based products and social media for impact and efficacy in communicating our science.
3. Examine how Fundamental Science Practices can be incorporated into new communication outlets.
4. Ensure that the Research Grade Evaluation processes fully recognize the significance of any new way of providing our science to our partners/customers.

III. Integration of Interdisciplinary Science

Given shared work practices and processes, another step in strengthening our interdisciplinary science is basing review and approvals for new and continuing science on DOI and USGS science priorities, (e.g. Mission Area Guidance) and Administration and Congressional direction. The USGS carries out substantial multi-disciplinary science at all levels that is often accomplished through good-faith funding contributions from various sources, leveraging of partner reimbursable funds, and various informal "workarounds." At the USGS level, Programs listed in the *Greenbook* have distinct, important funding and oversight roles that serve well for Mission area science. However, these Appropriated Programs vary greatly in their funding mechanisms, the level of science oversight, their planning models, and the breadth of science being funded. This increases the difficulty of conducting integrated science efforts across reimbursable and Appropriated Programs as well as Centers. In addition, reimbursable projects may be local in nature without clear links to Appropriated Programs or the USGS science priorities. Standard review processes will facilitate integrated or interdisciplinary science and strengthen the USGS Science Portfolio.

Recommendation III A: Ensure the USGS proposal/initiative review and approval process includes USGS Science Priorities and societal relevance by developing a standard review process that identifies key weighted criteria that evaluate proposals and initiatives for adding value to the Science Portfolio.

These are the next steps in implementing Recommendation III A:

1. Incorporate Administration, DOI and USGS priorities into the proposal and initiative review and approval process (e.g. through a decision tree) and into consistent internal and external Center and (or) Program reviews. Integrated science achievement or performance metrics should be tested and used to evaluate proposals and projects for alignment with USGS priorities and societal relevance.
2. Project plans throughout the USGS should be viewed as a contract for services that includes performance management and accountability.
3. Assure that funds from different Program sources serve a common intended purpose (particularly for interdisciplinary work) and are managed using the consistent application of a shared model across the USGS.

Good USGS-wide metrics will be challenging, nevertheless they are needed to measure success. USGS has used metrics before with mixed results. Therefore it is important that metrics be vetted for usefulness and tracked for several years. As suggested in the ACES Administration report for other work, a feedback loop to adjust metrics will improve how well the metrics measure our success. Just as continuous improvement and excelling at our science is necessary for our science success, continuously improved and evaluated metrics (including dropping poor metrics) are needed as well.

Collaboration in the Conduct of Interdisciplinary Science

Survey respondents identified the need to increase efficiency and collaboration in working across Mission Areas. As USGS considers changes in how to evaluate and prioritize the Science Portfolio, revise the funding process, and develop shared business practices and work processes, how we work together is likely to change in order to better meet interdisciplinary science needs. Structured relationships such as common definitions of terms and positions and a

common understanding and agreement on processes and engagement protocols among work units will be critical.

Recommendation III B: Enable increased collaboration and efficiency in conducting inter-disciplinary science through structured relationships.

These are the next steps in implementing recommendation III B:

1. Identify and modify or remove those managerial and administrative practices and processes that are an impediment to collaboration, inter-disciplinary science and increased work efficiency.
2. Define the role and responsibility of the Mission Areas, Regions, Centers and other responsible offices in managing the inter-disciplinary science to ensure consistency across the USGS Science Portfolio.

IV. Workforce Skills Development

An optimal Science Portfolio can best be implemented in part through a skilled workforce comprised of a diverse cadre of well-trained scientists, managers and support personnel. One of the challenges facing USGS is that information technology, communications and science technology have progressed very rapidly over the last 25 years. New hires are typically trained in these advances; however, USGS must do a better job of ensuring all staff uses the full array of tools to accomplish our science. Meaningful workforce planning, skills development, retention processes and optimal staff hiring are critical to building a strong Science Portfolio. The need for succession planning, efficient hiring authorities, training plans, and skills development are common processes discussed by respondents in our survey. Similarly, supervisory management, written and oral communication, project management, collaboration, information technology, web and database skills are commonly mentioned as needs in our workforce in addition to the science background and skills. Lastly, the complexities of "straddling science and business" are acknowledged by respondents who indicate that the process of recognizing the abilities of individuals who succeed in both areas is essential because

the skills are different yet equally necessary to successfully lead people in the practice of science. One respondent commented on the scarcity of individuals who are good at science, management, and effectively communicating the value of unbiased science for decision making. These are attributes we should strive to develop through staff training as we face restricted funding in order to create opportunities for new high priority science.

Recommendation IV: Foster comprehensive employee skills development as a keystone for efficient science production and science leadership.

To implement Recommendation IV, a structured training and development process targeted at developing competencies with individuals throughout the USGS is needed. A structured model process should include the following:

1. Develop an enhanced training program for Supervisors and Project Managers that goes beyond the minimum requirements set by the Office of Personnel Management (OPM);
2. Develop a training and development program and toolkit for new Program Managers, Center Directors, and Deputy Center Directors;
3. Develop a "change management" toolkit to support the workforce;
4. Standardize the effort to use industry standards like Analysis, Design, Development, Implementation and Evaluation (ADDIE) and competency models to develop structured training and development programs;
5. Use existing resources like DOI Learn and the expertise of the Office of Organization and Employee Development (OED) staff to reduce cost and ensure the above programs are compatible with USGS guidelines;
6. Adapt the competency model approach beyond typical foundational/leadership dimensions to address major USGS work processes and procedures, and science. This is outlined in detail in Appendix 4;

7. Ensure training includes development in interdependent leadership, mentoring, team approaches, science, management, and marketing. This is outlined in detail in Appendix 4;
8. Analyze and evaluate the training and development program for future use as either a structured curriculum offered on a specified frequency and at a variety of locations, and/or a training and developmental process to support meaningful Individual Development Plans;
9. Use selected questions from the FEVS to develop baselines and improvement metrics for skill development, collaboration, and job involvement (for example the MWR has developed an employee engagement metric). This is an industry standard approach, using an existing resource and data set, that allows us to apply metrics to what is traditionally thought of as the "soft side" of the business of change. A full list of the FEVS questions cited in this report and the 2012 USGS percent favorable scores are listed in Appendix 3.

V. Center Future State

Our Centers provide the science to fulfill USGS Science priorities and Mission/Partner needs. Center makeup and location have been influenced by many factors such as geography, science issue and historical placement.

Future technology, fiscal climate, efficiency and societal pressure issues should shape where and what our Science Centers are. The USGS currently has many examples of merging Centers as well as recommendations from the ACES Center Efficiencies Report to help guide us on Center composition. It is beyond the scope of this report to delve deeply in the future state issue. However, as we continuously improve our work processes and recommendations from our ACES Report are implemented, the logical next step is to define the future state of the Center taking into account all these factors and changes.

Recommendation V: Develop a future state vision for the Science Centers.

These are the next steps in implementing recommendation V:

1. Create criteria for a future state such as: Strong strategic leadership and direction; Entrepreneurial approach; Good mix of concentrations of expertise or knowledge (may be virtual) and geographically-based hard points (labs, field sites); Team-based approach; Centers-of-excellence that specialize in certain scientific skills and capabilities; Reduced infrastructure costs; Efficient business practices and Supports USGS Science Portfolio.
2. Develop a USGS standard for Center restructuring and evaluate Center models or structuring in relation to the USGS Standard and to future state criteria.

Federal Employee Viewpoint Survey and Report Recommendations

The FEVS questions were compared to the recommendations made in the Science Work Processes team report, to gauge support for the findings in the report, and to identify any questions that can be used as future metrics to measure the impact of any of the SWP or ACES report recommendations that are implemented.

Our review of the overall FEVS survey results indicate a high level of commitment and loyalty from the existing workforce to the organization, its mission and the work that is done. However, in response to questions about work process elements like proposals, work plans, projects, and budgeting, FEVS respondents indicate low to moderate amounts of support for the way that USGS currently manages the organization's policies, procedures, and key business strategies as evidenced by questions(percent positive responses is reported for each question):

57. Managers review and evaluate the organizations progress toward meeting its goals and objectives. (58.6% positive)

61. I have a high level of respect for my organization's senior leaders. (48% positive)

66. How satisfied are you with the policies and practices of your senior leaders? (38.7% positive)

This would indicate support for the recommendations that call for the periodic review of the Science Portfolio, shared organizational practices and budgeting tools, and a proposal/initiative review process that balances the science priorities and societal relevance.

Regarding work processes and current workload, the FEVS responses show a high degree of concern with things like:

9. *having sufficient resources to get the job done (45% positive)*
10. *My workload is reasonable (54.7% positive)*
30. *Employee has a feeling of personal empowerment with respect to work processes (51.3% positive)*
32. *Creativity and innovation are rewarded (50.6% positive)*
63. *Involvement in the decisions that affect your work (56.2% positive)*

These responses indicate support for the review of administrative and managerial workloads, and the need to better involve the workforce in determining the work that they do going forward.

Several of the FEVS questions indicate the need for further improvement regarding the increased creativity, innovation and collaboration necessary to conduct interdisciplinary science:

3. *I feel encouraged to come with new and better ways of doing things. (68.4% positive)*
31. *Employees are recognized for providing high quality products and services. (60.4% positive)*
32. *Creativity and innovation are rewarded. (50.6% positive)*
53. *In my organization leaders generate high levels of motivation and commitment in the workforce. (41.4% positive)*
58. *Managers promote communication among different units (about project goals, needed resources) (51.1% positive)*

59. *Managers support collaboration across work units to accomplish work objectives. (57.5% positive)*

There are many of the FEVS questions that support the need for better employee skill development and training:

1. *I am given a real opportunity to improve my skills in my organization. (70.5% positive)*
18. *My training needs are assessed. (52.4% positive)*
21. *My work unit is able to recruit people with the right skills. (43% positive)*
27. *The skill level in my work unit has improved in the past year. (56.7% positive)*
68. *How satisfied are you with the training you receive for your present job? (54.3% positive)*
29. *The workforce has the job-relevant knowledge and skills necessary to accomplish organizational goals. (76.5% positive)*

Questions 1 and 29 identify that the existing workforce has what it needs to do the job today, but the projected turnover of the workforce and the changing needs of the organization could quickly impact what is an existing strength. Questions 18, 21, 27, and 68 all indicate the need for a more structured and comprehensive employee development effort across USGS.

In the future the FEVS survey can be used to help measure USGS effectiveness from a change management approach. As USGS undergoes many of the changes recommended in the ACES Report, we can expect a lot of impact on the workforce. One way to mitigate the negative effects on the workforce is to implement a formal change management strategy to assist with organizational change. Several of the FEVS questions would be reasonable measurements of the implementation of the recommendations from the SWP and other ACES reports, and the overall change management effort. Some of the questions that could be used as metrics for change management are:

59. *Managers support collaboration across work units to accomplish work objectives. (57.5% positive)*

11. *My talents are used well in the workplace. (63.9% positive)*

12. *I know how my work relates to the agency's goals and priorities (82.2% positive)*

20. *The people I work with cooperate to get the job done. (77.9% positive)*

27. *The skill level in my work unit has improved in the past year. (56.7% positive)*

29. *The workforce has the job-relevant knowledge and skills necessary to accomplish organizational goals. (76.5% positive)*

56. *Management communicates the goals and priorities of the organization. (59.8% positive)*

57. *Managers review and evaluate the organizations progress toward meeting its goals and objectives. (58.6% positive)*

58. *Managers promote communication among different units (about project goals, needed resources) (51.1% positive)*

61. *I have a high level of respect for my organization's senior leaders. (48% positive)*

63. *How satisfied are you with your involvement in the decisions that affect your work? (56.2% positive)*

66. *How satisfied are you with the policies and practices of your senior leaders? (38.7% positive)*

Overall, we find support from the responses to the FEVS with the aforementioned findings and recommendations. The Team believes that the FEVS can be used to establish metrics to help measure the impacts of ACES changes. The FEVS provides us with an excellent baseline of knowledge on key topics in the report, as outlined above.

Summary

USGS is a science agency, and science does not always follow a linear path. However, the USGS can and should become more efficient by following recommendations in this and other ACES reports. The USGS Science Portfolio should provide a mix of cutting edge and emerging issue science that maximizes value to society while minimizing cost. The effort and resources directed to meet this goal are determined from partner and customer needs and as formulated in the USGS Strategic Science Reports, Mission Area Guidance, Regional Operational Plans, as well as direct input from scientists and partners on an ongoing basis. Given static budgets, our Science Portfolio must be built or maintained through reaffirming relevant current work, redirection of resources to new work where needed, and creating new initiatives such as WaterSMART funded by Congress or reimbursable sources in order to provide strong science with support regionally, nationally, and internationally. Standard Science Work Practices and Processes play a fundamental role in meeting the objective of maximum societal value at minimum cost by articulating Best Management Practices and Processes to assist managers and scientists in actively managing and determining what science we do, carrying it out effectively, and communicating findings to partners. A keystone in creating new science is our workforce and workplace. We must ensure we have the science, technical, team and leadership skills as well as the physical infrastructure required to efficiently create the societally relevant science our partners need.

There are five major recommendations on this report. The first is to assemble a Science Portfolio and hold scientists and managers accountable for relevance, impact, and alignment with USGS science priorities. This recommendation is of the highest priority and should be started as soon as possible. The second recommendation is to standardize work practices, evaluate project management and supervisory load on scientists and look at our information products. Adopting standard science work processes will be difficult, but it is of the highest priority and should be started as soon as possible with scientists' administrative workload a key consideration. The evaluation of scientists' administrative workload should begin after implementation of standard work processes is underway. The information product review is already underway by a team lead by the OCAP, and it should be left with them. The third recommendation on integration and improving interdisciplinary science should be scoped out in 2014. With the fourth

recommendation on employee skills, future development and an action plan should be in keeping with the ongoing OED Advisory Council Review recommendations and directions. The final recommendation on a Center future state scoping exercise is important to long term efforts to build and promote the Portfolio. It should be done in coordination with Recommendation I.

Abbreviations

ACES	Achieving Cost Efficiencies for Science
AD	Associate Director
Coop	Water Cooperative Program
DOI	Department of the Interior
FEVS	Federal Employee Viewpoint Survey
FSP	Fundamental Science Practices
OED	Office of Organizational and Employee Development
OPM	Office of Personnel Management
MWR	Midwest Region
OCAP	Office of Communications and Publishing
OSQI	Office of Science Quality and Integrity
PMP	Project Management Professional
RD	Regional Director
SME	Subject Matter Expert
SPN	Science Publishing Network
SSP	Strategic Science Plan
SWP	Science Work Processes
WMA	Water Mission Area

References

ACES Charter *http://internal.usgs.gov/homepage_files/blogs/docs/signed_aces_charter.pdf*

Greenbook Budget Justifications and Performance Information Fiscal Year 2014, the United States Department of Interior, U.S. Geological Survey. *http://www.usgs.gov/budget/2014/greenbook/2014_greenbook.pdf*

2007-17 Strategic Science Plan *http://internal.usgs.gov/director/science_strategy/*

U.S. Geological Survey, 2007, Facing tomorrow's challenges—U.S. Geological Survey science in the decade 2007–2017: U.S. Geological Survey Circular 1309, x + 70 p.

Mission Area Strategic Science Reports. *http://www.usgs.gov/start_with_science/* USGS Circular 1383, A-G:

Bright, P.R., Buxton, H.T., Balistrieri, L.S., Barber, L.B., Chapelle, F.H., Cross, P.C., Krabbenhoft, D.P., Plumlee, G.S., Sleeman, J.M., Tillitt, D.E., Toccalino, P.L., and Winton, J.R., 2013, U.S. Geological Survey environmental health science strategy—Providing environmental health science for a changing world: U.S. Geological Survey Circular 1383–E, 43 p.

Bristol, R.S., Euliss, N.H., Jr., Booth, N.L., Burkardt, Nina, Diffendorfer, J.E., Gesch, D.B., McCallum, B.E., Miller, D.M., Morman, S.A., Poore, B.S., Signell, R.P., and Viger, R.J., 2013, U.S. Geological Survey core science systems strategy—Characterizing, synthesizing, and understanding the critical zone through a modular science framework: U.S. Geological Survey Circular 1383–B, 33 p.

Burkett, V.R., Kirtland, D.A., Taylor, I.L., Belnap, Jayne, Cronin, T.M., Dettinger, M.D., Frazier, E.L., Haines, J.W., Loveland, T.R., Milly, P.C.D., O'Malley, Robin, Thompson, R.S., Maule, A.G., McMahon, Gerard, and Striegl, R.G., 2013, U.S. Geological Survey climate and land use change science strategy—A framework for understanding and responding to global change: U.S. Geological Survey Circular 1383–A, 43 p.

Evenson, E.J., Orndorff, R.C., Blome, C.D., Böhlke, J.K., Hershberger, P.K., Langenheim, V.E., McCabe, G.J., Morlock, S.E., Reeves, H.W., Verdin, J.P., Weyers, H.S., and Wood, T.M., 2013, U.S. Geological Survey water science strategy—Observing, understanding, predicting, and delivering water science to the Nation: U.S. Geological Survey Circular 1383–G, 49 p.

Ferrero, R.C., Kolak, J.J., Bills, D.J., Bowen, Z.H., Cordier, D.J., Gallegos, T.J., Hein, J.R., Kelley, K.D., Nelson, P.H., Nuccio, V.F., Schmidt, J.M., and Seal, R.R., 2013, U.S. Geological Survey energy and minerals science strategy— A resource lifecycle approach: U.S. Geological Survey Circular 1383–D, 37 p.

Holmes, R.R., Jr., Jones, L.M., Eidenshink, J.C., Godt, J.W., Kirby, S.H., Love, J.J., Neal, C.A., Plant, N.G., Plunkett, M.L., Weaver, C.S., Wein, Anne, and Perry, S.C., 2013, U.S. Geological Survey natural hazards science strategy—Promoting the safety, security, and economic well-being of the Nation: U.S. Geological Survey Circular 1383–F, 79 p.

Williams, B.K., Wingard, G.L., Brewer, Gary, Cloern, J.E., Gelfenbaum, Guy, Jacobson, R.B., Kershner, J.L., McGuire, A.D., Nichols, J.D., Shapiro, C.D., van Riper III, Charles, and White, R.P., 2013, U.S. Geological Survey Ecosystems Science Strategy—Advancing discovery and application through collaboration: U.S. Geological Survey Circular 1383–C, 43 p.

Appendix 1 — Members, ACES Sub-Team on Science Work Processes

The members of this sub-team were selected by the ACES Team to represent geographic and Mission Area diversity. The sub-team was made up of the following members:

Leon Carl (co-Chair)	Regional Director, Midwest Region
Jerad Bales (co-Chair)	Chief Scientist for Water, Water Mission Area
Paul Beauchemin	Emeritus and Senior Advisor for Communications
Kevin Breen	Bureau Approving Official, Office of Science Quality and Integrity
Stacy Bushée	Chief, Office of Organizational and Employee Development
Martha Garcia	Chief of Staff, Hazards Mission Area
Vito Nuccio	Associate Program Coordinator, Energy Resources Program, Senior Management Advisor, Energy and Mineral Resources, and Environmental Health Mission Areas
Randy See	Science Coordinator, Midwest Region
Frank Shipley	Associate Regional Director for Science, Office of the Northwest Regional Director
Jeff Simley	Product and Service Lead for Hydrography, National Geospatial Program, Core Science Systems Mission Area
Phil Turnipseed	Director, National Wetlands Research Center
Chad Wagner	Chief of Hydrologic Modeling and Investigations Section, North Carolina Water Science Center

Appendix 2 — ACES Science Work Processes Interviews

Whenever possible, the interviews were conducted with two SWP sub-team members present, one serving as the interviewer and the other compiling notes. Notes were compiled into an Excel® spreadsheet and evaluated by the sub-team. We asked the interviewees to share their ideas for improving science work processes in the USGS with the assurance that no personally identifiable information would be shared in the reporting of findings. We looked for the themes and best practices across the USGS and synthesized the feedback we gathered into considerations and recommendations.

Survey Instrument -- Interview Questions

Project Proposal Process

1. *To start, we'd like to find out about the science project proposal process in your (Mission Area, Region, Center, etc.). How are proposals developed in your (Mission Area, Region, Center, etc.)? Does your (Mission Area, Region, Center) use a standard process? (If so, please provide a digital copy.)*
    a. What is the proposal process for appropriated funding?
        i. How long has your process been in use?
        ii. Who initiates project proposals?
        iii. Who approves project proposals?
        iv. How long does it take to complete your process?
        v. Is your process competitive or directed?
        vi. What works well?
        vii. What obstacles, bottlenecks or delays do you find in the process?
        viii. What are your recommendations for improvement?
    b. Do you receive reimbursable funding? If so, what is the proposal process for reimbursable funding?
        i. How long has your process been in use?
        ii. Who initiates project proposals?
        iii. Who approves project proposals?
        iv. How long does it take to complete your process?
        v. Is your process competitive or directed?
        vi. What works well?
        vii. What obstacles, bottlenecks or delays do you find in the process?
        viii. What are your recommendations for improvement?
    c. How might your process help promote interdisciplinary science?

Project Work Plan Process

1. *We'd like to find out about the project work plan process in your (Mission Area, Region, Center, etc.). How are project work plans developed in your (Mission Area, Region, Center, etc.)? Does your (Mission Area, Region, Center) use a standard process? (If so, please provide a digital copy.)*
    a. Does your work plan process differ for reimbursable or appropriated funding? (If so, how do they differ?)
    b. Who reviews the work plan?
    c. Who approves the work plan?
    d. What role do publication costs play in work plan development?
    e. Do you have a data management plan? If so, what does the data management plan look like?
    f. Do you put your work plans into BASIS+?
    g. How do you define deliverables?
    h. What works well?
    i. What obstacles, bottlenecks or delays do you find in the process?
    j. What are your recommendations for improvement?
    k. How might your process help promote interdisciplinary science?

Project Management

1. *Next we'd like to find out about the project management process in your (Mission Area, Region, Center, etc.). Does your (Mission Area, Region, Center) use a standard process? (If so, please provide a digital copy.)*
    a. How do you track your project progress?
    b. Do you have progress reviews?
        i. If so, how frequently?
        ii. Who participates?
    c. Who monitors whether deliverables are completed?
    d. What communication process is in place with your stakeholders?
        i. How frequently do you communicate with your stakeholders?
    e. How does your project management actively track finances?
    f. How do you manage the life cycle of a project?
    g. How do you track human resources?
    h. What obstacles, bottlenecks or delays do you find in your project management process?
    i. How might your process help promote interdisciplinary science?

Program Management

1. *Next we'd like to find out about the program management process in your (Mission Area, Region, Center, etc.). Does your (Mission Area, Region, Center) use a standard process? (If so, please provide a digital copy.)*
    a. How do you track your program progress?
    b. Do you have program reviews?
    c. If so, how frequently?
    d. Who participates?
    e. Who monitors whether deliverables are completed?
    f. What type of feedback and communication do you have with project leaders?
    g. What communication process is in place with your stakeholders?
    h. How frequently do you communicate with your stakeholders?
    i. How does your program management actively track finances?
    j. How do you manage the life cycle of a project?
    k. How do you track human resources?
    l. What obstacles, bottlenecks or delays do you find in your program management process?
    m. How might your process help promote interdisciplinary science?

Skills

Given the scope of this conversation does your organization have the skills needed to be successful in the areas we've discussed? To recap, project and program planning, developing and managing? Where might there be gaps?

a. How do you assess your needs for new skills?
b. How do you develop skills for:
    i. Project management
    ii. Facilitation
    iii. Collaboration
    iv. Team skills
    v. Science leadership
c. Where do you find needed skill sets?

Survey and Interview findings and recommendations

The current work processes do not lend themselves to the "bottom up" generation and support of new initiatives, and make it difficult to sunset mature programs/projects in order to free up funds for emerging issues. Some respondents indicate that a complete and thorough proposal can fulfill the need for work plans and project management, however, a comprehensive and standard proposal process does not appear to exist. Most respondents use a combination of proposals, work plans, and project management with varying levels of competence and support across all

work streams. Tracking, reporting, and communicating program and project status varies, and while the BASIS system is utilized, it appears to be very limited in its capability and very difficult for individuals to learn and use. Managing work plans and projects, along with the tracking, reporting and communicating appears to be an added workload that is a burden on an already stretched thin scientist staff.

Proposal Process

Responses indicated that there is a lot of variation in the proposal process within and across the Mission Areas. The majority of appropriated funding approaches seem to be legacies of the Mission Area prior to coming under the umbrella of USGS. Some of these legacy approaches go back as far as 1995, while others have been updated, or undergo frequent changes. The origination of proposals can start with individual scientists, could be a formal Request for Proposals, or in many cases are generated at the Center level. Proposal approval ranges from committees to a Program Council, to individual Center Directors, individuals who control the funding, to the Regional Directors. The proposal/approval processes range from days, to weeks, or a year. The proposal process is primarily base directed, with some competitive, and some mixed.

Recommendations for improvement

- Increase communication and understanding between Centers and Field Teams.
- Streamline processes to make proposal review and turnaround more efficient. Reduce the number of people and steps involved. Centralize the proposal submission process.
- Change the 50/50 rule. 100% USGS funding with Coop matching funds. Change to auditing at the Center level, rather than the project level.
- Avoid the "hobby shop" mentality and ensure that reimbursable work is recognized by the USGS. Avoid taking on work just to make dollars to support salaries.
- Establish a defined budget project planning process; provide standard templates for submission; and training so that people know how to submit.
- Need more flexibility on carry over funding. Can't afford to lose funding that isn't spent at the end of the FY.
- Provide feedback on proposals that aren't funded, and increase the number of bottom up proposals.

Work Plan Process

Among respondents, half indicated having a formal process, while the other indicated having an informal process. Half the respondents indicated the processes are different for appropriated versus reimbursable funding, the other half said they use the same process for both. There is variation in who completes the work plan ranging from the project coordinator, the Centers, to the collaborator. Work plan approval can be at the program or Center level, and could be the funding entity, the Branch chief, or the Center Director or designee. Most work plans consider

publishing costs, along with data management plans which is generally part of the original proposal. The vast majority of respondents indicated they put their work plans into BASIS+. Defining deliverables ranges from written or annual reports and publications.

Recommendations for improvement:

- Develop a Standardized process entirely in the BASIS+ application
- Ensure that the plan has been looked at locally, regionally and by AO.
- Define a common template for a work plan; have them feel and look similar; would be easier to integrate plans into FBMS or other system.
- Develop a recommended timeline of activities for a proposal.

Project Management

Responses indicated that approximately half use a formal project management process. Tracking is variable through Quarterly reviews, Annual reviews, and BASIS. Most respondents indicate that they hold regular progress reviews, half on a quarterly basis and half on an annual basis. The main participants in the project management process are project chiefs and their staffs. Monitoring of project deliverables resides primarily with the Centers, usually delegated to AD's, Managers and Program Managers. Communication with stakeholders varies across the mission areas, with some missions having communication outreach once or twice a year. Tracking of finances associated with projects varies, and some manually compute data from systems like payroll - while others report using BASIS+, which is not user friendly for financial tracking. The project life cycle is primarily managed through BASIS+, which is also utilized to track staff/HR resources.

Recommendations for improvement:

- Quarterly updates should be required
- Not all staff are comfortable working in BASIS+. Provide more training and support.
- Account for and give credit for the staff time associated with doing project management work.
- Need better role clarification between science and project management roles. Scientists are spread too thin to handle all the project management workload.

Program Management

Responses indicate very little formal program management. Program progress is tracked through a variety of means. Program reviews, strategy meetings, publication, and annual reviews are utilized – with Program reviews being the most common. Most of the monitoring and progress tracking is performed by the Program Coordinators. The Program Coordinators communicate with the Project Coordinators and the Center Directors in an informal and varying frequency. Finance and HR resource staff varies.

Recommendations for improvement:

- Improve the BASIS+ system to support better financial tracking. BASIS+ is very difficult to use.

- Develop standard tools that provide national and regional level tracking of issues, products, management relevance, and cooperators.

Skills

Survey responses indicated concerns about succession planning; specifically regarding the large number of scientists who retirement eligible and the difficulties in hiring training new staff. They identified a high demand for emerging skills in communication, marketing and project management. Additional skill development concerns were identified in web and database skills.

Recommendations for improvement:

- Develop skills by developing toolbox/training to be delivered at the Centers. Need to emphasize proposal development, project management –Fundamental Science Practices (FSP), publication requirements, and how to manage projects well. Need to develop skills for development of good authors who can also manage projects well.

- Center Directors are frequently promoted from research positions and could benefit from the development of skills in project management, facilitation, collaboration, team skills, and science leadership; Staff and Deputy Center Directors will need this development through online training, workshops, etc.

- Provide a formal program in change management and training and development to focus on the new skills needed in today's environment. These skills include an ability to lead and work well with teams.

What is "The single most important thing you would do to improve science work processes in the USGS?"

In response to this question we found that there were several major themes related to work processes. There are strong concerns about streamlining programs, reducing administrative work and recognizing the more entrepreneurial role needed at the Center and Regional level. The need to become more collaborative in order to promote more interdisciplinary science, while creating more uniformity and standardization in the business models is a critical factor. Updating the funding model is urgently to ensure that the right programs and right science is pursued going forward.

Recommendations for improvement:

- Developing training that formalizes and recognizes the need to develop future managers, leaders.
- Develop skill for proposal development, project management (budget management, collaboration, facilitation, ability to work with cooperators) Interpersonal skills and project management skills.

- Programs and program coordinators need to work more closely together to promote interdisciplinary science.
- Integrate programs and have a more uniform business model across the Centers. A common approach needs to be used by all Mission Areas and Centers for proposals, project plan, etc. A standard template would make the process simpler and easier to understand. Have one business model instead of the current 4 or more.
- Diversity the Centers to become more entrepreneurial.
- Recognize the role of the regional office to translate programs for regional implementation
- Reduce the administrative burden on scientists.
- Don't reorganize or restructure he organization without addressing the funding models
- Make all science pass the "so what" or relevance test

Individual Interviews

Structured interviews were conducted with USGS staff personnel. The comments from the interview process support all of the themes identified from the survey data.

Recommendations for improvement:

- More authority needs to be delegated to the Center level to reduce redundant administrative workload.
- The funding process needs to be reviewed from the standpoint of when funds are available. It's difficult to plan projects and pay bills, when funding comes from multiple streams at different points in the fiscal year.
- Create a singular science process, with templates drawn from existing best practices.
- If the goal is to have internal USGS groups compete against each other for certain business, then the playing field has to be leveled. National groups control funding and can disadvantage other smaller competitors by reducing funding authorizations.
- There should be one standard, low-cost way to handle all of USGS publishing.
- There should be a process to evaluate the effectiveness of long term projects with appropriated funding to determine if any become "stale". Set fixed time limits, and establish a formal process to request extensions.
- Transform the culture so that all science that challenges all partners and stakeholders about the value and application of the "science".
- Establish a centralized proposal submission and evaluation system.
- Develop "management" focused training for Center Directors. Center Directors are largely coming in from a research position so there are skills developments needed in all the skills (e.g., project management, facilitation, collaboration, team skills, science leadership, etc.); Center Staff and Deputy positions will need this development also and could develop these skills through online training, workshops, etc.
- Standardize data management across all projects to make it more efficient and accessible.
- Develop standard procedures to assist cross-functional groups to work more effectively when performing inter-disciplinary science.

- Create career development pathways for scientists and managers. We need to remove many of the managerial distractions from our scientists – run interference for project scientists. There is a tradeoff between being able to do great science and being a good manager. A possible solution is to have smaller projects where the project chief is more able to do science and be accountable to the project. We need to be aware of not losing our great scientists to management.

Appendix 3 — List of Federal Employee Viewpoint Survey questions cited in the Science Work Processes Report

[Percentages of positive responses are presented in the order (Dept. of Interior, USGS, Government-wide)]

1. I am given a real opportunity to improve my skills in my organization. (64.3%, 70.5%, 63.2%)

3. I feel encouraged to come up with new and better ways of doing things. (60.9%, 68.4%, 57.8%)
6. I know what is expected of me on the job. (77.2%, 80.0%, 80.1%)
9. I have sufficient resources (people, materials, and budget) to get my job done. (39.9%, 45.0%, 48.0%)
10. My workload is reasonable (50.0%, 54.7%, 58.9%)
11. My talents are used well in the workplace. (59.6%, 63.9%, 59.5%)
12. I know how my work relates to the agency's goals and priorities (82.7%, 82.2%, 83.7%)
18. My training needs are assessed. (46.7%, 52.4%, 53.1%)
20. The people I work with cooperate to get the job done. (72.2%, 77.9%, 72.8%)
21. My work unit is able to recruit people with the right skills. (42.1%, 43.0%, 43.5%)
25. Awards in my work unit depend on how well employees perform their jobs. (44.9%, 51.0%, 41.0%)
27. The skill level in my work unit has improved in the past year. (52.9%, 56.7%, 54.7%)
29. The workforce has the job-relevant knowledge and skills necessary to accomplish organizational goals. (70.2%, 76.5%, 71.6%)
30. Employees have a feeling of personal empowerment when it comes to work processes. (45.3%, 51.3%, 45.2%)
31. Employees are recognized for providing high quality products and services. (49.8%, 60.4%, 48.4%)
32. Creativity and innovation are rewarded. (39.4%, 50.6%, 38.5%)
53. In my organization leaders generate high levels of motivation and commitment in the workforce. (40.0%, 41.4%, 42.9%)
56. Management communicates the goals and priorities of the organization. (55.9%, 59.8%, 62.5%)
57. Managers review and evaluate the organizations progress toward meeting its goals and objectives. (54.2%, 58.6%, 62.0%)
58. Managers promote communication among different units (about project goals, needed resources) (49.1%, 51.1%, 53.3%)
59. Managers support collaboration across work units to accomplish work objectives. (54.7%, 57.5%, 56.9%)
61 I have a high level of respect for my organization's senior leaders. (49.0%, 48.0%, 54.1%)
63. How satisfied are you with your involvement in the decisions that affect your work? (52.6%, 56.2%, 51.6%)
66. How satisfied are you with the policies and practices of your senior leaders? (39.2%, 38.7%, 43.4%)

68. How satisfied are you with the training you receive for your present job? (50.5%, 54.3%, 53.7%)

Appendix 4 — Learning competency models and needed skills.

The ACES science work processes sub-team has identified the need for targeted development at the manager/Center Director level in: Science, Management and Marketing (triple threat). These areas of development correspond to the USGS leadership model and the USGS managerial model which can be found at (*http://www.usgs.gov/humancapital/ecd/ecd_leadershipdevelopmenthome.html*).

The existing USGS national training programs meet Office of Personnel Management (OPM) requirements for new supervisors and formal succession planning but there is a gap in Supervisor/Managerial skill development, education on USGS work processes and procedures, and the discipline of doing science from a training and development perspective at the field level. A pilot process could involve potential candidates for managerial positions and existing Center Directors (12 to 15 people). It would be a sponsored team with support from OED, field SMEs, and some outside resources. In summary, the model process can:

a. Fill the gap in USGS employee development programs at the field level;
b. Allow USGS to meet the OPM guidance of going beyond the minimum requirements *"These minimum training requirements, while helpful, do not address the full spectrum of skills and competencies a supervisor needs to be effective"*--3 Dec. 2012;
c. Develop a structured way to meet OPM requirements for refresher training every three years for supervisors;
d. Create competencies for USGS work processes, and science that will result in standard training for new/existing hires;
e. Increase the effectiveness and efficiency of the USGS staff at a time of decreasing resources, thus, do more with less;
f. Develop a protocol for OED to work with the field on the standard development of training materials beyond the existing courses/curricula; and

g. Utilize existing USGS training resources and eliminate duplicative effort across Centers and Regions.

In addition to the core skills in management, science and marketing, several skills such as project management and communication are highlighted below as fertile areas for skills development and training. These are skills that would be valuable in all employees.

Collaboration

A number of respondents mentioned the importance of collaboration and an "ability to see a collaborative approach rather than viewing each Center for itself," as important to the USGS. The collaborative approach aids in the ability to identify the "big issues emerging from a national context" and allow for Centers to work together naturally. One respondent commented that "sometimes we need a sociologist rather than a scientist," indicating that interpersonal communication skills are required to collaborate.

Facilitation

Underpinning a number of the skills needed is the ability to work collaboratively, communicate effectively and help members of groups or project teams understand their common objectives and assist them to plan to achieve them. Tools and techniques on how to help teams achieve their goals would be beneficial to achieving science goals. If people are more successful working together, outcomes are more easily achieved and often have more impact than a process where group synergy is not considered.

Interdependent Leadership

An advantage of a diverse workforce is the varied backgrounds and perspectives team members bring to a challenge. Interdependent leadership means the team shares leadership and benefits from different perspectives. Interdependent leadership skills overlap with other skills; however, the ability to share leadership on a diverse team is critically important for addressing large complex issues efficiently.

Team skills

Like facilitation and collaboration, the ability to be a successful member of a team is an important skill for USGS scientists and needs to be rewarded in performance plans and through other forms of recognition. At least one respondent commented that new hires to the USGS are entering the USGS with a greater ability to work on teams, having had extensive opportunities to work on teams during their advanced academic experiences.

Effective Project Management

Project management is critical to cost effective delivery of science. Most project leaders employ management methods based on Center tradition, along with ad hoc ideas of their own or from their team. Although these methods seem to work, there is no standardization and approaches are varied. As a result, oversight ranges from thorough to somewhat loose depending on the Center. As currently implemented, there is no training for project management and it is not a standardized process, subject to variation, which in turn can lead to lapses and inefficiencies. There is no evidence that Project Management Professional (PMP) practices are being used extensively. Considerations for fostering "quality products—on time" management processes are:

- Establish standard operating procedures following PMP guidelines to ensure a minimum set of objectives are realized.
- Establish training to develop measureable proficiencies in project management with emphasis on scheduling tasks, tracking progress, and other skillsets needed to deliver quality products on time. Project management training, conducted in the Minnesota Water Science Center during February, 2013, is a foundation for a USGS project-management curriculum.
- Develop shared training and continue to encourage a mentoring process that focuses on skills for collaboration, continuous improvement, customer service, facilitation, leadership, and teamwork.
- Emulate existing USGS leadership courses with offerings in Project Management Intensives and specialized topics.
- Establish standardized training on USGS policy for managing and archiving scientific information through National data repositories.

Workforce Planning

The USGS has gone through several rounds of top-down workforce planning. These efforts have not been viewed in the field as helpful in structuring the Center workforces of the

future. Our challenge is to link these plans to the Strategic Science Reports direction and societal relevance with heavy emphasis on direction from the field. We recommend a bottom-up approach to structure the planning requirements.

Empowering Our Scientists as Communicators

Making our scientists better communicators is a priority. Writing skills to empower our authors are important; however, there is more that our scientists need in order to be efficient in preparing information products. We need to make our authors more efficient through exposure to tools for enhanced productivity such as managing references and citation databases. We also must teach our scientists how to deal with requests from journalists and news-media outlets and how to efficiently use the resources available through the Office of Communications and Publishing. Expanding training opportunities, by enhancing the current 'empowering authors' course, adding topics such as communications intensives, developing software toolkits for efficient writing, and establishing online sessions for illustrations and manuscript template training, will develop the skills our scientists need to be more effective communicators.

We suggest a team from throughout the USGS and led by OED delineate skills needed and ways of meeting those skills needs. In tandem, workforce planning along with recruitment and hiring practices should be evaluated for efficacy and efficiency.