

**NATIONAL SCIENCE FOUNDATION
GEOGRAPHY AND SPATIAL SCIENCES (GSS) PROGRAM**

STRATEGIC PLAN, 2011-2015

The Earth and its inhabitants are dynamic. The number, range, and activities of people continually changes and interacts with natural systems to alter the planet's biota and physical characteristics. Continued advancement in the methods and approaches that scientists use to study the patterns and processes of the Earth, including new analytical tools, geographic information systems, global positioning systems, and new modes of visualization, have transformed the way that geographers, other spatial scientists, and scientists in numerous complementary fields conduct research and provide education.

As noted in the National Research Council's 2010 report titled *Understanding the Changing Planet: Strategic Directions for the Geographical Sciences*:

Many of the central challenges of the 21st century are tied to changes to the spatial organization and character of the landscapes and environments of Earth's surface as populations move, natural resources are depleted, and climate shifts. Research in the geographical sciences has the potential to contribute greatly to efforts to monitor, analyze, and prepare for these changes.

The NRC report highlights the broad range of topics for which research in geography and related fields can generate new knowledge and benefit society. Some of the questions identified in the report are: How are people changing the physical environment of the Earth's surface? How will the world's population be fed in a sustainable way in the coming decade and beyond? How is the movement of people, goods, and ideas transforming the world? How are geopolitical shifts influencing peace and stability? How might scientists better observe, analyze, and visualize a changing world?

The Geography and Spatial Sciences (GSS) Program of the U.S. National Science Foundation (NSF) seeks to advance basic understanding and methods in geography, other spatial sciences, and related fields to enhance fundamental knowledge and address societal problems in response to questions, such as those posed in the NRC report. In 2008, the GSS Program developed a strategic plan that explicitly embraced the broader range of overlapping research communities that it sought to serve and also become more active in supporting interdisciplinary research for which geographers, regional scientists, and other spatial scientists may be major participants. A schematic diagram that conceptually represents the overlap among geography, other spatial sciences, and cognate disciplines is provided on the last page of this document.

In 2011, GSS reaffirms the program's commitment to support basic geographic and spatial scientific research as well as wider-ranging interdisciplinary research in which geographers and spatial scientists may play critical roles. In alignment with the new National Science Foundation strategic plan for Fiscal Years 2012 through 2016, *Empowering the Nation Through Discovery*

and Innovation (NSF 11-047; accessible at http://www.nsf.gov/news/strategicplan/nsfstrategicplan_2011_2016.pdf), GSS expects that the research it supports will continue to draw upon and enhance fundamental theory in geography and/or other spatial sciences. At the same time, GSS will intensify its efforts to encourage and support potentially transformative research, to increase expectations that supported research will benefit society, and to encourage researchers to look beyond traditional scholarly audiences to disseminate research findings and approaches.

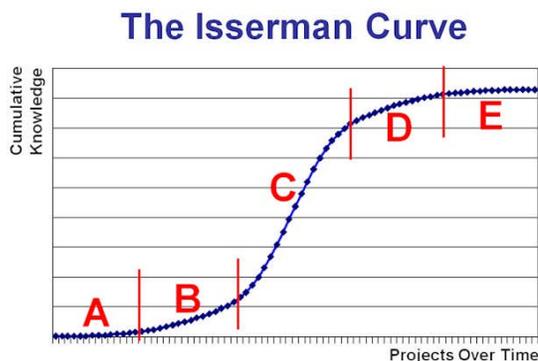
In its 2007 report titled *Enhancing Support of Transformative Research at the National Science Foundation* (accessible at http://www.nsf.gov/nsb/documents/2007/tr_report.pdf), the National Science Board offered the following working definition:

Transformative research involves ideas, discoveries, or tools that radically change our understanding of an important existing scientific or engineering concept or educational practice or leads to the creation of a new paradigm or field of science, engineering, or education. Such research challenges current understanding or provides pathways to new frontiers.

Transformative research has led to dramatic new developments over broad expanses of science over decades. GSS believes that the concept of potentially transformative research needs to be properly framed when considering the proposals that are submitted to NSF for support of specific projects. Within that context, GSS will draw on "The Isserman Curve," a conceptual model that has been used regularly for discussion of proposals by GSS panels for about two decades.¹

The Isserman Curve adapts traditional innovation-adoption curves by considering a productive line of scientific inquiry. Projects over time are represented sequentially on the horizontal axis, while the cumulative knowledge resulting as each project is conducted is represented on the vertical axis. The curve notes that productive lines of inquiry occur well after the line of inquiry, after initial explorations led to a more robust period when the line of inquiry was refined and then widely adopted. After the most significant theoretical and/or methodological advances are made, however, the incremental contributions of subsequent projects decrease, with additional work largely devoted to filling gaps.

Because a merit evaluation process based on peer review normally seeks to identify projects for which the incremental advances are most significant, projects in the middle phase tend to be the ones for which the rationale for funding seems greatest. The GSS Program recognizes that that phase is not attained until lines of inquiry pass through earlier phases, however. So while seeking to avoid providing continued support for once-significant lines of inquiry that no longer are as productive, the GSS Program will intensify its efforts to identify research projects that



¹ The concept was first presented by the late regional scientist Andrew Isserman, during a meeting at NSF in the late 1980s.

may potentially transform geography, other spatial sciences, and related fields by trying to assess the longer-term potential as well as the more immediate significance of research projects. The program will experiment with ways to elicit information from reviewers and advisory panel members regarding the potential longer-term significance of projects that are separate from assessments of the likelihood of a project's success. In cases where potentially promising research is identified despite shortcomings with immediate research plans, GSS will look to provide support for "springboard awards," which will provide lower levels of funding but still seek to enable investigators to meaningfully pursue pilot studies, exploratory activities, or other forms of research aimed at exploring the future potential for a promising line of inquiry.

The GSS Program will continue to examine the full range of potential broader impacts of the projects it considers, but it will place increased emphasis on the societal impact of research. It will call upon investigators to explicitly describe their plans for communicating research results and insights to individuals, groups, and organizations beyond traditional scholarly audiences. Through this change in emphasis, GSS will seek to maintain a strong emphasis on enhancing theoretical development and fundamental understanding while it also endeavors to broaden the value of the new knowledge beyond traditional audiences, thereby helping researchers in geography and other spatial sciences to become even more effective in helping to address the significant challenges and opportunities of this rapidly evolving period.

VISION

The Geography and Spatial Sciences (GSS) Program of the National Science Foundation (NSF) seeks to *advance discovery, basic understanding, and education in geography and the spatial sciences.*

MISSION

The mission of the NSF Geography and Spatial Sciences Program is:

- *To stimulate and support basic research in geography and the spatial sciences;*
- *To advance the development and capabilities of geographers and spatial scientists; and*
- *To foster the involvement of geographers and spatial scientists in interdisciplinary research.*

CORE VALUES

As core values to guide their work, program officers and those who serve on advisory panels or assist as staff members associated with the NSF Geography and Spatial Sciences Program strive to be:

- *Forward-looking.* Anticipating and facilitating advances in basic scientific knowledge and methods in geography, spatial sciences, and related fields.

- ***Integrative.*** Fostering connectivity among geographic subfields and across disciplines in ways that enhance basic scientific knowledge and methodologies that benefit all participating scholarly communities.
- ***Transformative.*** Encouraging and supporting innovative approaches that provide new perspectives and insights.
- ***Inclusive.*** Seeking and accommodating participation by the broadest possible range of investigators, cultures, institutions, and scientific research approaches.
- ***Accountable.*** Conducting programmatic operations with integrity and transparency.

GOALS

The goals of the NSF Geography and Spatial Sciences Program are:

- ***To promote basic scientific research in geography and the spatial sciences that advances theory and basic understanding and that addresses the challenges facing society;***
- ***To promote the integration of geographers and spatial scientists in interdisciplinary research;***
- ***To promote education and training of geographers and spatial scientists in order to enhance the capabilities of current and future generations of researchers; and***
- ***To promote the development and use of geographic methods, tools, and infrastructure for scientific research.***

OBJECTIVES AND STRATEGIES

To attain its goals, the GSS Program will employ a range of strategies to achieve a set of critical objectives:

A. Support Research Through the Geography and Spatial Sciences Program

GSS will support research and related activities that have the highest intellectual merit and most positive broader impacts. Research support will be provided for those projects that are most effective in grounding research in relevant theoretical frameworks in geography and related fields, that focus on questions that emanate from the theoretical discussions, and that use scientifically sound methods to explore the viability of answers to those questions. GSS-supported projects are expected to yield results that will enhance, expand, and transform fundamental theory and methods in geography, the spatial sciences, and related fields. For projects conducted outside the United States, GSS encourages the development of true collaborations between researchers based in the U.S. and other nations, their students, and their organizations.

1. **GSS will support research projects in geography and other spatial sciences for investigators at all stages of their professional careers whose research draws on and enhances theory in geography and/or other spatial sciences and has positive broader impacts, including societal benefits.**

- GSS will conduct up to two competitions annually to support the highest-quality basic scientific research across a broad range of topics, approaches, institutions, and investigators.
 - GSS will monitor the distribution of proposals and awards across different topical, demographic, and organizational categories and use these data to inform future decision making.
 - Pending availability of funds and the quality of submitted proposals, GSS will seek to support at least 15 percent to 20 percent of the proposals it receives each year.
 - Pending availability of funds and the quality of submitted proposals, GSS will seek to support at least three large, interdisciplinary team awards that have strong geographic and/or other spatial scientific content each year at project levels of \$400,000 or more.
- 2. GSS will support Doctoral Dissertation Research Improvement (DDRI) awards in geography and the spatial sciences.**
- GSS will conduct up to two Doctoral Dissertation Research Improvement (DDRI) award competitions annually to provide support for the highest-quality doctoral research.
 - Pending availability of funds and the quality of submitted proposals, GSS will seek to support at least 20 percent to 25 percent of DDRI proposals it evaluates each year.
- 3. GSS will support Faculty Early-Career Development (CAREER) awards in geography and the spatial sciences.**
- GSS will conduct annual Faculty Early-Career Development (CAREER) award competition as part of an NSF-wide effort to provide support for the highest-quality integrated research and education programs by early-career faculty members.
 - Pending availability of funds and the quality of submitted proposals, GSS will seek to support at least two CAREER awards each year.
- 4. GSS will place increased emphasis on potentially transformative research.**
- GSS will encourage investigators to make specific the longer-term significance of their research.
 - GSS will encourage external (ad hoc) reviewers and advisory panel members to explicitly consider the long-term significance and potentially transformative character of proposed research, and GSS program officers will seek to provide support for projects seen as having especially strong long-term potential and/or potentially transformative character.
 - GSS will try to identify projects that have considerable potential long-term significance and/or transformative character but that have deficiencies in their immediate research plans. In such cases, GSS may provide support for "springboard awards" at lower levels of funding that will enable investigators to meaningfully pursue pilot studies, exploratory activities, or other forms of research aimed at exploring the future potential for a promising line of inquiry.
 - Pending availability of funds and the quality of submitted proposals, GSS will seek to support at least six potentially transformative awards each year. GSS also will seek to support at least four "springboard awards" each year.

5. GSS will place increased emphasis on the societal impacts of research and on the dissemination of research results to potential beneficiaries beyond traditional scholarly audiences.

- GSS will encourage investigators to explicitly describe their plans for communicating research results and insights to individuals, groups, and organizations beyond traditional scholarly audiences
- GSS will encourage external (ad hoc) reviewers and advisory panel members to explicitly consider the potential societal impact of proposed research and the plans of investigators to disseminate research results beyond traditional scholarly audiences

B. Support Research Through Wide-Ranging Interdisciplinary Competitions

GSS will support interdisciplinary research and research-related education and training that draws on and contributes to the communities of geographers and spatial scientists as well as related fields.

1. GSS will explore mechanisms and pursue opportunities for working with other NSF programs and other organizations to help encourage and support interdisciplinary research.

- Together with other interested programs, GSS will seek to help conduct at least one interdisciplinary competition to support research and/or methods development that will draw on and contribute to theoretical insights across all participating fields.
- Pending the willingness of other units or organizations and the availability of funds, GSS will seek to participate in at least three special multi-program competitions between 2011 and 2015.

2. GSS program officers will participate in interdisciplinary competitions that span NSF divisions and directorates.

- GSS program officers will participate in the conduct of at least four interdisciplinary competitions that span NSF divisions and directorates each year.

C. Support Research Community Development

GSS will provide support for community-building activities that strengthen geography and other spatial sciences and that lead to collaborative interactions with other fields.

1. GSS will support activities designed to diversify the composition of the geographic and spatial scientific workforce.

- GSS will encourage the conduct of activities designed to diversify the composition of the geographic and spatial scientific workforce.
- Pending availability of funds and the quality of submitted proposals, GSS will seek to support at least one award to support diversity-enhancing activities each year, with special attention given to trying to increase the involvement of individuals from historically underrepresented groups.

- GSS will explore possibilities for collaborating with other NSF units and other organizations to pursue activities that will address fundamental issues related to and approaches for broadening diversity in geography and the spatial sciences.
2. **GSS will support activities designed to promote the sharing of perspectives, approaches, and/or methods between geographers/spatial scientists and researchers in other relevant fields.**
 - GSS will encourage the conduct of institutes and/or other integrative activities designed to provide geographers, spatial scientists, and researchers in related fields at early career stages with education and training in the effective use of innovative research methods and research approaches.
 - Pending availability of funds and the quality of submitted proposals, GSS will seek to support at least one award to enhance interdisciplinary methodological development each year.
 3. **GSS will support activities designed to promote new and transformative research methods.**
 - GSS will encourage the conduct of activities designed to promote the development, adoption, and use of advanced research methods by geographers and other spatial scientists, especially methods that may have transformative impacts on future research. Support will be provided through research awards, education and training institutes, or other forms of activity.
 - Pending availability of funds and the quality of submitted proposals, GSS will seek to support at least three methods-advancement awards each year.
 4. **GSS will support research coordination networks (RCNs).**
 - GSS will alert geographers and other spatial scientists to the potential for support of RCNs and will participate in the evaluation of RCN proposals.
 - Pending availability of funds and the quality of submitted proposals, GSS will seek to support at least one RCN award each year.

D. Engage in Outreach and Communications

GSS will actively engage in outreach activities designed to communicate information about GSS and other NSF funding opportunities among researchers in geography, the spatial sciences, and related communities.

1. **GSS program officers will disseminate information about funding opportunities and other relevant issues through professional society publications.**
 - GSS will prepare articles and notices for dissemination through professional society publications, such as the *Newsletter* of the Association of American Geographers (AAG).
 - GSS program officers will prepare at least three articles/notices each year.

2. GSS program officers will conduct workshops and make outreach presentations at a variety of gatherings.

- Pending the availability of funds and/or the availability of necessary technology, GSS program officers will engage in outreach activities through face-to-face presentations and the use of other media for a variety of groups, including:
 - (1) The Association of American Geographers (AAG).
 - (2) Major spatial science societies, such as the North American Regional Science Council, the University Consortium for Geographic Information Science, and the Association of Collegiate Schools of Planning.
 - (3) Regional groups, such as the regional divisions of the AAG, regional science regional divisions.
 - (4) Organizations that serve related research communities and offer opportunities to promote interdisciplinary activities that link scholars in geography and the spatial sciences with scholars in those communities.
 - (5) Universities or other groups that provide opportunities for interaction with scholars from the broader region and/or with larger numbers of current and potential scholars from underrepresented groups.
 - (6) NSF-organized outreach conferences, especially in EPSCoR states.
- GSS program officers will engage in outreach at the following rates:
 - (1) GSS program officers will conduct at least three workshops and/or special sessions at AAG annual meetings each year.
 - (2) GSS program officers will conduct workshops or make presentations during at least one annual meeting of another spatial scientific society each year.
 - (3) GSS program officers will make presentations in person or remotely during at least three regional meetings each two years.
 - (4) GSS program officers will make presentations or participate in panel discussions or other activities in person or remotely at least one meeting of an organization that serves other disciplinary or interdisciplinary research communities at least once every two years.
 - (5) GSS program officers will participate in NSF-organized outreach activities at least once every two years.

3. GSS will involve geographers and spatial scientists in the development of NSF Highlights and other media activities designed to showcase project activities and outcomes.

- GSS program officers will involve geographers and spatial scientists supported by NSF in the development of NSF Highlights, press releases, and other forms of outreach to share noteworthy findings and activities resulting from their work.
- GSS will help develop at least four Highlights, press releases, and other forms of outreach each year that showcase transformative and societally significant NSF-supported research conducted by geographers and spatial scientists.

E. Operate with Integrity, Commitment, and Accountability

GSS program officers will strive to maintain high levels of responsiveness to investigators, reviewers, panelists, and others outside NSF as well as to staff members in all parts of NSF.

GSS program officers also will strive to maintain high standards for management of proposals and awards and for providing timely, fair, transparent, and effective service when making decisions and addressing other tasks. In all aspects of their work, GSS program officers will act with integrity and accountability.

1. GSS program officers will manage the evaluation of proposals in timely, fair, transparent, and effective ways.

- GSS will employ appropriate NSF review procedures to evaluate proposals, using external (ad hoc) reviewers and advisory panel members who provide specific expertise and general perspectives to fairly and effectively evaluate the strengths and weaknesses of proposals with respect to the intellectual merit and broader impacts of the proposed work.
- GSS will evaluate the potential transformative impact and societal impacts of proposals as well as plans to disseminate research findings to relevant individuals, groups, and organizations beyond traditional scholarly audiences.
- GSS program officers will write up award and decline recommendations in ways that make clear how the proposal was evaluated and the rationale on which a final decision is based.
- GSS program officers will ensure that investigators have appropriate information to understand the basis for the final recommendation to award or decline their proposals.
- GSS program officers will work together to be aware of and to respond in prompt and effective manners to inquiries from investigators at all stages of the process, from pre-proposal development through post-recommendation explanation of decisions to decline proposals and management of awards.
- GSS program officers will complete the evaluation of proposals managed by the program in timely ways, working with other division staff members to have award or decline recommendations for at least 90 percent of all proposals concurred by division leaders within six months after the proposal-submission due date.

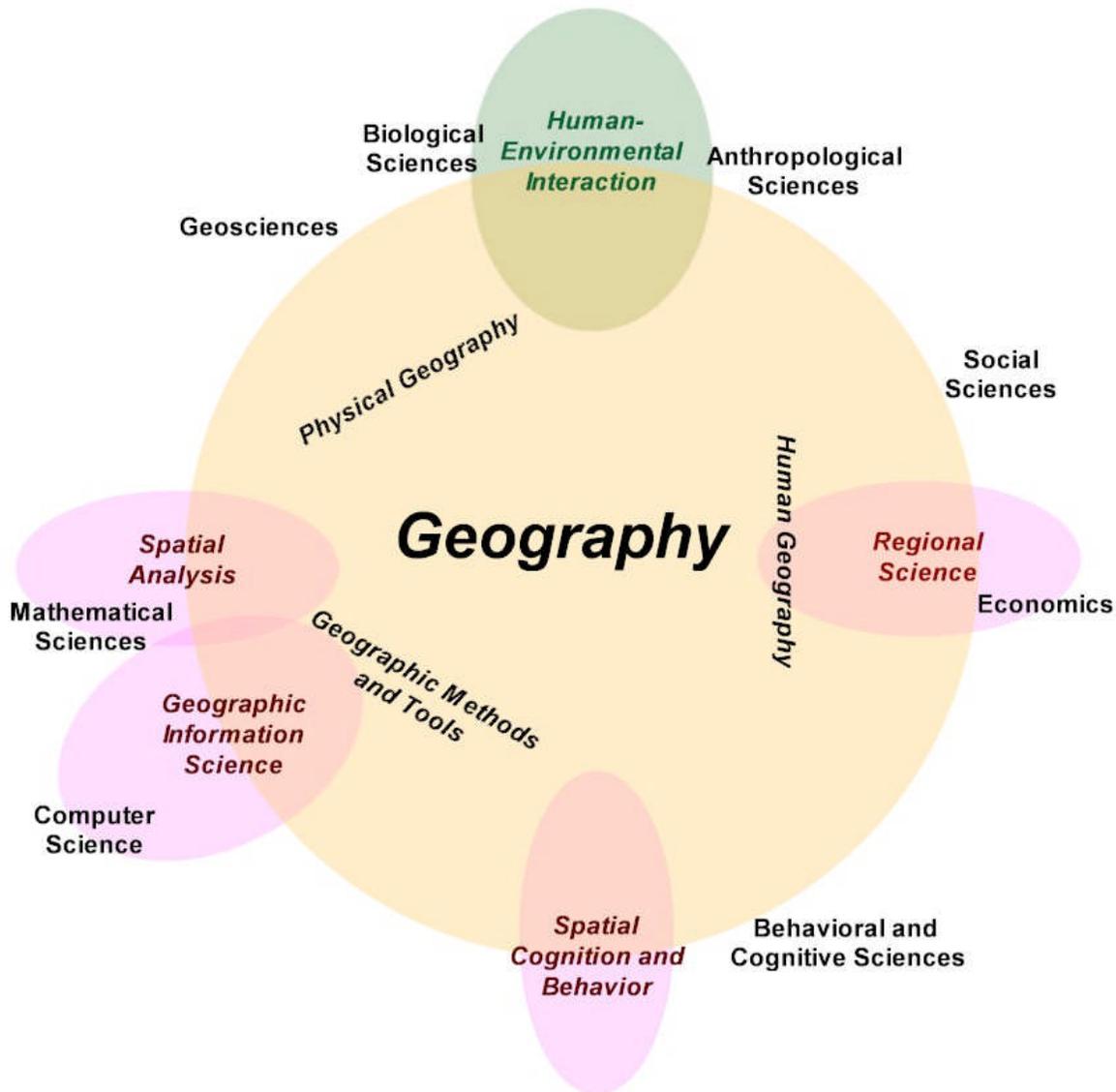
2. GSS program officers will strive to demonstrate the highest standards of integrity and accountability.

- GSS program officers will stay informed about NSF conflict-of-interest rules and procedures and will seek counsel whenever appropriate to avoid conflicts of interest by all involved in the evaluation of proposals and the management of awards.
- GSS program officers will be accountable to others within NSF and to all those who interact with NSF.
- GSS program officers will strive to interact with NSF staff and individuals outside NSF in ways that are open, inviting, polite, respectful, and responsive.

3. GSS program officers will prepare an annual report to assess program activities and accomplishments within the framework of this strategic plan, and they will review this strategic plan on an annual basis.

- GSS program officers will prepare an annual report to summarize activities and accomplishments and to assess how well the objectives specified in this strategic plan have been met.

- The annual report will be completed during the summer and presented to the division director. Following discussions with the division director and other relevant NSF staff members, the annual report will be accessible on the GSS web site.
- GSS Program officers will review this strategic plan each year in order to keep the plan and program looking forward and operating in as effective a manner as possible.



Relationships among geography, other spatial sciences, and cognate disciplines

This diagram is an abstract representation of some ways that geography relates to other fields. It is an admittedly geography-centric diagram. It is not meant to be a comprehensive inventory of all major subfields in geography and the spatial sciences or other related fields. It highlights those areas for which NSF support has been most frequent.