

**GEOSYSTEMS RESEARCH INSTITUTE
at Mississippi State University**



A STRATEGIC PLAN FOR PROGRAM EXCELLENCE

2009-2013

MSU

RESEARCH

Geosystems Science

LEARNING

Enabling Technology

SERVICE

Applications

GRI

The Geosystems Research Institute (GRI) engages faculty from across the University, supports a number of federal sponsors, and collaborates with many university and industry partners. GRI supports Mississippi State University's (MSU's) land-grant mission of Research, Learning, and Service by acquiring and disseminating knowledge about earth and its systems, integrating geosciences and engineering, translating geospatial technologies and skills into useful tools, and transitioning science and technology into practice to support our stakeholders and improve policy and public awareness.

GRI has excelled in interdisciplinary geospatial systems research and applications, but further integration is needed to solve increasingly complex issues. Geospatial systems integration is an end-to-end process that takes into account the end-users' requirements and societal benefits, and integrates domain knowledge of specific scientific disciplines, observational science, and computational science to provide an optimized and integrated solution. Our integrated approach is not commonly executed or taught within individual academic disciplines, but offers the University the opportunity to explore and capture nontraditional research initiatives and broaden its research portfolio. The following strategic plan lays out an approach to further this aim and achieve GRI program excellence.

VISION

Advance Geospatial Discovery, Knowledge, and Education to
Improve Decision-Making

MISSION

Better Understand and Predict Earth's Systems and Develop Geospatial
Technologies that Promote their Stewardship, Sustainability, and
Contributions to Prosperity

GOALS

1. Create an organization that serves as the equivalent of a University "Geosystems Skunk Works" that is able to rapidly and effectively respond to opportunities and challenges that arise.
2. Enable outstanding research, innovation, and applications by developing unique geosystems infrastructure, data streams, modeling and capabilities that respond to sponsor needs, inter-disciplinary perspectives, systems engineering principles, and a shared commitment to excellence.

3. Expand and improve the quality of, access to, research opportunities with, and applications using advanced geospatial knowledge, observational data, information technology, and modeling.
4. Foster a working environment that is challenging, collegial, entrepreneurial, inclusive, nurturing, outward-looking, and team-rewarding.
5. Educate and train a next generation of geosystems-literate scientists, innovators, and educators and, through collaboration and communication, better inform and support our sponsors and stakeholders.
6. Develop new and innovative information products, tools, and technologies that support understanding, decision-making, and sustainable management of natural systems and resources.
7. Enhance the academic reputation of the Institute, and the University, by establishing and upholding rigorous metrics for publications, research support, education and outreach, and societal impact.

STRATEGIES

A few important strategies that we have adopted and employ are presented here to illustrate the steps we are taking to become a nationally recognized *Program of Excellence*.

- Focus on a few key high-risk, high-payoff, complex geospatial problems to develop the geospatial systems integration research process.
- Through broad research and applications understanding, systematically improve our flexible geosystems infrastructure and capabilities by carefully developing each initiative, program, and project based on stakeholder requirements.
- Continue to develop GRI's distinctive competencies in agricultural and natural resource systems, coastal and ocean processes, sensor design, systems engineering, remotely sensed data verification and validation, large scale data and information handling, modeling, and visualization.
- Recruit and develop new faculty with complementary knowledge and skills with the rest of the University that are capable of capturing competitive funding to maintain core skills and capabilities.
- Facilitate partnerships and strengthen advisory and leadership teams.
- Seek sponsors meaningfully engaged in either the process of discovery and development, or vitally interested in the results of research, technical experimentation, or prototypes.
- As GRI matures, place even more emphasis on supporting state and regional communities through outreach, contribute to the broader educational and scientific goals of the state, and provide leadership for

the next decade of economic and environmental needs in our region and the Nation.

- Use Federal agencies unmet geospatial requirements to direct our development of expertise and build unique infrastructure to expand and improve the quality of and access to research opportunities.
- Develop an organizational structure that provides the necessary flexibility and ability to execute activities through well defined roles and responsibilities.

PHILOSOPHY

Some elements of our GRI philosophy have stood the test of experience, others have emerged from experimentation and new sponsorship, while still others will continue to be refined as needs and opportunities change in the years ahead. Key elements of the GRI philosophy are presented that highlight the proven and enduring underpinnings of our Vision, Mission and Goals.

- Our founding philosophy of geospatial systems integration — of requirements, technical solutions, and customer centeredness — continues to resonate as a core value of GRI.
- The ability to adapt to meet sponsor needs through collaboration, shared facilities, and administrative responsiveness, as distinguished from traditional compartmentalized arrangements, is a hallmark GRI philosophy.
- Experience leads us to promote and support collaboration as a central philosophy of the Institute—across departments and centers, with and among other academic institutions, and especially with sponsors and partners.
- GRI’s philosophy of operation remains to maintain a small “core cadre” of flexible faculty and staff that find the varied and multidisciplinary challenges of GRI stimulating and rewarding. This allows GRI to foster relationships with individual researchers from across the breadth of the University and elsewhere as required to meet specific sponsor needs.
- GRI emphasizes the importance of creating a great place to work, a rewarding environment for research and learning, a living laboratory for the technical arts, and a “go to” geospatial resource.
- The University’s commitment to service through extension, economic development, and continuing education is embraced as a rewarding way of doing business.

Organizational Structure

The GRI organizational structure can be thought of in two ways. From a staffing perspective, GRI is organized in a hierarchical structure, with a

Director, and Associate Directors reporting to the Director. The GRI Director leads the executive management and program direction of GRI. The GRI Leadership Team assumes increasingly important roles in project management, and in coordination among the functional elements of GRI, with academic departments, and with external collaborative arrangements. As programs mature from the conceptual and developmental stages to sustainment and implementation (perhaps the most important overall criterion of GRI success), Program Offices will be formalized and become more autonomous but will continue to be linked to the core program via Leadership Team participation, administrative and technical ties, and shared infrastructure/facilities.

Advanced concepts groups will be created as opportunities arise, supporting the Director in strategic planning and coordinating with the internal organization to respond to and develop interdisciplinary projects. An advanced concept group may include a social sciences component to estimate the social benefit of projects. An advanced concept group will develop the embryonic initiatives, such as small satellites and unmanned aircraft systems as opportunities arise. This function will also service as an interface with private industry and support the development of partnerships.

In order to effectively engage advanced concepts and to reflect the necessary integration of effort, a second, functional, organization has been adopted by GRI. The structure is designed to demonstrate a matrixed organization that is able to support large scale geospatial systems integration and effectively function as a University "Geosystems Skunk Works". In doing so, GRI will employ three complementary strengths— Application Disciplines, Geographic Information Systems (GIS) and Remote Sensing, and Visualization and High Performance Computing. GRI's ultimate strength is in its ability to bring these together to address opportunities that an individual function could not.

The Application Disciplines encompass typical departmental subject areas – plant pathology, biology, engineering, geosciences, wildlife conservation, etc. GIS and Remote Sensing include phenomenology, platforms, sensors, and remotely sensed data verification and validation, which are essential to providing unique capabilities and improve competitiveness. Visualization and High Performance Computing include high end computing, visualization, and modeling. As projects mature and are large enough and have multiyear funding, they will have their own project management infrastructure. As of May 2010 the Northern Gulf Institute (NGI) is only the project that meets these criteria, but others are in development.

The NGI was established in 2006 based in part on a compelling argument made to the National Oceanographic and Atmospheric Administration (NOAA) that the integrated and collaborative GRI model was highly effective and desirable as a foundation for a cooperative institute. Our organizational model shows the NGI Program to be distinctly identifiable in its own right, but wholly

embedded within the GRI framework. This allows both entities to function independently when necessary, but to capitalize as appropriate on the strengths both bring to bear. All faculty and staff will be identified as GRI employees, with the exception of the NGI program office staff at the Stennis Space Center (SSC). This will help clearly delineate the responsibilities and commitments made to the MSU faculty and staff within the Institute, and ensure that NGI staff is able to effectively capitalize upon the broader resources available to them through GRI. A separate organization chart is available for NGI in its Strategic Plan (found at <http://www.northerngulfinstitute.org>).

PROGRAM EVALUATION AND METRICS

GRI has significant experience in meeting the administrative and performance reporting requirements of its funding sponsors. Yet, evaluation and metrics is a key area in need of immediate attention as we move from various “start up” initiatives to more structured (and demanding) collaborative program. In conjunction with NOAA’s Cooperative Institute Program, and in its role as lead university for the NGI consortium, GRI plans to develop a structure for better characterizing and reporting the “societal benefits” of our research, education, and applications.

As a means of executing the goals outlined above we propose to emphasize the societal benefits that each of our projects possess as a distinguishing hallmark of the Institute. Figure 1 provides a guide to a common set of steps that will be developed for each major GRI project. Specifically, each program initiative or implementation component (and over time, each funded collaborative project) should develop a “profile” that identifies: (1) what societal priorities drive or relate to our work; (2) what benefits our research and/or applications seek to achieve; (3) the specific geospatial technical requirements that underpin the work; (4) the collaborative options considered and adopted for the project; (5) how projects fit within GRI (and collaboration) plans and the larger GRI program; and, (6) how the results will be communicated and/or what transition-to-user strategy is adopted.

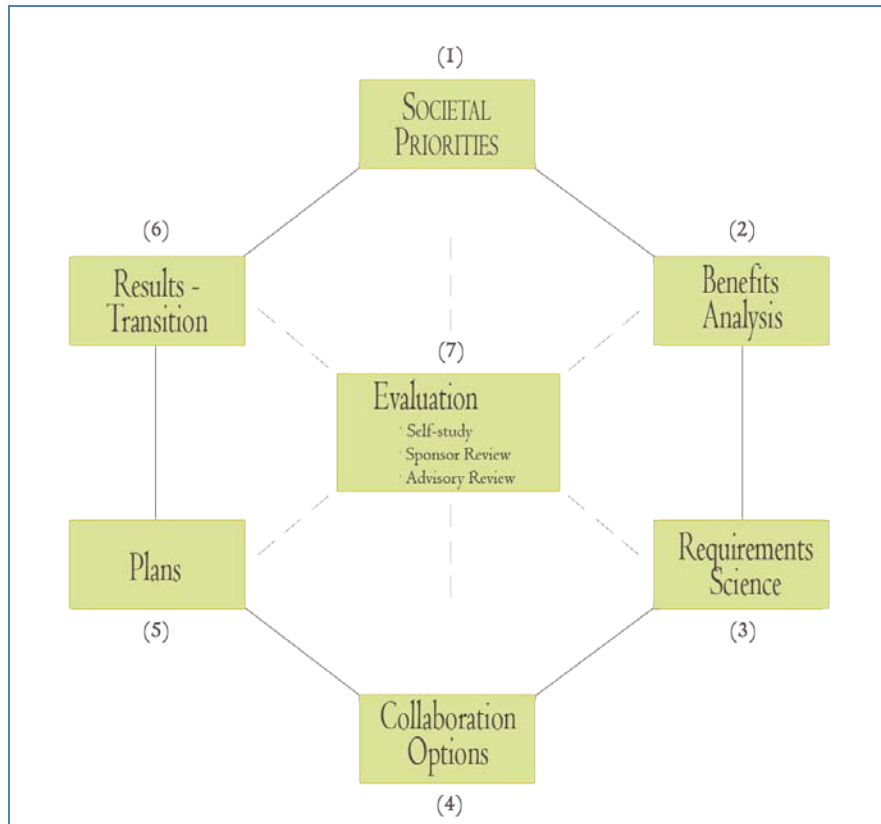


Figure 1: A GRI Program and Project Process

Understanding how each project fits into a larger societal benefit context can begin to instill within the Institute and University at large the meaningful work environment we aim to achieve. The general process described above can formalize and extend program-wide “best practices” to improve the quality of our research, initiate new worthwhile projects, as well as manage and record our experience.

A second major area of evaluation—the measurement of research and technology value—presents a major challenge to the program (and to science generally), but a challenge that must also be addressed immediately. GRI will include the following types of measurement and criteria:

- The number and percent of competitive grants and awards won by GRI;
- Sponsor acknowledgement and use of GRI contributions;
- Invitations by other sponsors or academic institutions to collaborate; and
- Involvement in regional research and applications bodies.
- Transition of knowledge and technology to users.

GRI will place major emphasis on all funds coming through the institute as being rigorously peer reviewed and of the highest quality. Without competition and peer review, project teams can develop a sense of entitlement, or lose their competitive edge, thus harming not only their program, but the quality of the

GRI program overall as well. Competition and peer review can be implemented in a number of forms, from open requests for proposals (as is done with the NGI program), to rigorous peer-review for project teams that have been pre-selected for awards, to limiting project teams to a certain period of funding with the expectation of moving to external competitive grants.

In addition, the Leadership Team will establish baselines and review evaluation criteria to include the following measurable goals:

- Increase nationally competitive research funding;
- Increase PhD student to faculty ratio;
- Increase faculty to research associate ratio;
- Increase post-doctorate involvement in GRI; and
- Increase journal publications per GRI employee.

The leadership team will establish baseline information on these metrics and diligently track them in the future as one means of assessing quality. On a yearly basis GRI will assemble and meet with an Advisory Council, composed of external partners and stakeholders, and separately the Academic Advisory Council that has met in the past, composed of all department heads, deans, and center directors who have faculty collaborating with GRI. Each of these councils will play a strong role in providing independent assessment of GRI vision, mission, and goals, as well as direct input on the relevance and strength of individual projects.

*The Geosystems Research Institute is a member of the
High Performance Computing Collaboratory at Mississippi State University.*

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