FY 2007 Call for Proposals

U.S. Geological Survey, Geospatial Information Office

Center of Excellence for Geospatial Information Science (CEGIS) Research Prospectus

Background

In 2005, the USGS plan Geography for a Changing World: A Science Strategy for the Geographic Research of the U.S. Geological Survey, 2005-2015 described a set of science goals and strategic actions that are consistent with national science priorities and the Department of the Interior and USGS missions, take advantage of existing expertise, and lead to the strengthening of critical core geographic research capacities. One of the core capacities identified was GIScience (geographic information systems, data management techniques, visualization, remote sensing, and spatial statistics and modeling) and one of the strategic actions recommended was to establish a Center of Excellence for GIScience at the USGS.

As a result of the organizational changes instituted by the Director in August 2004, the Geospatial Information Office (GIO) assumed a leadership role within the Bureau for defining an overall GIScience research agenda, in championing GIScience research as a component of the Bureau's science portfolio, and in guiding research to address critical GIScience questions of importance to the USGS. The role of the GIO in providing a geospatial framework for integrating information among all the USGS science disciplines is an important element of GIScience at the USGS.

In January 2006, the USGS Center of Excellence for Geospatial Information Science (CEGIS) was established within the GIO. The CEGIS conducts, supports, and collaborates in research to address critical geographic information science questions of importance to the USGS and to the broader geospatial community. As an essential component of this research program, CEGIS will support and collaborate in technological innovations that further the implementation of the National Spatial Data Infrastructure (NSDI).

GIScience includes the traditional mapping disciplines of surveying, aerial photographic interpretation, photogrammetry, remote sensing, and cartography. It also encompasses a broader scope of issues related to the modeling and representation of geographic phenomena, data, and processes; human cognition of geographic information; the analysis, depiction, and use of uncertainty information; spatial analysis and modeling, including geographic information systems (GIS); scale sensitivities; geographic ontologies; visualization; and other similar topics.
Scope and Priorities

Total funding available for new projects under this prospectus in FY 2007 is approximately $1,000,000. Projects may be of one to three years in duration with second and third year funds provided based on satisfactory progress and availability of funds in the FY 2008 and FY 2009 budgets. One-year projects should serve as seed or pilot projects and will be funded to a maximum level of $150,000. Two- and three-year projects will be funded to a maximum level of $250,000 per year. In FY 2007, it is expected that the majority of the awarded funds will be devoted to one-year projects.

Lead Principal Investigator must be a full-time USGS government employee. Matching and cost-sharing of funds are not requirements, but projects with these characteristics will be given preference. USGS cross-disciplinary, other Federal agency, and/or academic collaboration are also not required, but such proposals will be given preference.

Priority Research Questions

The science mission of USGS offers numerous challenges within the GIScience domain. For instance, consider the Bureau science thrusts - Water Availability for Ecological Needs, Landslides and Debris Flows, Fire Science, and Integrated Landscape Monitoring. How do we choose and integrate the geospatial data sets needed to understand landslide hazards? How does the error and uncertainty in geospatial data affect the accuracy of water quantity and quality predictions? How can we effectively communicate the results of our fire modeling efforts? Other examples of specific questions of relevance across the USGS science disciplines include:

- What roles do scale, resolution, and uncertainty of scientific information play in addressing different types of environmental or natural resources issues?
- Can a theoretical model be developed and verified that provides a basis for fusing geospatial data sets of different geometry, resolution, and accuracy?
- Can we develop appropriate methods of visualization to: handle generalization of features at different scales, deal with color and contrast issues when combining multiple raster and/or vector data sets, and represent and display critical data elements on a variety of display media?
- Can we develop tools to automatically measure resolution and accuracy/quality directly from the data and not rely on metadata?
- How can data mining algorithms be designed for handling geospatial data, spatial data access structures, and use of domain knowledge for improved query processing and mining?
- How can science performed with natural boundaries support decisions that have administrative or social boundaries?
- What science-based tools and products can be developed to support decision making?

In addition to these broad science issues, there are important research topics in the areas of visualization, generalization, information fusion, knowledge discovery, data mining,
and database management and information technology that need to be addressed in order to realize the promise of *The National Map*. Examples of specific questions of relevance to the National Geospatial Program Office include:

- Database population and maintenance approaches including: conflation, semantic interoperability, and transactional updates.
- Methods for authenticating vector datasets and raster GIS layers for rights management of geospatial data
- Cartographic base mapping, generalization, and visualization methods for printed and web-based products
- Delivery protocols and mechanisms for digital geospatial data
- Multiscale, seamless, database designs for vector and raster data
- Building an ontology for *The National Map*

**Proposal Format**

Project proposals should use the following format and should not exceed the page limits specified. Do not attach letters of support.

**Project Title Page (1 page)**

*Project Title* Be as descriptive as possible.

*Principal Investigators (PI)* Name, title, address, phone, and E-mail address of all PI's. Note a PI plays a major role in completing the research and receives funds to do work. A scientist can only be a PI on one proposal.

*Primary Contact* Name of the Principal Investigator who will serve as point of contact for any questions about the proposal. Lead PI must be a full-time USGS government employee.

**Project Description (10 pages)**

*Background* Describe the issue, its significance, and the science needed to address the issue.

*Hypothesis* Clear statement of a research hypothesis or question that addresses the need for the study. The statement should be supported by a short literature review.

*Objectives/Approach* Describe project objectives and the proposed methods or approach. Include enough information for reviewers to judge the likelihood of success.

*Expected Results/Products* List and describe the reports, publications, models, fact sheets, web sites, workshops, etc. which will be developed. Funded projects
are expected to produce journal articles describing their research and findings. A final project report will be due within 6 months of project completion.

**Significance to the USGS Mission** Describe how the research benefits the USGS mission or how products of the research meet objectives and goals of the USGS.

**References (2 pages)**

Include a selected literature review of cited references relevant to the proposed research.

**Project Support**

**Cooperators/Collaborators** Name, title, organization, address, phone, and E-mail for each.

**Other Project Support** Describe amount(s) and sources of additional support (internal to USGS and external) directly related to this proposal. Include matching funds, cost-sharing, in-kind support, etc.

**Budget (1 page per year and 1 page summary for all years)**

Use the table below to outline the budget request. Include indirect costs using assessment rates provided by your cost center or regional administrative officers (note -- table has been completed with sample information). For projects continuing beyond FY 2007, complete a separate table for subsequent fiscal year(s) and a summary table for all years.

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**Sample Budget Request**

<table>
<thead>
<tr>
<th>Fiscal Year 2007 Budget</th>
<th>Distribute budget amounts by participating cost center(s)</th>
<th>Total Year 1</th>
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<tbody>
<tr>
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<td>Identify 4-digit Cost Center Code</td>
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<td>Personnel Salary</td>
<td>25,000 10,000 15,000</td>
<td>50,000</td>
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<td>Other expenses travel,</td>
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<td>equipment &amp; supplies,</td>
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<td>laboratory analyses,</td>
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<td>9,000</td>
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<tr>
<td><strong>TOTAL DIRECT</strong></td>
<td><strong>28,500</strong> <strong>13,000</strong> <strong>22,500</strong></td>
<td><strong>64,000</strong></td>
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<tr>
<td>Gross Assessment Rate (for each participating cost center)</td>
<td>7.50%</td>
<td>21.00%</td>
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</table>
| **INDIRECT COSTS ESTIMATE**  
(Gross Assessment rate times Total Direct) | 2,138 | 2,730 | 4,894 | 9,762 |
| **TOTAL** | 30,638 | 15,730 | 27,394 | 73,762 |

**Project Selection**

**Timetable**

All proposals are due by 5:00 pm EDT on September 15, 2006. Proposals must be submitted by e-mail as Microsoft Word document files. No hardcopy proposals will be accepted. Send proposals to cegis@usgs.gov with a subject line: CEGIS Prospectus Proposal.

**Criteria for Evaluation**

An interdisciplinary team will review the proposals based on the following criteria:

1) Intellectual merit,
2) Degree of innovation in the proposed methods or approach,
3) Perceived likelihood of success; value of planned products and outcomes,
4) Overall quality of the proposal, including readability,
5) Application to USGS mission and objectives and overall value to USGS for funds expended.

The recommendations of the review team will be submitted to the Associate Director for Geospatial Information for review and concurrence. Submitters will be notified of funding decisions by October 13, 2006.

**Reference:**