



National Science Foundation

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Dear Colleague Letter: Cyberinfrastructure in Support of Biological Sciences

Directorate for Biological Sciences
Office of Cyberinfrastructure
Offices of the Assistant Directors

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The relationship between transformative scientific discovery and technological advance is an iterative, symbiotic one. The Directorate for Biological Sciences and the Office of Cyberinfrastructure would like to call attention to a recent, cross-foundation solicitation that provides a unique opportunity for members of the biological (and collaborating) sciences to become engaged in advancing an innovative and sustainable cyberinfrastructure in support of biological sciences. The Software Infrastructure for Sustained Innovation (SI2) (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503489&org=NSF&sel_org=XCUT&from=fund) program takes a multi-dimensional approach to the development and provisioning of scientific software. The SI2 program has recently announced a competition that includes *Conceptualization Awards*, which are planning awards aimed at organizing an interdisciplinary community to examine and define their software requirements and challenges.

Numerous Dear Colleague Letters, research initiatives, and programs offered through the BIO Directorate, have drawn attention to significant areas of research where potential grand-challenge problems can be identified, including, but not limited to:

- environmental research at macro scales;
- predicting phenotypes from genotypes;
- characterizing and understanding dimensions of biodiversity on the planet;
- understanding complexity in biological systems; and
- research in science, engineering, and education for sustainability.

When considering the constraints facing such emerging topics, it is possible to identify cyberinfrastructure challenges which, if addressed, could enable one or more areas to make significant advances. These include overcoming limits to data storage and transport, achieving high-throughput performance in critical analytic workflows, extracting complex data from multi-media source, multi-scale modeling and analysis. The past and current technological and research investments made by BIO in areas of data acquisition (National Ecological Observatory Network (NEON), Protein Data Bank (PDB), Plant Genome, Assembling the Tree of Life (ATOL), Long-term Ecological Research (LTER)), software tools (Advances in Biological

Informatics (ABI), SI2), and collaborative science (BIO synthesis centers, Research Coordination Networks) present a fertile assortment of resources that could be leveraged to achieve new levels of technical capability to respond to grand challenge research questions.

BIO encourages members of its research and informatics community to consider this opportunity, either by participating directly in the submission of conceptualization proposals, or by responding to invitations to participate in projects that may be funded through this program. BIO is especially interested in conceptualization proposals that focus on high priority research problems and that will significantly leverage existing investments in ways that transform the infrastructure in support of BIO and BIO-related research. OCI is interested in providing a comprehensive, shared software environment as part of an overall coordinated cyberinfrastructure and encourages interdisciplinary research to provide better infrastructure.

Sincerely,

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Software Infrastructure for Sustained Innovation (SI2) website:

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503489&org=NSF&sel_org=XCUT&from=fund