



NSF 10-029

## Software Infrastructure for Sustained Innovation (SI<sup>2</sup>)

The Office of CyberInfrastructure (OCI) is partnering with Directorates and Offices across the Foundation to establish *Software Infrastructure for Sustained Innovation (SI<sup>2</sup>)*, a long-term program focused on realizing a sustained software infrastructure that is an integral part of NSF's *Cyberinfrastructure Framework for 21<sup>st</sup> Century Science and Engineering (CF21)*<sup>1</sup> vision. This program will catalyze and nurture the multidisciplinary processes required to support the entire software lifecycle, and result in the development of sustainable community software elements at all levels of the software stack and addressing all aspects of CI, from embedded sensor systems and instruments, to desktops and high-end data and computing systems. The goal is to create a software ecosystem that scales from individual or small groups of software innovators to large hubs of software excellence.

The overarching goal of the CF21 is to catalyze new thinking, paradigms and practices in science and engineering. CF21 fosters a pervasive, linked architecture for cyberinfrastructure that enables research at unprecedented scales, complexity, resolution, and accuracy by integrating computation, data and experiments in novel ways, nationally and internationally. CF21 has the potential for revolutionizing virtually every discipline by providing unique insights into complex problems, and thus represents unprecedented opportunities for understanding and managing natural and engineered systems.

Software is a primary modality through which CF21 innovation and discovery will be realized. It permeates all aspects and layers of cyberinfrastructure (from application codes and frameworks, programming systems, libraries and system software, to middleware, operating systems, networking and the low-level drivers).

The CF21 software infrastructure must address complexity, accommodating disruptive hardware trends, ever-increasing data volumes, complex application structures and behaviors, and emerging first-order concerns such as fault-tolerance and energy efficiency. The software must be continually refined, at one end to support these new trends and requirements, and at the other end to support new advances in the disciplines and their computational methodologies. There is also a new sense of urgency and opportunity for such an investment driven in part by the confluence of various stresses, including disruptive hardware trends, new technologies, new application formulations and community readiness.

The SI<sup>2</sup> program will collectively support a vibrant ecosystem of partnerships between academia, government laboratories and industry for the development and stewardship of a software infrastructure that can sustain and accelerate innovation and productivity, nationally and internationally. The focus and scope of the program has been informed by the findings of a number of workshops and panels organized by multiple communities, most notably the various ongoing taskforces that are subcommittees of the NSF-wide Advisory Committee for Cyberinfrastructure (ACCI). It is anticipated that this program will begin with a program solicitation as early as FY 2010 and will ramp up in subsequent years.

Questions or feedback related to this SI<sup>2</sup> initiative and upcoming program solicitation may be directed to Manish Parashar, OCI Program Director, by sending email to [si2@nsf.gov](mailto:si2@nsf.gov)

<sup>1</sup> <http://www.nsf.gov/pubs/2010/nsf10015/nsf10015.jsp>