

## Social, Economic, and Workforce Implications of IT and IT Workforce Development (SEW)

**NITRD Agencies:** NSF, NIH, DOE/SC, DOE/NNSA

**Other Participants:** GSA

The activities funded under the SEW PCA focus on the co-evolution of IT and social and economic systems as well as the interactions between people and IT devices and capabilities; the workforce development needs arising from the growing demand for workers who are highly skilled in information technology; and the role of innovative IT applications in education and training. SEW also supports efforts to speed the transfer of networking and IT R&D results to the policymaking and IT user communities at all levels in government and the private sector. A key goal of SEW research and dissemination activities is to enable individuals and society to better understand and anticipate the uses and consequences of IT, so that this knowledge can inform policymaking, IT designs, and the IT user community, and broaden participation in IT education and careers.

### President's 2009 Request

#### *Strategic Priorities Underlying This Request*

**Human-centered computing:** Develop new knowledge about and understanding of the design, use, and implications of new technologies in economic, social, and legal systems, and their dynamic interactions, with special emphasis on information privacy and human-robot interaction

**Public policy:** Sponsor activities that bring SEW researchers and research findings together with policymakers and practitioners to foster informed decision-making

**Federal information sharing:** Develop interoperability models and best practices for information sharing as part of the Federal Enterprise Architecture and E-government initiatives

**Government IT practitioner communities:** Build communities of practice across all levels of government and private-sector organizations in which practitioners, with support from researchers, can work collaboratively on implementing emerging technologies to improve government services

**Preparing the workforce of the 21<sup>st</sup> century:** Revitalize education to prepare a globally competitive U.S. workforce by expanding access to and integrating computing concepts, methods, and technologies at every stage of the educational pipeline – from K-12 to undergraduate and graduate training; support doctoral and post-graduate programs to expand the highly skilled workforce in such specialized IT fields as bio-informatics and computational science

#### *Highlights of Request*

**Cyber-enabled Discovery and Innovation (CDI):** R&D to address the challenges of distributed knowledge environments that enhance discovery, learning, and innovation across boundaries; better understand the design, implementation, and sustenance of large-scale socio-technical systems such as virtual organizations that integrate humans and cyberinfrastructure to revolutionize the conduct of science and enable innovation in a strong digitally enabled economy; utilize knowledge environments at all levels of education and integrate computational discovery techniques in the education of scientists – NSF

**Creativity and IT:** Advance understanding of the relationships among IT, creativity, and innovation; develop computational models of cognition and approaches that encourage creativity in scientific research and education; continue broadening participation in IT activities by underserved communities; transform IT education in U.S. universities and colleges; develop a globally aware workforce – NSF

**Human-centered computing:** Focus on co-evolution of social and technical systems to create new knowledge about human-machine partnerships – NSF

**Preparing the workforce of the 21<sup>st</sup> century:** Investments that infuse computational thinking into computing education at all levels and in all fields of science and engineering – NSF

**Bioinformatics fellowships and training:** Graduate and post-doctoral programs to expand the ranks of professionals trained in both IT and applications of IT in biomedical research, health care systems – NIH (NLM)

**Computational Science Graduate Fellowship Program:** Support for advanced computational science training activity at national laboratories – DOE/NNSA, DOE/SC

**Collaborative Expedition Workshops:** Open workshop series exploring cost-effective implementations of emerging technologies for the delivery of services at all levels of government, establishing “communities of practice” among IT implementers across government and the private sector, developing reference standards for interoperable Federal information sharing, and fostering communication between researchers and practitioners to inform policy development – CIO Council, GSA, NSF, with NITRD agencies

### ***Planning and Coordination Supporting Request***

SEW activities provide a bridge between the networking and IT R&D community and the larger arena of government policymakers and IT implementers. SEW's partnership with GSA and the Federal Chief Information Officers (CIO) Council supports the Collaborative Expedition Workshops, now in their seventh year, to encourage collaboration among government and community implementers of IT and to demonstrate promising IT capabilities emerging from Federal research. NSF often co-sponsors these events and invites researchers to give talks on SEW-related topics in order to bridge gaps between research and policy. The focus is on emerging technologies for applications in such areas as emergency preparedness and response, environmental protection, public health and health care systems, government information services for citizens, and agency projects under the Administration's Federal Enterprise Architecture (FEA) and E-government initiatives. FY 2008 plans include:

**Scientific collaboration:** Explore lessons from national science communities' "build to share" infrastructure and discovery methods (e.g., tools, governance, security, privacy)

**NITRD participation:** Work with IWGs/CGs to build workshops around high-priority NITRD interests and interagency R&D topics (e.g., scientific peer/merit review, roadmapping, identity management)

Selected impacts of workshop planning and coordination:

**Broad participation:** Total workshop attendance in the thousands (Federal, state, and local government, academia, industry, and other communities); 60-100 participants per workshop; counters stove-piping

**Spread of Wiki technology:** Growing use of cost-effective, efficient tool for collaborative work across the Federal government; 1,700 Wiki pages with 4,000 community files developed, drawing nearly 2 million visits; 5.2 million files downloaded to date, including public comment on E-government implementation (e.g. Federal Funding and Transparency Act)

**Communities of Practice (CoPs):** More than a dozen self-organized groups totaling more than 1,000 participants (e.g., Chief Architects, Capital Planning, IT Performance Management, Enterprise Process Improvement, Knowledge Management Working Group, Semantic Interoperability, Spatial Ontology, XML, Federal XBRL, GeoSpatial, Service-Oriented Architecture, National Transportation Knowledge Network, Agile Financial Data Services, Health Information Technology Ontology Project); use Expedition Workshops to leverage learning and collaborative prototyping around data and information sharing

**Information standards:** Development and implementation of reference models (e.g., National Information Exchange Model developed by DOJ, DHS for interagency sharing of critical information builds on Data Reference Model developed by CIO Council with contributions from workshop participants)

**Interoperability:** Adoption of interoperability models and standards in OMB activities under FEA

### **Additional 2008 and 2009 Activities by Agency**

**NSF:** Continue investments in core research and education programs in human-centered computing; expand opportunities for innovative education and curriculum-development projects; broaden participation in computing by underrepresented minorities

**GSA:** Explore emerging standards and technologies that improve interoperability, ease of use, and cost-effectiveness of Federal IT implementations; foster open CoPs around applications of emerging technologies to improve government services