

Western Region Executive Summary

"Integrative Computing Education & Research (ICER): Preparing IT Graduates for 2010 and Beyond"

Introduction

In order to maintain a workforce that contributes to the country's continuing economic, cultural, and democratic vitality, NSF's CISE Directorate is proactive in identifying and addressing issues related to undergraduate computing education in the nation. In this context, CISE is taking a five to ten-year view of the field of computing education and the impacts of trends such as: decreasing enrollments in academic computing programs, needs of the USA workforce, national demographics, shifts in global competitiveness, movement towards multidisciplinary domains of knowledge in computing applications, the integrative nature of the field of computing, and future grand challenges that may face the field of computing.

Stimuli for Strategic Planning

The driving forces for ICER planning are domestic and global events and trends that impact on the nation's competitiveness and the maintenance of its intellectual resource base in computing including:

- The intellectual content of the field of computing has changed radically. It affects other fields, is affected by other fields, and involves understanding many more complex interactions and integration than in the past. For the most part, computing curricula do not address an integrative view of the field nor have curricula kept pace with industry needs and challenges posed by ever expanding and increasingly complex applications.
- There is no uniform agreement about what constitutes the core of the computing field or how to produce graduates who are intellectually agile in a dynamically changing discipline. Typically, multiple IT programs exist on campus. Cross campus coordination and integration of these programs will improve the efficiency and effectiveness of education and research for every one.
- Graduates of computing programs typically are lacking a systems approach toward solving problems. They are not adept at dealing with the scale-up challenges associated with complex systems of the type they will encounter as practitioners.
- The dwindling pipeline of high school graduates majoring in computing and the underrepresentation of women and other minorities enrolled in computing programs or working as practitioners persists. In the past, international students compensated for the dwindling pipeline, studying both at the undergraduate and graduate levels and most often remaining in the USA workforce after graduation. However, with restrictions on visas, the USA lost this important source of students and practitioners.
- National IT competitiveness is threatened by global economies in a number of ways (e.g., offshoring/outsourcing, emergence of new information-based centers such as in the mid-east, and government supported software development industries such as in Ireland, Israel, and Poland).
- Security has become one of the nation's most pressing immediate needs.

Vision

To foster integrative computing education, CISE envisions a series of activities that will involve major stakeholder groups in the USA. The proposed stakeholders will be selected from groups such as: computing faculty, academic administrators, representatives of professional computing societies and trade organizations, government policy makers and funding organizations, recognized nation leaders and futurists in the field of computing, and representatives of national research and industrial laboratories. The activities will address:

- Campus-wide integration of IT education and research,
- Designing computing curricula that reflect the integrative nature of the field,

The outcomes will be long-term, high impact, and potentially high-risk, strategies to catalyze the transformation of university computing education throughout the nation.