CPATH CB: Living in the Knowledge Society - SUMMARY

This CPATH Community Building project, led by four representative sites (Virginia Tech – a large state university, Villanova – a private university, NC A&T – a historically black university, and U. Texas El Paso – a predominately Hispanic university), will cause an expansion in computing education, helping lead to the Knowledge Society of the 21st Century. Central to that vision is the helpful application of computing, for: individuals, groups, organizations, and societies, in a global context, including the USA.

Transforming computing education is necessary for the Knowledge Society. Students must develop computing competencies so they can help to advance the health, security, and prosperity of the nation. Transformation is needed both for the education of computing professionals and for the larger society, spanning the range of university core disciplines. Many of these disciplines are increasingly dependent on computing to manage data and information necessary to support decision making and action in their own domains. Yet most faculty in these areas are unable to show students how to leverage computing, due to: lack of awareness of computing concepts / capabilities, and belief that exposure to computing only means knowing how to use simple tools (e.g., spreadsheets). This project will place relevant computing concepts within context, e.g., creating / using a decision support system for critiquing plays in a theatre class, understanding digital government in a political science course, or learning hierarchical data structures in a biology class. Similarly, the variables, issues, constraints, and complexity of the problems from these domains will be infused into the computing-related curriculums – so problem solving has a richer and more interesting meaning. The result for our now inadequately prepared students will be full engagement with computing concepts, through direct application to the rapidly changing global society they face.

This project will identify the knowledge and information needs of a range of disciplines, then map these needs to key computing concepts, revitalizing research and education. First, students in computing disciplines will learn more, when they address “real” problems, that are integrated into computing curricula. Computing education will be more fun, with real appeal for a more diverse audience, especially through problem-based learning. Second, identifying the key computing concepts useful for a range of disciplines – then developing and implementing tools, learning modules, and techniques that enable the learning of both the computing concepts and the concepts of the discipline – facilitates (the knowledge of) applying computing concepts to non-computing disciplines. Third, an “open” philosophy and approach will be applied, where students and faculty from computing-related disciplines develop tools and modules in collaboration with those in other disciplines. This approach facilitates the necessary scale and continuous improvement of educational materials, and their wide dissemination through digital libraries.

**Intellectual Merit:** There is a push toward computing services that comes from R&D in computing-related science, technology, and engineering. At the same time, there is a pull that comes from a variety of disciplines with the desire to solve grand challenge problems (e.g., with simulations, supercomputers, data mining, or virtual environments), and to enhance the quality of life for individuals and social groups. Through a series of four workshops, related online community discussions, and our own research, we will discover key computing related issues in core disciplines, engaging leaders nationwide in brainstorming about their computing (education) needs. We will advance computing-related education programs, both in departments like Computer Science and Information Systems, and in core / liberal education courses that will be enhanced with computing-related concepts, tools, and techniques – so those from both persuasions can engage together to build the global Knowledge Society.

**Broader Impacts of the Proposed Activities:** Transforming education, in computing-related disciplines, provides for the technical innovation needed to ensure the future of the nation. Transforming education, by extending knowledge of key computing concepts across the range of core curriculum areas inherent in undergraduate education nationwide, will prepare US college graduates to live in the Knowledge Society.