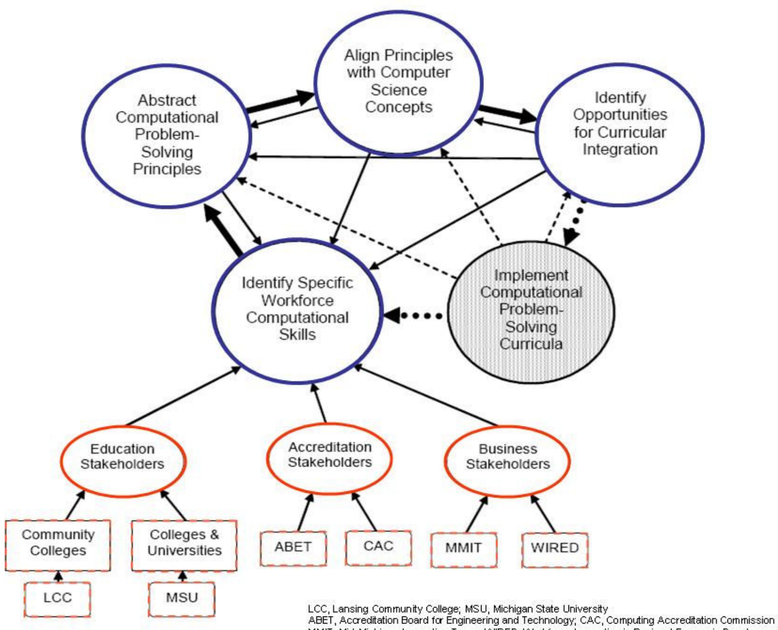
CPACE: NSF Award—0722221

Contributions to Discipline

CPACE is a collaborative effort to bring together a community of stakeholders and academics around the issues of computing education to better prepare students for employment within engineering and technology fields. A major expected outcome is the development of a dynamic process that documents every step of the research from engaging the different stakeholders to implementing a process for curricular reform. CPACE places primary emphasis on the engagement of higher education and higher education engineering and computer science faculty in the process of regional economic change and school-to-work education. Noting the strong computational demands of employers, our core goal is to better prepare graduates for the new economy being created in mid-Michigan. This approach somewhat mirrors the process by which ABET accomplished a reformed evaluation criteria based on customer focus, continuous program improvement, and outcomes in student learning. The apparent success of these new criteria for engineering education demonstrates the need for innovation and flexibility in curricular design based on constituency input and quality improvement principles.

We are developing the Transformation Model depicted in Figure 1. This is a cyclic model with feedback among the five major nodes.



CPACE Transformation Model. The primary focus of this project is on the nodes that are highlighted in blue. The various stakeholders groups and subgroups involved in the Identify Specific Workforce Computational Skills node are highlighted in red. The thick arrows indicate the proposed steps to Identify Opportunities for Curricular Integration. The shaded processes will not be addressed in this project; we will address these in the subsequent Transformation (T) proposal.

The process comprises five phases:

1. Interview and survey stakeholders to identify specific workforce computational skills.

2. Abstract computational problem-solving principles from those skills.

3. Align those principles with computer science concepts to map the problem-solving requirements onto underlying computer science concepts that are the foundation of computer science curricula. This alignment is checked among stakeholders to confirm that they capture important skills.

4. Identify opportunities for curricular integration that fit between the computer science concepts and engineering curricula in other departments. The abstract concepts begin to align with disciplinary problem-solving that addresses the eventual workforce needs.

5. Implement computational problem-solving revisions in both computer science and other engineering curricula.

We envision revising curricula across courses in multiple engineering departments to incorporate computational problem-solving tools within the various disciplinary contexts. From here, graduates enter the workforce, bringing the improved computational problem-solving knowledge and skills.