Principled Assessment of Computational Thinking

Principal Investigators: Eric Snow & Marie Bienkowski, SRI International. Partner: University of Oregon, Exploring Computer Science

SRI Education

ECS Exploring Computer Science

Goals

- Develop valid and reliable assessments of computational thinking practices
- Aid in the adoption of high school computer science courses through assessments that stakeholders recognize as useful boundary objects
- Create **design patterns** for computational thinking practices that can be used to develop new assessments as curriculum evolves
- Create and field test assessments for *Exploring Computer Science* (ECS)

Accomplishments

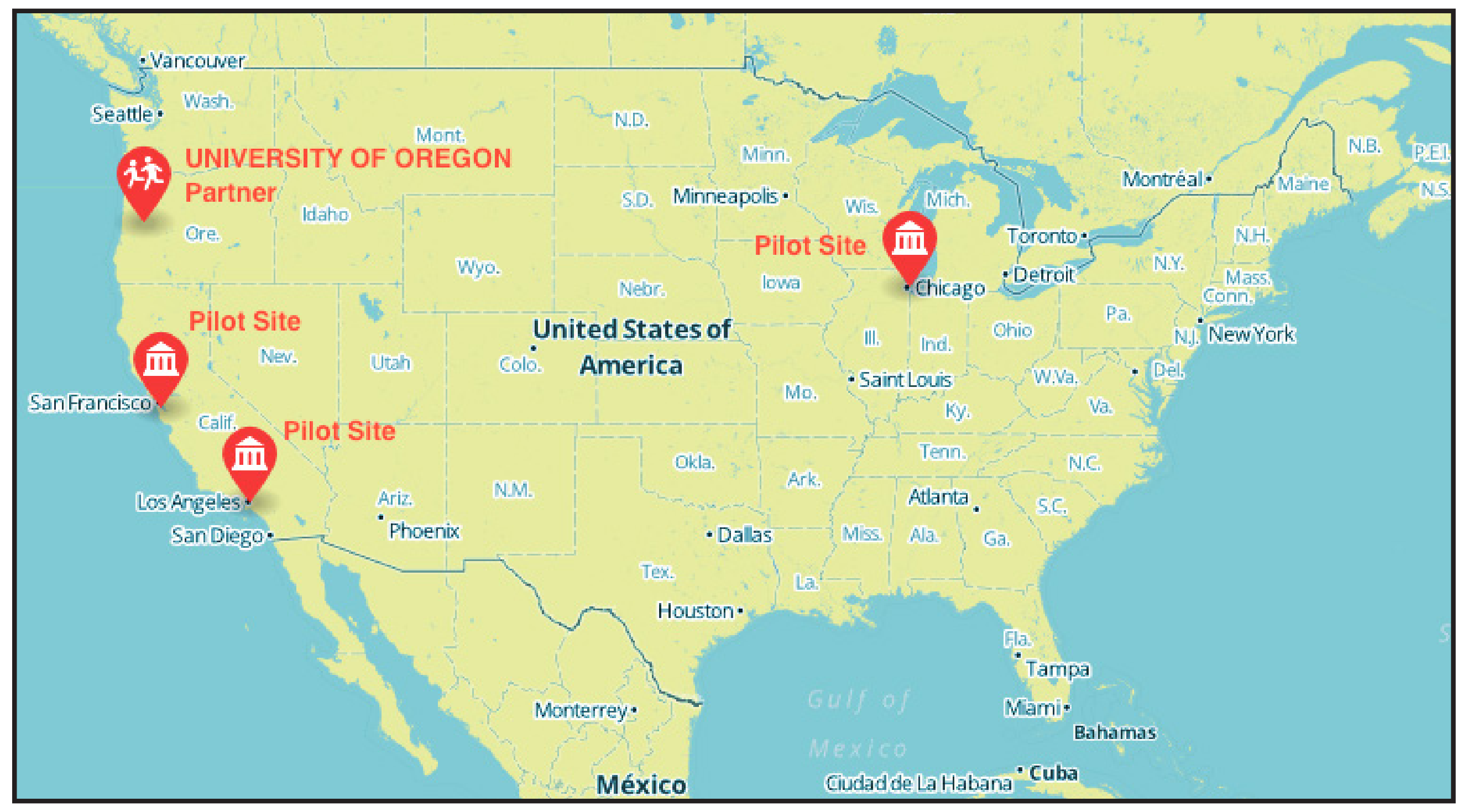
- ✓ Aligned Exploring Computer Science lesson objectives to CSTA, NETS, Common Core, and state science and CTE standards
- ✓ Defined computational thinking practices (CTP) and focal knowledge, skills, and abilities (FKSAs) that constitute them
- ✓ Developed and applied CTP design patterns to guide the development of assessments for ECS
- ✓ Field testing assessments for ECS Units 1-4, and a summative assessment
- ✓ Conducting cognitive interviews with ECS students

Focal KSAs are the core of design templates which specify what to measure, the behaviors that are evidence of what we want to measure, and the types of tasks we can use to elicit the desired behaviors.

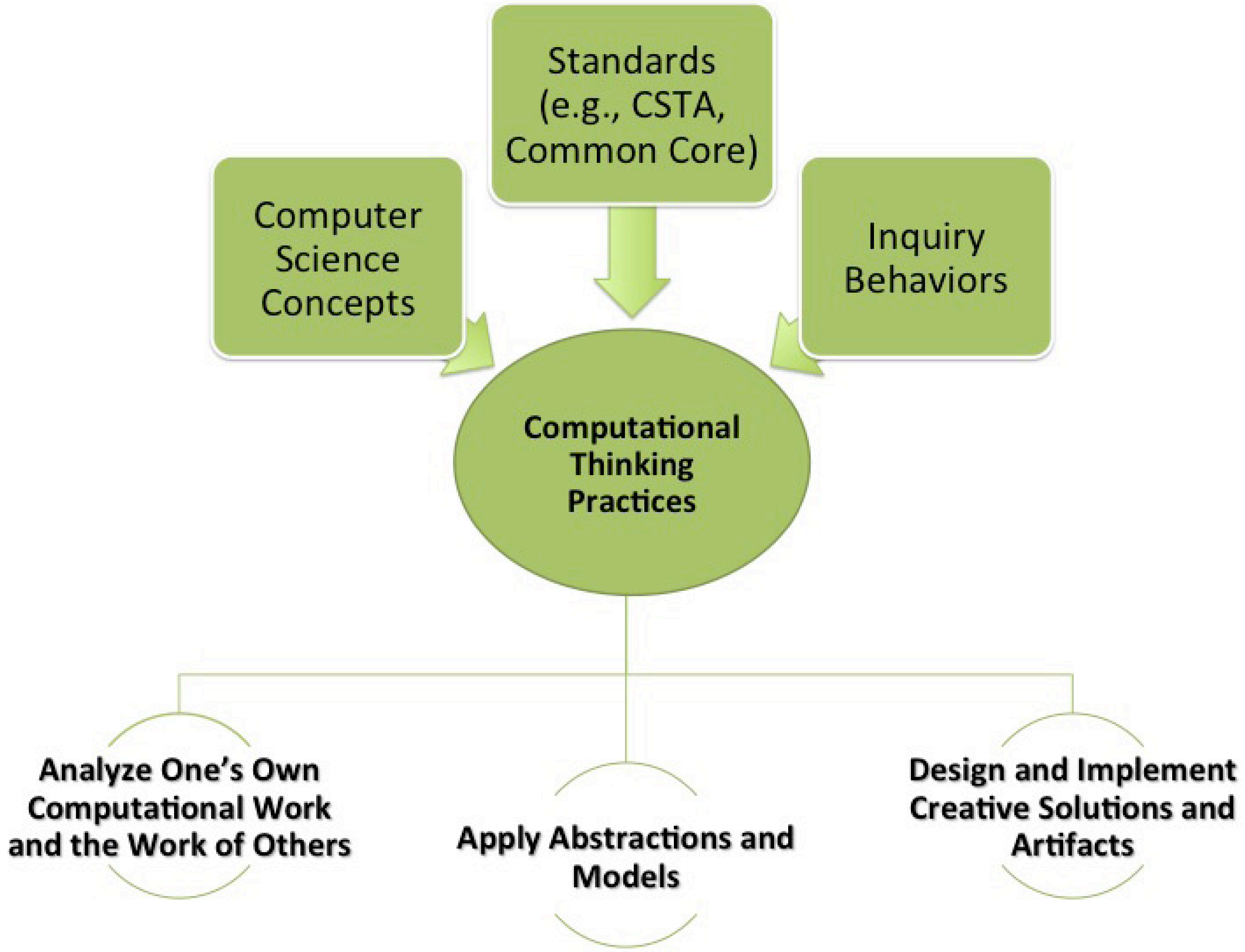
Creating boundary objects for the ECS curriculum: How can we improve CS teaching, learning, and adoption through ***evidence-based assessment?***

Scope

Partner sites for developing and field testing assessments for the *Exploring Computer Science* curriculum.



Computational Thinking Practices


Standards (e.g., CSTA, Common Core)
Computer Science Concepts
Inquiry Behaviors
Computational Thinking Practices
Analyze One's Own Computational Work and the Work of Others
Apply Abstractions and Models
Design and Implement Creative Solutions and Artifacts

Design and Implement Creative Solutions and Artifacts: Students translate novel ideas into tangible forms. This design pattern encompasses steps of the problem solving cycle, including understanding, decomposing, and exploring the problem. Students create work products that show one or more designed solutions and/or artifacts, and then test and improve the solution and or artifact.

Apply Abstractions and Models: Students use ideas and representations that capture general to specific aspects or patterns of an entity or a process, and the coherent relationships/structures among entities or processes, including level-of-detail. These ideas and representations may move among different contexts (problem or disciplines). Students demonstrate knowledge of the representational properties of discrete mathematics.

Analyze one's own computational work and the work of others: Students demonstrate that they can understand problems, how they are solved computationally/algorithmically (including hardware), and how they may be unsuitable for a computational solution either by taking too many resources to solve or being unsolvable. Students show they can measure the accuracy, efficiency, and elegance of the solution.

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