



# Computer Science Principles

## *For The Win*

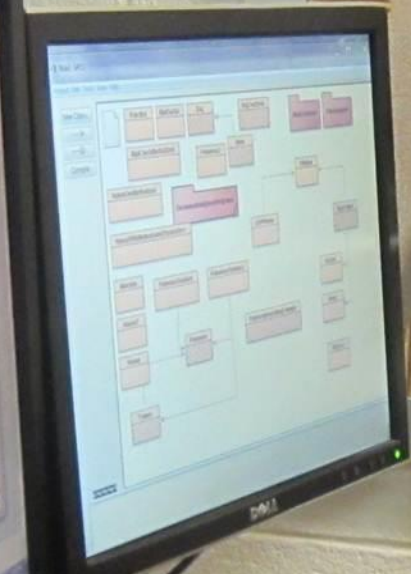
Brook Osborne and Pat Yongpradit

1. CS P Meets the Needs
2. The Case for Credit
3. Go on a Treasure Hunt
4. Future: Pilots and Prep
5. Questions

# Agenda

# **CS Principles Meets the Needs**







A grayscale photograph of two female students in a classroom setting. They are seated at a desk with two computer monitors. The student on the left is typing on a keyboard, while the student on the right looks on. The background wall is covered with various papers, a calendar, and a small clock. The text '1 in 10' is overlaid in large red font across the center of the image.

# 1 in 10

**Schools offer Computer Science**

A grayscale photograph of two female students in a classroom setting. They are seated at a desk with two computer monitors. The student on the left is pointing at the screen, while the student on the right, wearing glasses, is typing on the keyboard. The background shows a bulletin board with various papers and a clock. The text '1 in 20' is overlaid in large red font across the center of the image.

# 1 in 20

**High Schools are certified to offer AP CS  
(2011)**

A grayscale background image showing two female students in a classroom or computer lab. They are sitting at a desk with two computer monitors. The student on the left is typing on a keyboard, while the student on the right is looking at the screen. The desk has speakers and a mouse. The background wall is covered with various papers, a calendar, and a small clock. A large, bold red "#1" is superimposed over the center of the image.

# #1

**MD ranked first in AP CS exams per capita  
student population (2011)**





**CS Principles is designed to...**  
**Increase Exposure to CS**









A large group of approximately 30 diverse students, including young men and women of various ethnicities, are posed in three rows outdoors. They are standing in front of large trees and a light-colored building. The students are dressed in casual attire like t-shirts, jeans, and skirts. The image has a semi-transparent overlay with text.

# 5.1

**Percent of AP CS exam-takers were  
Black/African American (2012)**



A large group of approximately 30 students of various ethnicities and ages are posed in three rows outdoors. They are standing in front of large trees and a building. The students are dressed in casual clothing like t-shirts, jeans, and skirts. The image has a semi-transparent overlay with text.

# 9.4

**Percent of AP CS exam-takers were  
Hispanic/Latino (2012)**



A large group of students, approximately 30 in total, are posed in three rows outdoors. They are standing in front of large trees and a building. The students are dressed in casual attire, including t-shirts, hoodies, and athletic wear. The image has a semi-transparent overlay with text and a large number.

# 19

**Percent of AP CS exam-takers were  
female, lowest of any AP course.**





**4<sup>th</sup>**

**MD has the 4<sup>th</sup> highest participation rate  
among women and minorities**







**CS Principles is designed to...**  
**Improve Diversity in CS**







A grayscale photograph of two female students sitting at a desk in a classroom, working on an electronics project. The student on the left is looking towards the camera, while the student on the right is smiling. They are surrounded by various electronic components, including resistors, capacitors, and a breadboard, which are laid out on the desk. A box labeled 'ELECTRONICS' is visible in the foreground. The background shows rows of empty desks and chairs, suggesting a typical classroom setting.

# 2020

**The year that current 9<sup>th</sup> graders will  
graduate from college**



A grayscale photograph of two young women sitting at a desk in a classroom, working on a project. They are surrounded by electronic components, a breadboard, and various papers. The woman on the left is looking towards the camera, while the woman on the right is smiling. The background shows rows of empty desks and chairs in a typical classroom setting.

# 1,000,000

**More computing jobs than CS students in 2020**

A grayscale photograph of two young women sitting at a desk in a classroom, working on an electronics kit. The woman on the left is looking towards the camera, while the woman on the right is smiling and working on a circuit board. The desk is covered with various electronic components, a breadboard, and a kit box labeled 'ELECTRONICS'. In the background, there are rows of empty desks and chairs. A large red '#1' is overlaid on the image.

# #1

**Where the DC area ranks in IT hiring**





A grayscale photograph of two young women sitting at a desk in a classroom, working on a project. They are surrounded by electronic components, a breadboard, and a kit box. The woman on the left is looking at the camera, while the woman on the right is smiling and working on the project. The background shows rows of empty desks and chairs in a classroom setting.

**CS Principles will...**

**Boost the CS job pipeline.**





# CS Principles Philosophy

**More than just content...**

**It's about how kids learn**

**How the teacher teaches**

**How computer scientists work**

**Attitudes**

**Behaviors**

**Language**

**Skills**



# What is CS Principles?





# What is CS Principles?



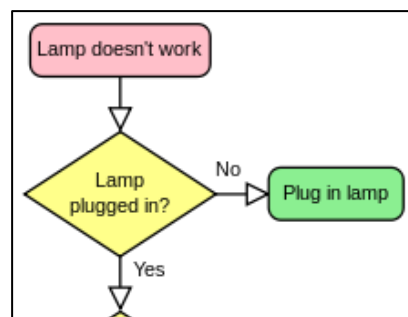
**Creativity**



**Abstraction**



**Data**



**Algorithms**



**Internet**



**Impact**



**Programming**



# What's in it for \_\_\_\_\_?

Students  
Teachers  
Schools  
Maryland





# **CS Principles will...**

**Increase Exposure to CS**

**Improve Diversity in CS**

**Boost the CS Jobs Pipeline**



**CS Principles <sup>wasn't</sup> ~~is~~ designed to...**

**Increase Exposure to CS**

**Boost the CS Jobs Pipeline**

**Improve Diversity in CS**

**Make the case for credit, but it can**



# The Case for Credit







A grayscale photograph of four students (three boys and one girl) sitting around a table in a classroom, working on a project. They are surrounded by various electronic components, wires, and tools. The background shows shelves with boxes and a window with blinds. The number '10' is overlaid in the center in a large, bold, blue font.

# 10

**States offer core credit for  
Computer Science**



# Math Credit:

## Common Core:

**Build new functions from existing functions.  
(F-BF.3)**

## CS Principles:

**Select appropriate combinations of algorithms  
to make new algorithms.  
(LO 17b)**

# Math Credit:

## Common Core (Modeling) :

“When making **mathematical models**, **technology is valuable** for varying assumptions, exploring consequences, and comparing predictions with data”

## CS Principles:

**Use models** and simulations to raise and answer questions.

(LO 10)



# Science Credit:

## CS Principles:

Use **models** and simulations to raise and answer questions.

(LO 10)

## Next Generation Science Standards:

Use a **computer simulation to model** the impact of proposed solutions to a complex real-world problem ...

(HS-ETS1-4)

# Science Credit:

Using Mathematics and Computational Thinking

“Mathematical and **computational thinking** in 9-12 builds on K-8 experiences and progresses to using algebraic thinking... and **computational tools** for statistical analysis to analyze, represent, and model data.”



**The Key to Credit is  
Computational Thinking**

# What is computational thinking?



Connecting Computing

Computational Artifacts

Abstracting

Analyzing problems

Communicating

Collaborating



# **CS P Sample Lesson**

## **Treasure Hunt Activity**

# CS P and the 5 E's

Engage

Explore





# CS P and the 5 E's

**Engage**

**Explore**

**Explain**

Q: How did you create the map?

Discuss:

The different islands represent finite states.  
The map is called a state diagram.

Q: How does this relate to how a digital watch works?

# CS P and the 5 E's

**Engage**

**Explore**

**Explain**

**Elaborate**

Directions:

1. Work with a partner to create a state diagram for a car radio, video game menu, or another electronic interface.
2. Include:
  - States
  - Transitions
  - Etc...



# CS P and the 5 E's

**Engage**

**Explore**

**Explain**

**Elaborate**

**Evaluate**

## Rubric (10 pts)

Labeled states	3 pts.
Used arrows for transitions	3 pts.
Described two example paths	4 pts.
Total:	_____

# CS P and the 5 E's

**Engage**

**Explore**

**Explain**

**Elaborate**

**Evaluate**

**Exit Card (5 pts)**

How can you program a device with only one button to do four different actions?



# Portfolio tasks

**Three performance-based tasks:**

- Data

- Internet

- Programming

# Pilot Program

**Work directly with the College Board to implement, review, provide feedback on the curriculum framework, assessment, and the assessment platform.**



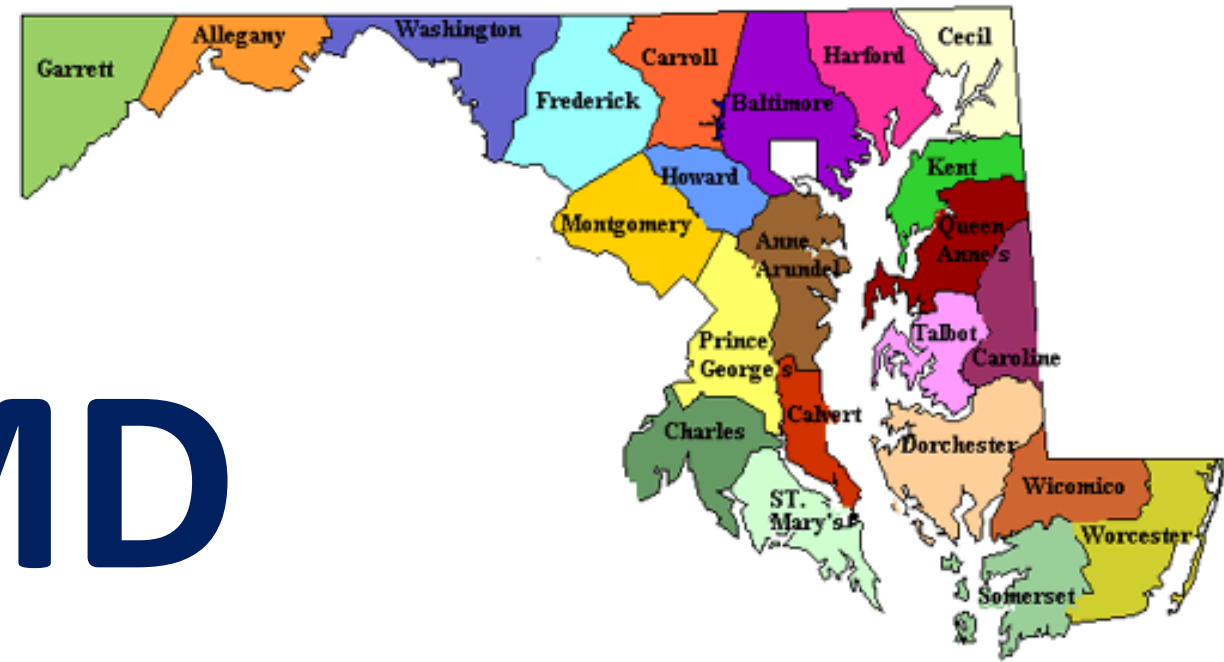
# Pilot Timeline

<b>2010-11</b>	<b>Pilot I (5 universities)</b>
<b>2011-12</b>	<b>Pilot II (9 universities, 10 HS)</b>
<b>2012-13</b>	<b>Pilot III (2 universities, 4 HS)</b>

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<b>2013-16</b>	<b>Years 1-3 of Pilot Phase II</b>
<b>2016-17</b>	<b>First exams offered</b>
<b>2017-18</b>	<b>Brook goes on vacation</b>

# How does MD prepare?



**Renewal of CE21 Project**  
**Curriculum Development**  
**Statewide Implementation Plan**



**CS P meets the needs**

**CS P is a key to credit**

**CS P's future is bright**

**Summary**



# Questions/Comments

**Download pdf at [CSprinciples.org](http://CSprinciples.org)**

**or [patyongpradit.com](http://patyongpradit.com)**