



# CE21-Maryland Summit for Computing Education: A Call to Action

Marie desJardins, Susan Martin, and Penny Rheingans  
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# Welcome!



- Today's goals:
  - **Share** information about the state of CS education in Maryland and nationally
  - **Examine** specific paths for improving curriculum and increasing quality of CS education
  - **Develop** recommendations for action
  
- Today's participants:
  - **58 teachers** from 11 Maryland school systems, four private schools, and two Pennsylvania school systems
  - **20 administrators** from 9 school systems, one private school, and MSDE
  - **34 industry/government/nonprofit professionals** (NSF, ACM, ABET, Lockheed Martin, Orbis, Cisco, Microsoft, Harris, NAF, Next Century, CSTA, DoD, NSA, NIST, .....)
  - **19 faculty/staff/students** from 15 community colleges and universities



# Summit Team



- CE21 staff (yellow ribbons)
  - PIs: Marie desJardins, Susan Martin, Penny Rheingans
  - Students: Rebecca Chhay, Shelby Clarke, Shawn Squire, Abigail Williams
  
- Student panelists (green ribbons)
  - Beatrice Garcia, Anastasia Iljina, Alex Markowski, Blossom Metevier, Khai Nguyen, Maxwell Weinberg
  
- Lunchtime speakers (green ribbons)
  - Rick Adrion, Mark Guzdial
  
- Session presenters (blue ribbons)
  - Dianne O'Grady-Cunniff, Chris Stephenson, Mark Wolkow, Pat Yongpradit



# Logistics



## ■ Schedule

- Student panel (UC Ballroom – this room)
- Two parallel sessions (UC Ballroom Lounge and UC 312)
- Lunch panel (UC Ballroom)
- Three parallel working sessions (check your badge! – UC 310, UC312, UC Ballroom Lounge)
- Plenary wrapup (UC Ballroom)

## ■ Facilities

## ■ Resources – table in back of room

## ■ Evaluations – overall evaluation and individual sessions – please leave in box at registration table

## ■ Teacher stipends – turn in form ***before you leave*** to Susan or another organizer



# CS Education: A National Crisis



- We need many trained computer scientists
  - There will be **more new jobs in computing than in *all other areas of STEM combined***
- We are not producing enough computer scientists
  - Enrollment in computing majors dropped dramatically in the 2000s
  - Recently, enrollments have increased dramatically (20% more CS degrees awarded in 2012 than in 2011! -- but still may not be enough)
  - **Retention and student preparation** continue to be major issues
- Our pool of computer scientists is **not sufficiently diverse**
  - Women, African-Americans, and other ethnic minorities choose CS at a much lower rate than white males
- We need more **highly qualified K-12 CS teachers**
- We need a **strong K-12 CS curriculum**



# CS is Not Just Programming and Video Games!

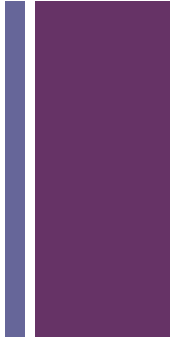


- Stereotypical view of CS:
  - CS is mostly about programming
  - The part that isn't about programming is about video games and hacking
  - The typical computer scientist is an asocial, nerdy, young white male who likes to play video games and works all alone in a cubicle all day
  - CS isn't a good career for someone who wants to make a difference in people's lives

**WRONG!**



# Interdisciplinary Diversity of CS



- CS is inherently **mathematical**
- CS is directly related to **engineering**
- CS connects to the **visual arts**
- CS applications often help to solve and model **scientific problems** and **societal challenges**
- Building CS systems requires understanding **human behavior**
- **Computer science lies at the boundary between mathematics, science, and engineering, and helps us to understand, interact with, and control the world around us**



# Challenges in K-12 Curriculum



- In most states (including Maryland!):
  - Very few of the CSTA-identified K-12 CS standards are part of the standard curriculum\*
  - **Computer science classes are not required** for graduation, and in most cases **don't count** towards any graduation requirement
  - Many schools don't offer computing courses beyond the level of keyboarding skills, and even fewer offer college preparatory CS courses

\* CSTA data on Maryland standards: 31 out of 35 Level I standards; 3 out of 10 Level II standards; 1 out of 10 Level III standards.





# Challenges in Teacher Preparation



- In most states (including Maryland!):
  - Certification requirements are unclear
  - Certifications often do not meet the needs of the discipline
  - CS classes are often taught by teachers without CS certification
  - There is inadequate in-service professional development for CS

# + What UMBC is Doing

- **CE21: Maryland** (funded by NSF)
- **Artemis** (summer camp for rising 9th grade girls)
  - <https://sites.google.com/a/umbc.edu/the-artemis-project-umbc/>
  - Funded by NSF and the Silicon Valley Community Foundation
- **“Computational Thinking 101”** (NSF-funded design-based intro course for first-year computing majors)
- **ACTIVE Center** (active learning classroom)
  - Funded by the Hrabowski Academic Innovation Fund, BAE, and Northrup Grumman
- **CS4HS** summer workshops (funded by Google)
- Proposed **BS/MAT** program (under development)
- Planned larger **professional development** summer program (under review by NSF’s CE21 program)





# What You Can Do



- Today:
  - **Meet** new people and share ideas
  - **Ask** questions, listen, and learn
  - **Discover** new resources
- After the summit:
  - **Share** what you have learned here with your colleagues
  - **Join** CSTA and your local CSTA-Maryland chapter
  - **Learn** about national standards (CSTA)
  - **Emphasize** teamwork, computational thinking, and real-world applications in your classes
  - **Think** about ways to increase diversity in your classes
  - **Ensure** that your school has a Tech Ed course with CS content
  - **Lobby** to offer the new CS Principles class in your school
  - **Help** us work towards statewide credit for CS as a math or science class