CS Principles: computing for everyone

Discussion facilitated by Brook Osborne

Purdue University, July 31, 2012

Online At: CSPrinciples.org

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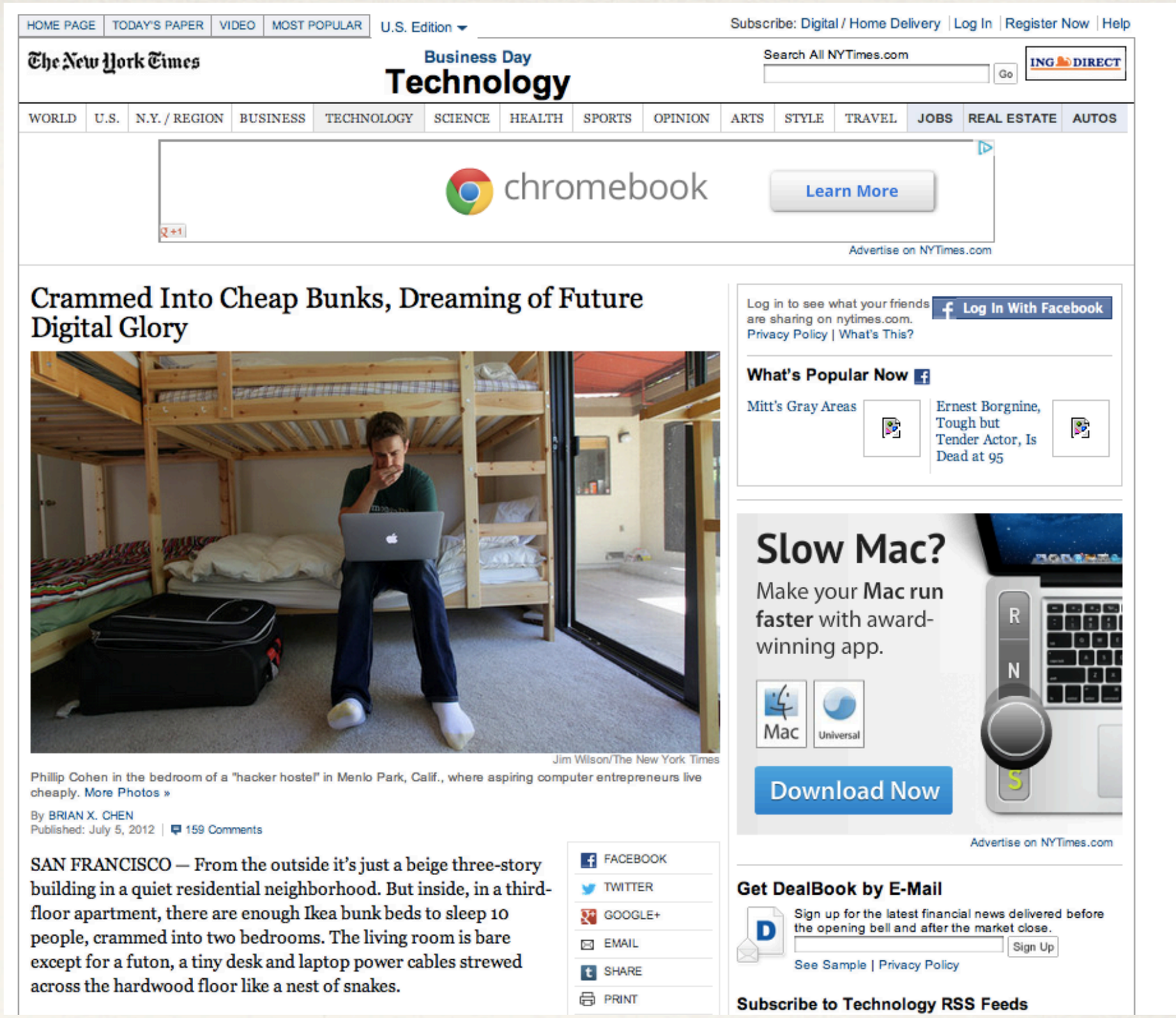

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Crammed Into Cheap Bunks, Dreaming of Future Digital Glory

Jim Wilson/The New York Times

Phillip Cohen in the bedroom of a "hacker hostel" in Menlo Park, Calif., where aspiring computer entrepreneurs live cheaply. More Photos »

By BRIAN X. CHEN
Published: July 5, 2012 | 159 Comments

SAN FRANCISCO — From the outside it's just a beige three-story building in a quiet residential neighborhood. But inside, in a third-floor apartment, there are enough Ikea bunk beds to sleep 10 people, crammed into two bedrooms. The living room is bare except for a futon, a tiny desk and laptop power cables strewed across the hardwood floor like a nest of snakes.

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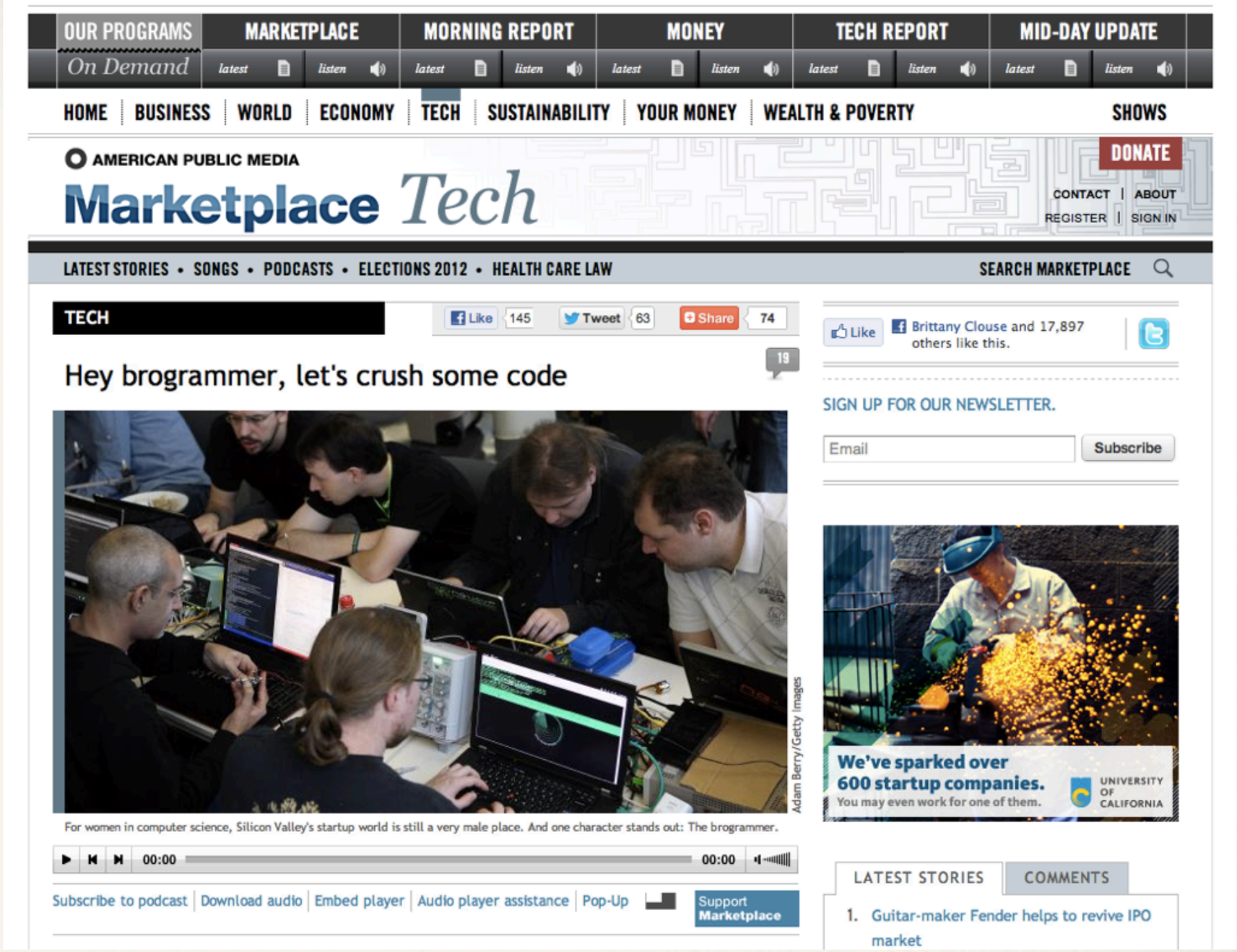

where are we now?

Purdue University, July 31, 2012

Online At: CSPrinciples.org

read the article at:
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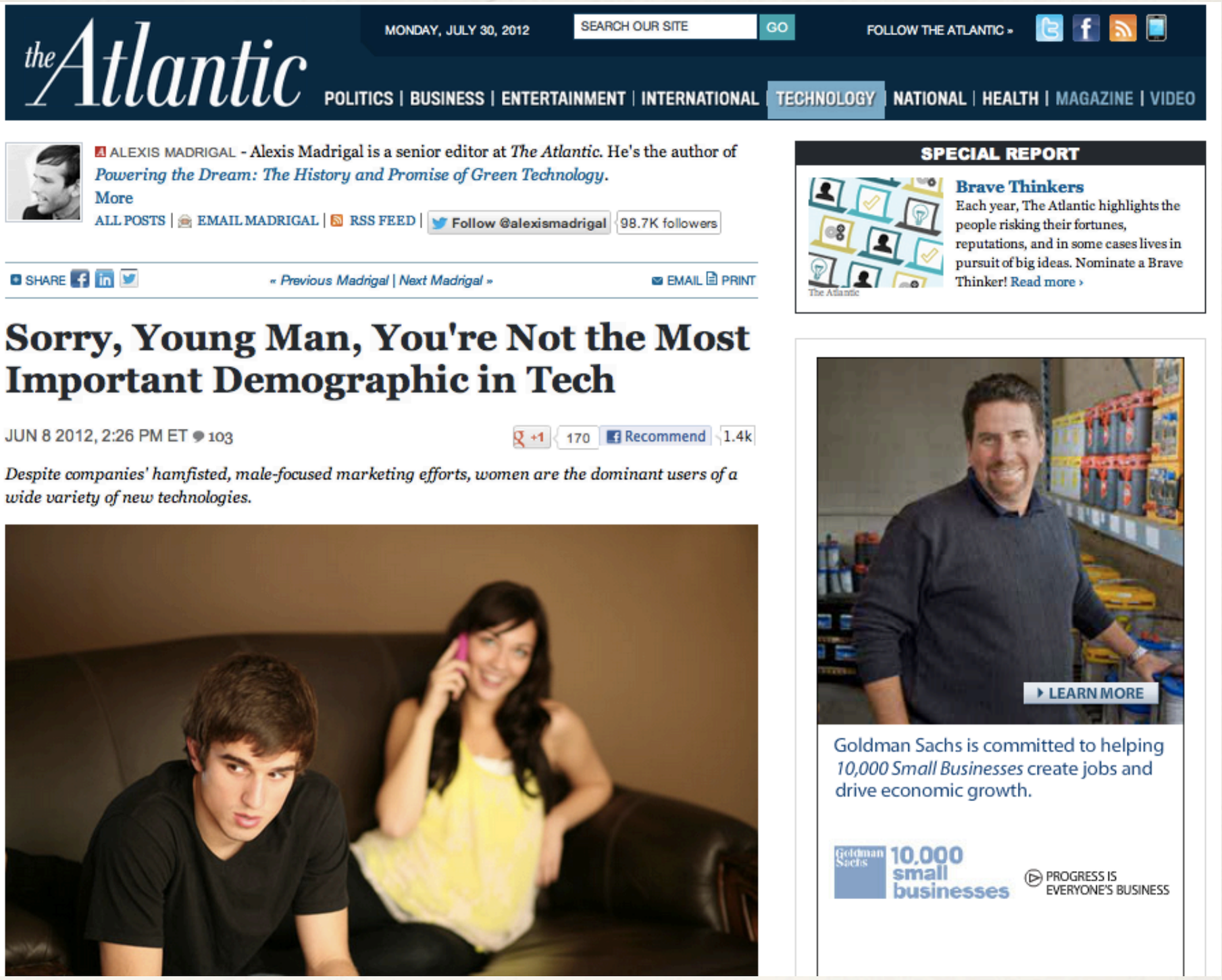

why is this a problem?

read the article at:
bit.ly/purdue-womenintech

If you're a man between the ages of 18 and 35, you used to be tech industry's most coveted prize. You were the one who decided what products failed and what products succeeded. That's why companies like Asus tweet ridiculous, sexist stuff. That's one reason why less than 10 percent of venture capital-backed companies have female founders and there is a massive gender gap in tech. The technology industry's focus on men is reflexive and all too intuitive to the men who run the companies. And it's built on a plain wrong reading of the reality of the market.

I hate to tell you/us, but we're not as important as we thought. The body of evidence amassed by Intel researcher Genevieve Bell indisputably shows that men's role in technology adoption continues to be overstated. Here's a summary she gave of her work in a "Big Ideas" talk last month at Australia's Radio National:

> It turns out women are our new lead adopters. When you look at internet usage, it turns out women in Western countries use the internet 17 percent more every month than their male counterparts. Women are more likely to be using the mobile phones they own, they spend more time talking on them, they spend more time using location-based services. But they also spend more time sending text messages. Women are the fastest growing and largest users on Skype, and that's mostly younger women. Women are the fastest category and biggest users on every social networking site with the exception of LinkedIn. Women are the vast majority owners of all internet enabled devices--readers, healthcare devices, GPS--that whole bundle of technology is mostly owned by women.

Sit with this for a minute. Let me break out the categories where women are leading tech adoption:

- Internet usage
- Mobile phone voice usage
- Mobile phone location-based services
- Text messaging
- Skype
- Every social networking site aside from LinkedIn
- All Internet-enabled devices
- E-readers
- Health-care devices
- GPS

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why is this a problem?

how can we address this?

CS Principles

we're not just changing *content*. we're changing *how* cs is taught and, in turn, *who* chooses to take it.

CS Principles

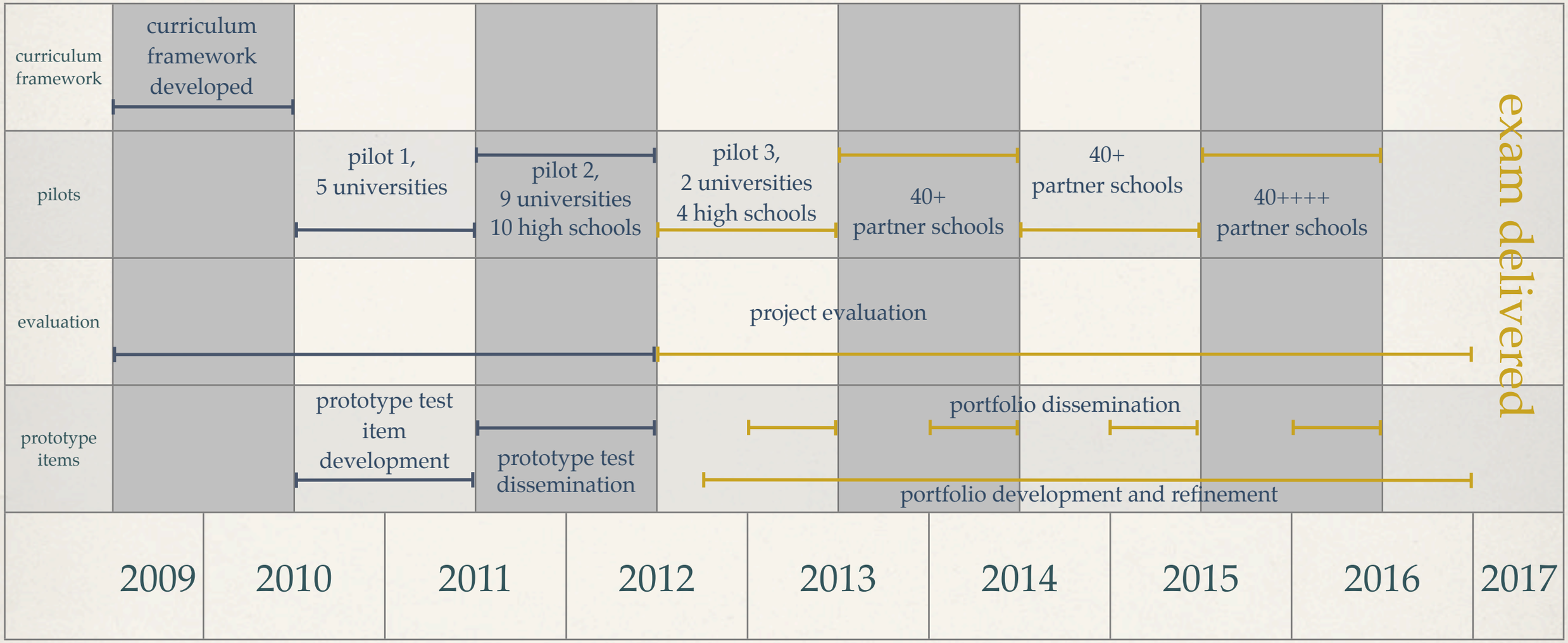
7 big ideas

- computing is a **Creative** activity.
- **Abstraction** reduces information and detail to facilitate focus on relevant concepts.
- **Data** and information facilitate the creation of knowledge.
- **Algorithms** are used to develop and express solutions to computational problems.
- **Programming** enables problem solving, human expression, and creation of knowledge.
- the **Internet** pervades modern computing.
- computing has global **Impacts**.

check out the complete curriculum framework at : csprinciples.org

where have we been, where are we going?

timeline

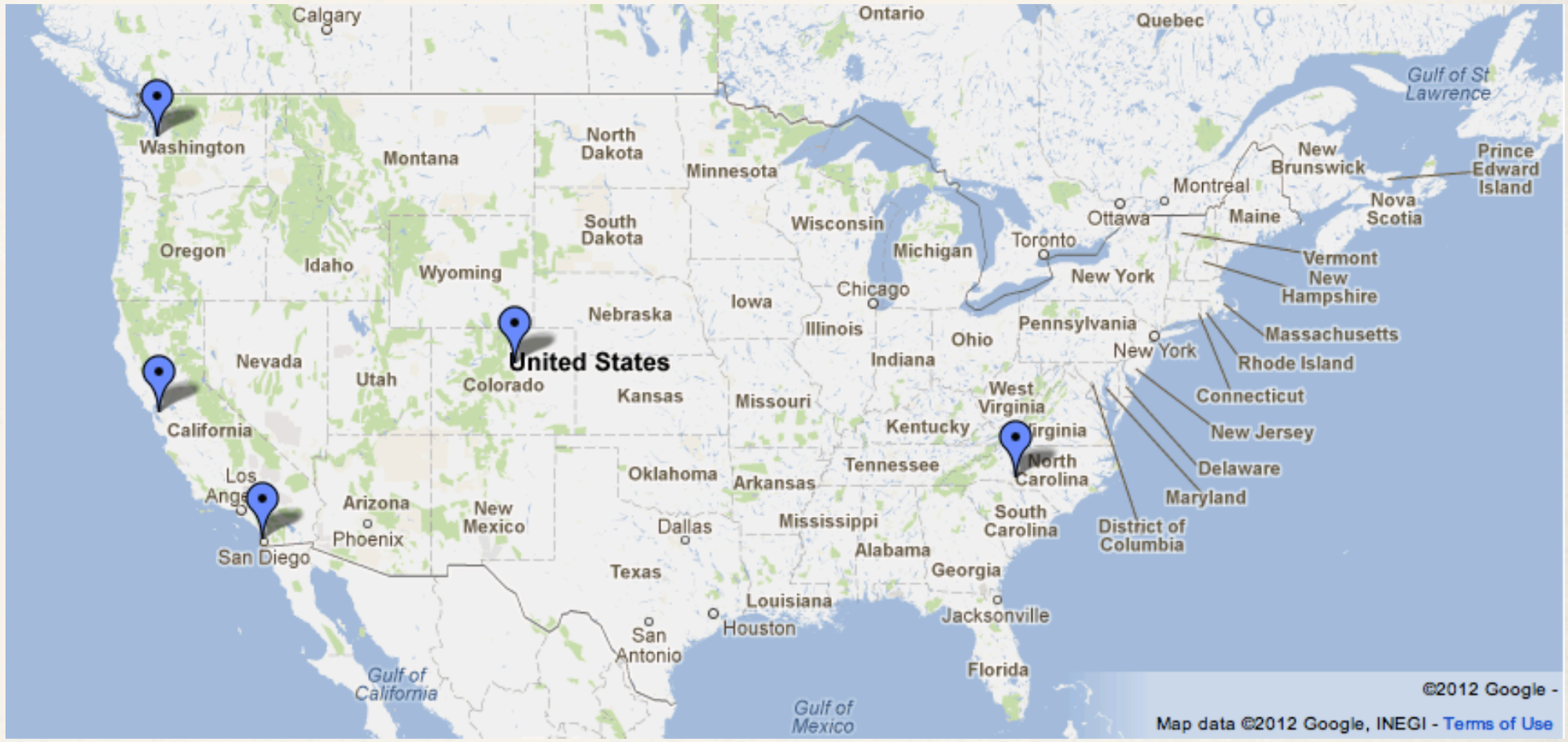


where have we been?

pilot 1

fall ‘10- spring ’11

- 5 pilot universities
- attestation



where have we been?

pilot 2

fall ’11-summer ’12

- 9 partner universities
- 10 partner HS
- test item prototyping

where are we going?

pilot 3 and beyond

fall 2012- spring 2013

- 2 partner universities
- 4 partner HS
- portfolio prototype

2013 and beyond

- 40 partner schools in 2013-2014
- 40 partner schools in 2014-2015
- design and test portfolio assessment
- create the operational course and exam
- produce instructional and professional development (pd) materials
- conduct teacher pd

the journey to an exam

2011-2012 prototype exam

questions were designed to assess the *test platform* and the *curricular framework*. they are <u>not</u> being used to assess (nor are they being reported back to) students, courses, schools, or teachers.

the questions are being released to show the *depth* and *rigor* of how big ideas and computational thinking practices are mastered and used in a CSP course.

these questions illustrate the differences between standard computer science and the computer science principles.

CS != CSP

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the journey to an exam
from free response to portfolio

portfolio assessment is under construction, with the first pilot launching in ’12-’13. development of the portfolio has already started, and development and refinement will continue in the coming years. here are a few of the themes that we anticipate will be present in each year of the portfolio offering:

students will submit executable programs, a reflective explanation about the programs, and demonstrate collaboration on parts of the programs.

a textual report that demonstrates in-depth research, analysis, synthesis around “impact” of computing, with current events playing a major role (and making unauthorized collaboration more difficult from year to year)

a big-data component that includes visualizations as well as explanations

why have a portfolio?
let's look at *what* we're trying to measure

Learning Objective 4: The student can use computing tools and techniques for creative expression. [P2]

Learning Objective 14: The student can use computing to facilitate exploration and the discovery of connections in information. [P1]

Learning Objective 15: The student can use large datasets to explore and discover information and knowledge. [P3]

Learning Objective 32: The student can collaborate as part of a process that scales. [P6]

why have a portfolio?
let's look at *what* we're trying to measure

Learning Objective 32: The student can collaborate as part of a process that scales. [P6]

Student work is characterized by:

32a. Participation in a collaborative solution that requires a process that scales.

32b. Explanation of how human capabilities are enhanced by collaboration (e.g., re-captcha and crowd-sourcing).

32c. Collaboration to impact a group using the Internet and the web.

free response question data

In June of 2011 a conference titled "Information: Making Sense of the Deluge" used the quote below to express the purpose of the conference:

The world now contains unimaginably vast amounts of digital information, which is growing exponentially. The era of big data presents incredible opportunities --- smarter cities, stronger companies, faster medicine --- but just as many challenges. Storage is scarce, systems overloaded and governments and businesses know too much. Managed well, data can be used to unlock new sources of economic value, provide fresh insights into science and hold governments to account. Managed poorly, it can cause great harm.

Using this quote as a starting point provide two examples of what are referred to as "incredible opportunities" that can arise from big data, and two examples of how big data can "cause great harm", as mentioned at the end of the quote.

free response question

the internet

The Internet Protocol (IP) and the Domain Name System (DNS) are two important components of the Internet and the World Wide Web. Write a short response to each of the two questions below. You should take a few minutes to plan and outline your answer for each of the two questions.

(A) The Internet Protocol IPv4 was in widespread use from 1980-2012. There is a more recent protocol named IPv6 now used more frequently than in the past. With IPv6 128 bits specify an IP address whereas 32 bits specify an address using IPv4. IPv6 also includes support for Internet security that is not present in IPv4. Describe two examples for why the change in the number of bits per address is necessary and two examples for why security is necessary in the new, more recent IPv6 protocol compared to the IPv4 protocol.

(B) The Domain Name System or DNS translates human-readable addresses or hostnames like www.whitehouse.gov to IP addresses like 208.77.55.42 (IPv4) or 2001:db5:1f67::998:de4:7457:6d5 (IPv6). Describe one reason that DNS is useful for a person using a web browser to find information. Describe one characteristic of DNS that demonstrates your knowledge of how DNS is hierarchical.

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free response question impact

Choose two of the following four questions and write a brief response. High scores will be earned only by responses that explore both benefits and risks, demonstrate knowledge of the Internet, provide a credible argument rather than simply listing facts, and that use appropriate computing terminology.

1. Browser cookies are an example of a computing technology that has privacy implications. Identify and explain one associated privacy benefit and one risk to individuals or society that stem from the use of browser cookies or another use of the Internet that has privacy implications.
2. Firewalls are an example of a computing technology that has security implications. Identify and explain one potential benefit and one associated risk to individual or societal security that come as a result of the use of firewalls. or another aspect of the Internet that has security implications.
3. Broadband Internet access is an example of a computing technology that has economic implications. Identify and explain one associated benefit and one risk to individual or societal economics that develop from the use of broadband Internet access or another aspect of the Internet that has economic implications.
4. YouTube® is an example of a computing technology that has cultural implications. Identify and explain one associated benefit and one associated risk to individual or societal culture that derive from the use of YouTube or another use of the Internet that has cultural implications.

free response question

impact: rubric

+1 describe topic accurately using appropriate terminology, with description relating to either a benefit or a risk. The description must be accurate, but the benefit or risk doesn't need to be. Cannot earn this point if something incorrect is provided about the topic is. Either a benefit or risk must be provided to earn this point. The description can be indirect, e.g., in the context of supplying a benefit or risk. The response does not need to provide a definition, but the description in the context of benefit/risk should be accurate [27b]

+1 a benefit and a risk related are given and explained. It must be clear from the description what the benefit is and what the risk is. These do not need to be related to privacy/security/economics/culture to earn the point, but they must relate to how the topic actually work --- student cannot map a risk to an incorrect description and earn the point, though the point can be earned if it does relate to accurate description even if the student lost the point because of something inaccurate. In other words this point doesn't depend on the first point.[30b]

+1 the articulation of both the risk and the benefit relate to privacy/security/economics/culture not just to convenience, for example. The risk must be a risk, not simply an inconvenience.[30b]

free response question

impact: sample answers

"Youtube can be used for many great things. Someone can upload a video on it and have people laughing for hours or can start a movement like KONY 2012. This, more rapid sharing of data then ever experienced before can really help people and society as a whole. However, it has many negative side effects. One is the decreased socialization of the internet. Many people can spend hours on YouTube going from video to video wasting time all by themselves. another problem this creates is increased procrastination for an entire society. The generation graduating high school now can't do anything without checking their facebook 10 times an hour or watching a few YouTube videos. "

free response question

impact: sample answers

"Broadband access to the data and other resources on the Internet offers clear advantages to both individuals and society. Being able to locate, use, and share data and resources quickly means that individuals and society are more productive. Increased productivity can lead to other economic benefits, such as increased GDP, decreased disease, and better living conditions. There are risks associated with more implementation of broadband access. Those users who cannot afford the increased cost for broadband will be at a disadvantage. This means that these segments of society will be left behind in their ability to access information and learn the skills needed for future economic growth. This inequality can cause political and social problems for society. "

free response question

impact: sample answers

"Firewalls are one of the most convenient ways to block certain websites from being displayed or accessed. This is good for security because it can keep people out of websites that are riddled with malware or could deceive people into giving out personal information to an unverified source. However, it can also restrict certain intellectual freedoms if a larger entity, such as a school, is blocking websites using a firewall that can interfere with the students knowledge of certain topics if they are doing research on a school-provided computer. The need to be secure can often inhibit intellectual freedom, although this is mostly found in publicly owned and operated computers, such as those used by libraries. On personal computers, the use of firewalls is an effective way to protect one's information. "

free response question

impact: sample answers

"Browser cookies are an example of a computing technology that has privacy implications. Browser cookies are basically little reminders that your web browser keeps track of when you go to different websites. As you browse different sites, these cookies leave a trail on your computer of where you have been on the internet. The main reason for these cookies is so that it makes browsing websites you have been to before quicker because some of the data from that website is already on your computer. A privacy benefit of browser cookies is that these cookies are able to be used in court cases to help find criminals. Lawyers may get a court order for a person's browser cookies to help prove a point or paint a picture of the person's interests on the internet. This could prove helpful when proving guilt."

CS Principles and you

encourage and enable change

we're not just changing *content*. we're changing *how* cs is taught and *who* chooses to take it.

that change can happen in *any* classroom, CS Principles or not. the material we're talking about isn't just important in the context of this course, it involves a knowledge base and skill set that are *crucial* for 21st century learners and leaders.

CS Principles and you

teach a class

our curriculum framework is online and anyone can be an early adopter of CS Principles. we invite you to explore the curriculum and have a course of your own.

if you choose to teach a course, *please* keep in touch. your feedback will help direct the future of this course, the ensuing AP exam, and the professional development available for forthcoming AP CSP teachers.

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