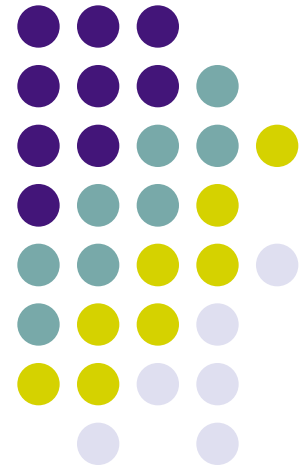


Why it's a great time to major in CS

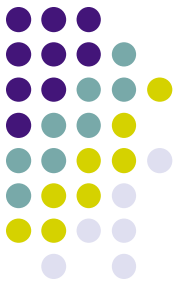
Brent Seales

CS 100

Fall 2015

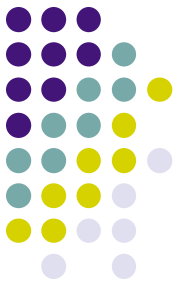


Reason #1: Intellectual Challenge

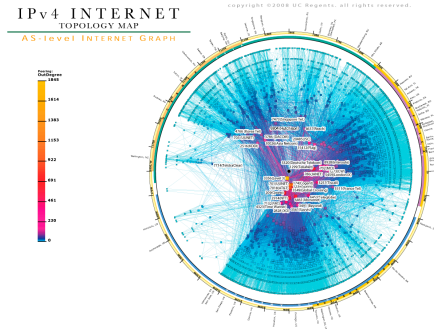


"Computers represent a radical novelty ... Coming to grips with a radical novelty amounts to creating and learning a new foreign language that can not be translated into one's mother tongue"

- Edsger W. Dijkstra
1930-2002



Reason #1: Intellectual Challenge

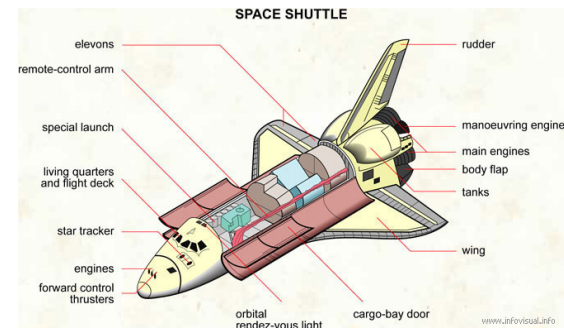
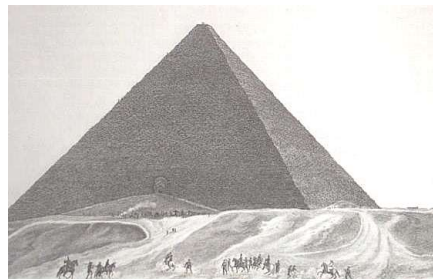


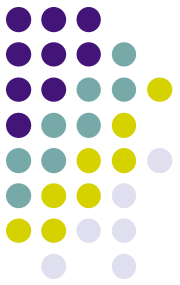
Consider:

- Intel processor chip: $\sim 10^{10}$ transistors
- Internet: $\sim 10^9$ computers connected

Result: an engineered artifact, with $\sim 10^{19}$ parts

Nothing in the history of mankind comes close!

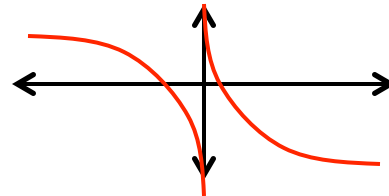
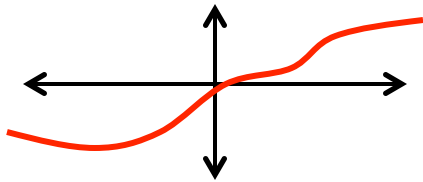




Reason #1: Intellectual Challenge

Why **software** is different from other kinds of engineered artifacts:

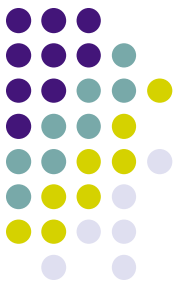
It is not continuous.



Change even one bit in a program, and its behavior will be completely changed!

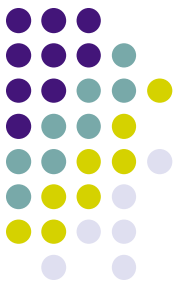
⇒ No such thing as a "safety margin" in software!

Reason #2: Unequaled Career Opportunities



“Computer science has topped the National Association of Colleges and Employers' list of best majors for jobs for the first time since 2008. Students who earned degrees in computer science are obtaining more offers of employment than any other major because computer scientists are needed in many different industries.”

– Software Development Times, July 8, 2011



Students are figuring out...

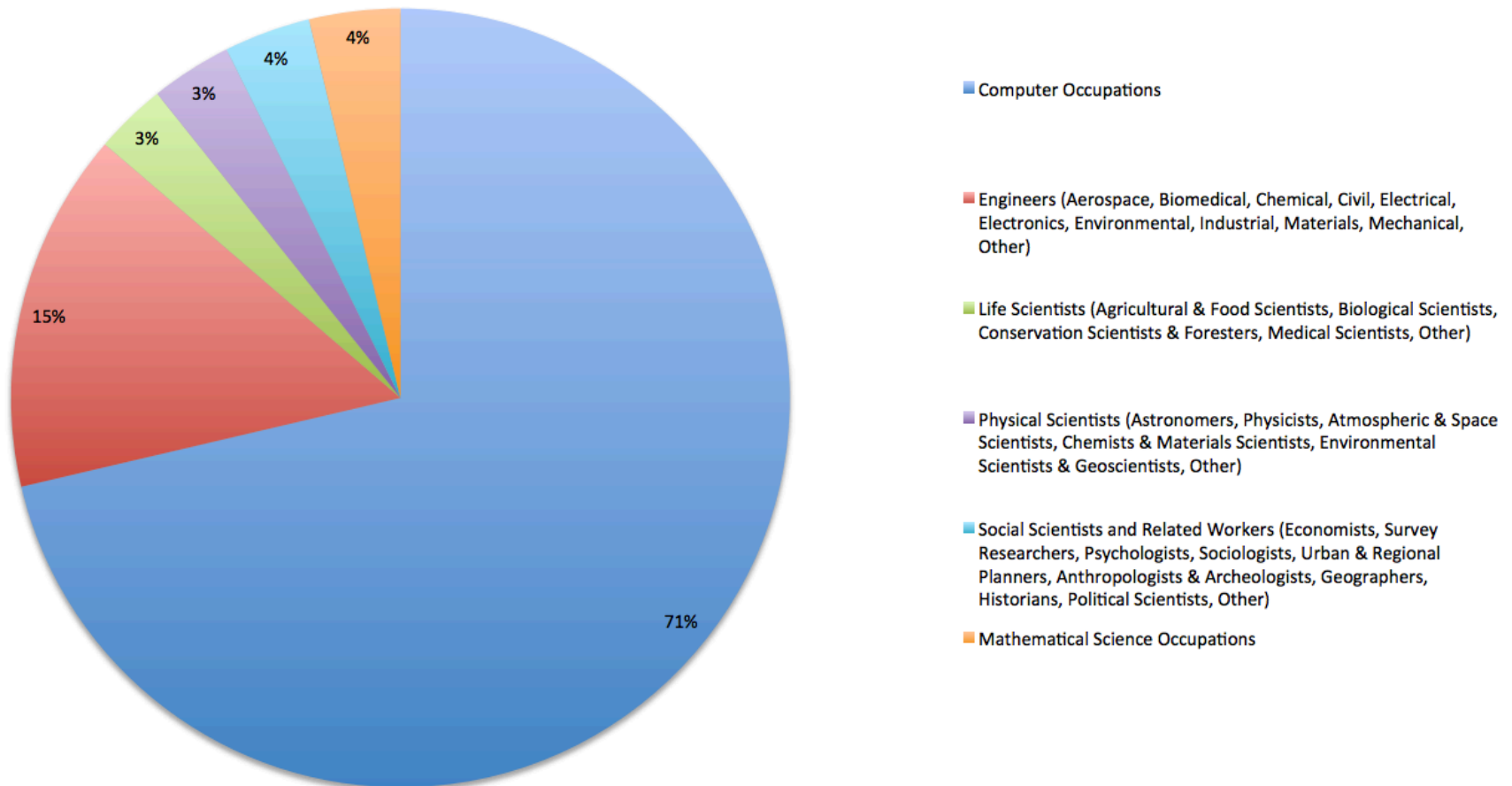
- Everyone needs facility with “computational thinking”
- Problem analysis, decomposition, abstraction, algorithmic thinking – all are increasingly required to be successful
- Fields in engineering and from *Anthropology* to *Zoology* are becoming *Information* fields – and that *Computer Science* will position them for success

Students are figuring out

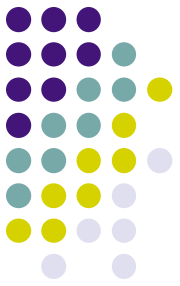


Job Growth, 2012-22 - U.S. Bureau of Labor Statistics

Computer Occupations = 71% of all STEM

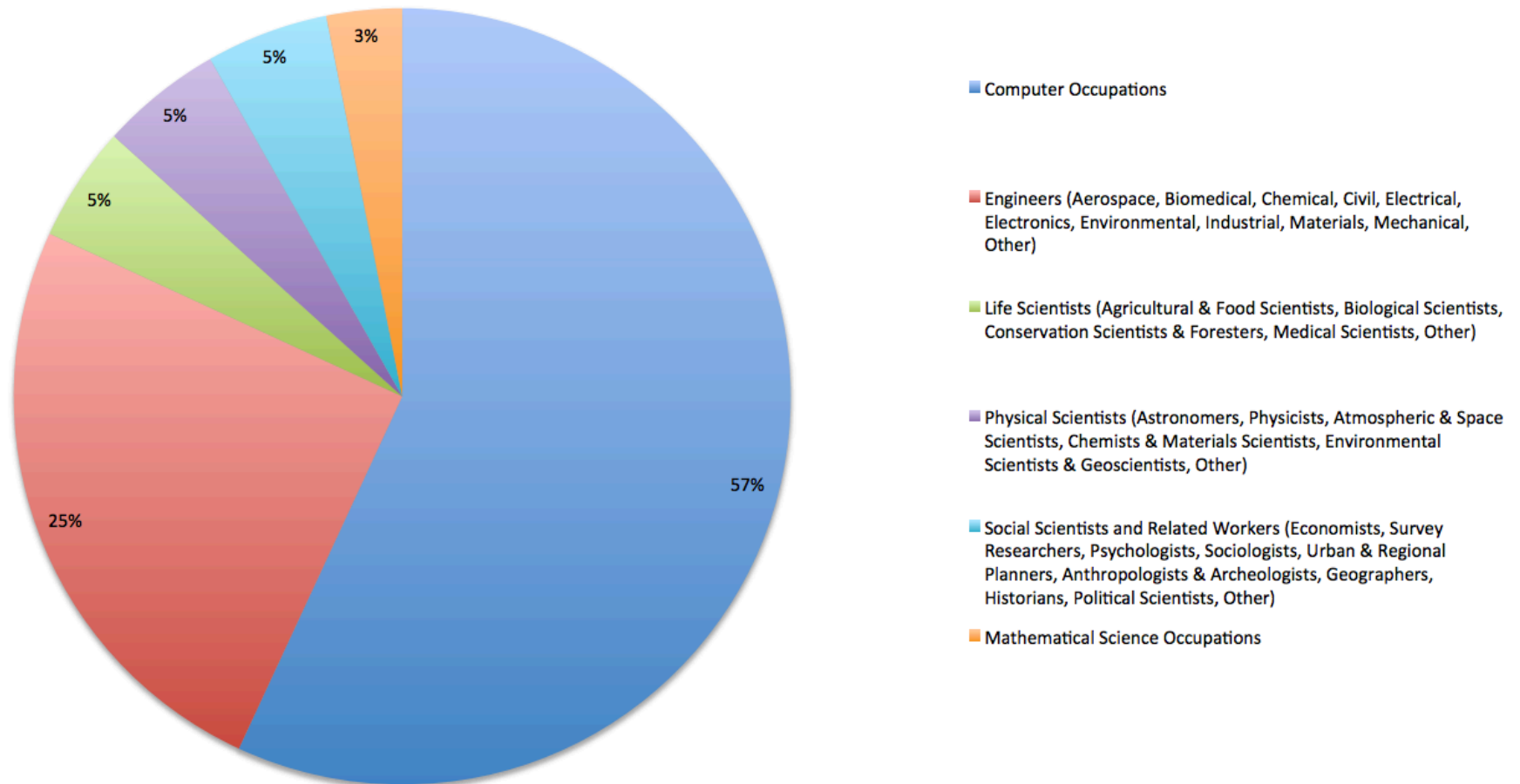


Students are figuring out

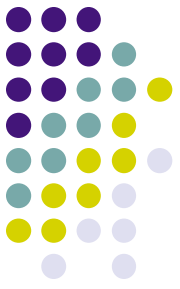


Job Openings (Growth And Replacement), 2012-22 - U.S. Bureau of Labor Statistics

Computer Occupations = 57% of all STEM

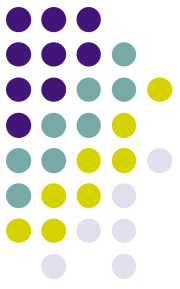


Reason #2: Unequaled Career Opportunities



"National statistics indicate that computing will be one of the fastest-growing areas for employment in coming years, but experts say the US educational pipeline is expected to fall far short in producing college graduates in the field." -- Education Week, July 2010

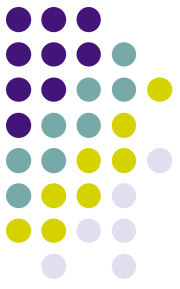
Reason #2: Unequaled Career Opportunities



“Across the United States, new computer science graduates from strong programs are receiving extraordinary job offers. The high starting salaries are due to the recent tech industry boom... In addition ... just about every field is starting to rely heavily on information technology, putting computer science graduates in high demand.”

– Xconomy, May 2011

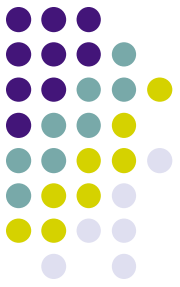
Reason #2: Unequaled Career Opportunities



“The President's Council of Advisors on Science & Technology recently completed a report assessing the Federal Networking and Information Technology Research and Development Program.

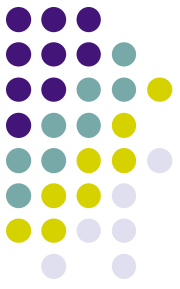
"All indicators--all historical data, and all projections--argue that [computer science] is the dominant factor in America's science and technology employment," the report says.

Reason #2: Unequaled Career Opportunities



There are more technology job openings in a single day on Dice's career Web site than there are computer science graduates joining the U.S. workforce, according a Dice Holdings report. The report notes that the gap between graduates and job openings has created competition for talent among tech companies. **There are at least two or three jobs for every computer science graduate**, says Massachusetts Institute of Technology's Ann Hunter. -- eWeek, May 2011

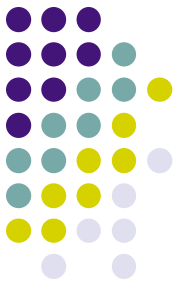
Reason #2: Unequaled Career Opportunities



Something very interesting is happening today

- Made possible by the Internet
- Instead of owning and maintaining their own hardware, companies are now renting “virtual machines” (= **compute cycles** and **storage**) from large, utility-like providers (e.g., Google, Amazon)
- Consequences:
 - Companies don't own/maintain their own hardware/software – fewer sysadmin jobs
 - Lower barriers to entry = more entrepreneurial opportunities!

Reason #3: Lucrative!



“Across the United States, new computer science graduates from strong programs are receiving extraordinary job offers. 2011 CSE graduates at the University of Washington have reported starting salaries as high as \$105,000 and signing bonuses as high as \$30,000.” -- Xconomy, May 2011



Reason #4: Constant Change!



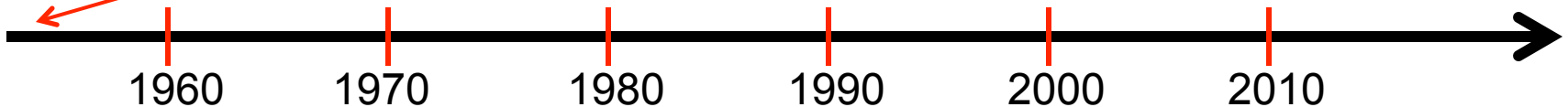
Thomas J. Watson, Sr.

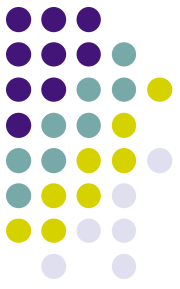
"We think there is a world market for about five computers."

Thomas J. Watson, Sr., in 1943 ?

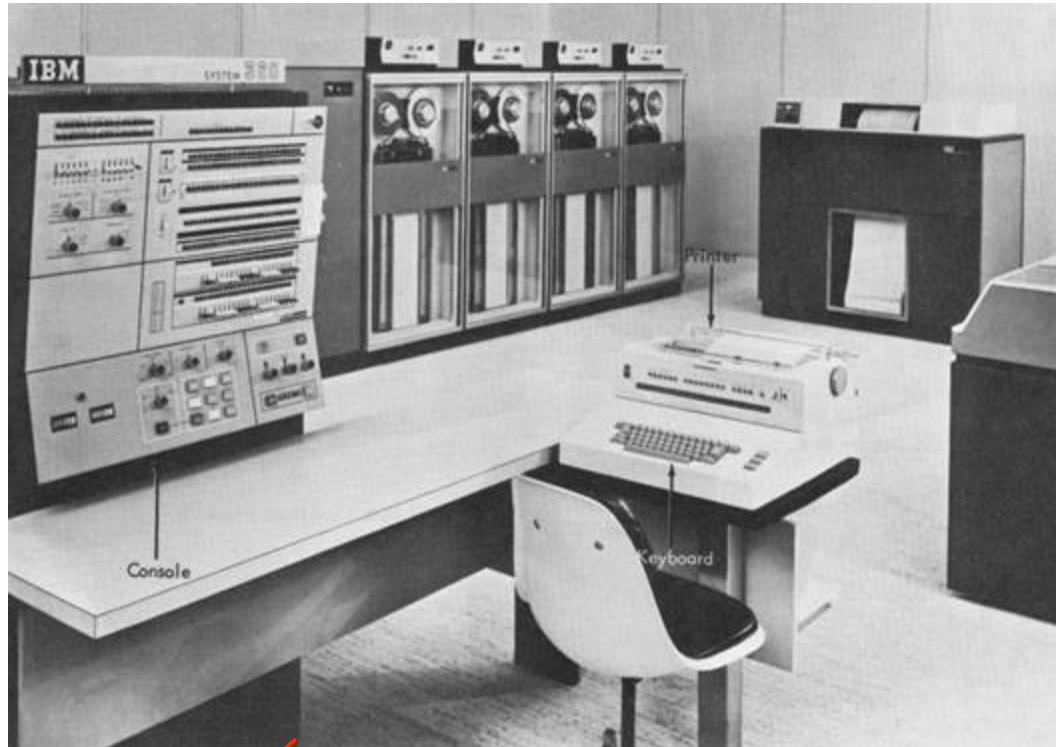
"... All the calculations that would ever be needed in this country could be done on the three digital computers [which were then being built]..."

Professor Douglas Hartree
Cambridge mathematician, 1951

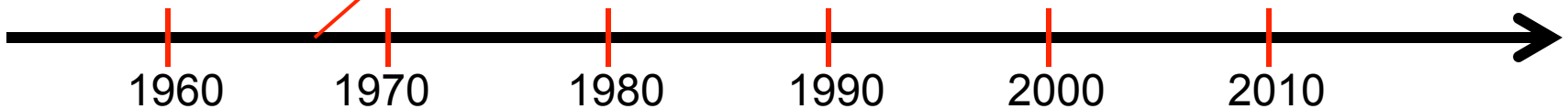




Reason #4: Constant Change!



Mainframes
(IBM System 360)



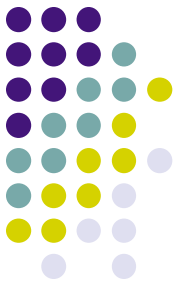


Reason #4: Constant Change!



Minicomputers
(PDP-11)

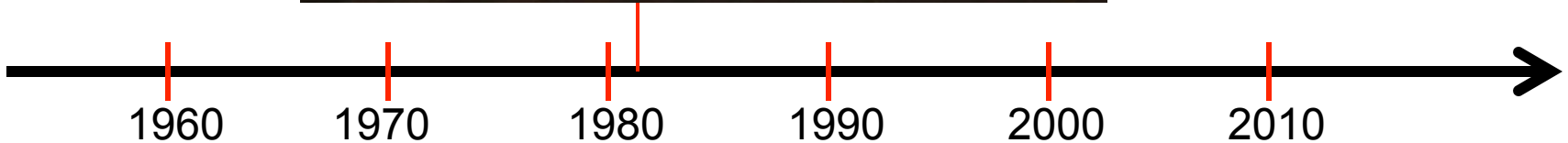




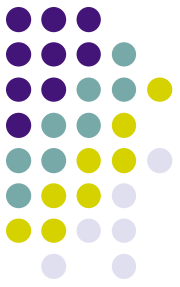
Reason #4: Constant Change!



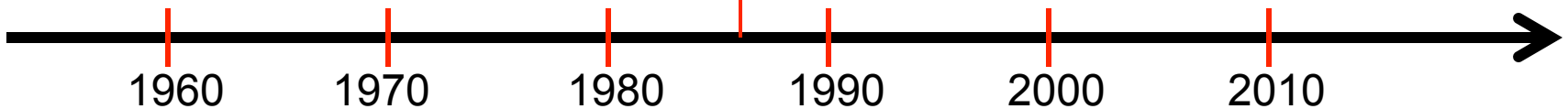
IBM
Personal
Computer



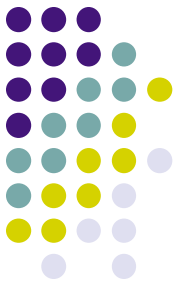
Reason #4: Constant Change!



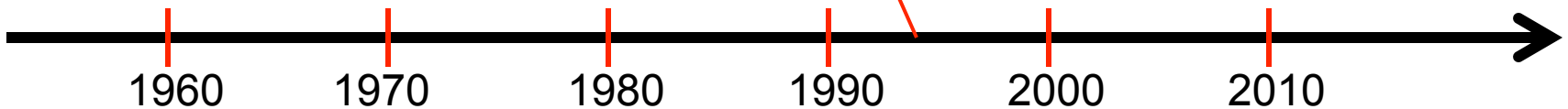
Workstations
with
Bitmapped Displays
(Apollo)



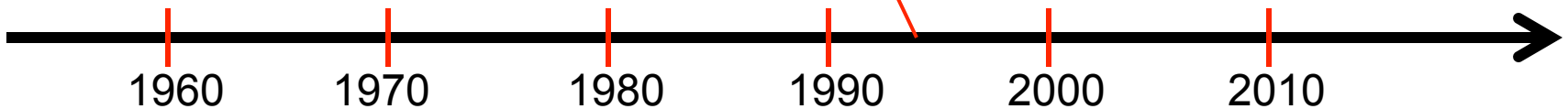
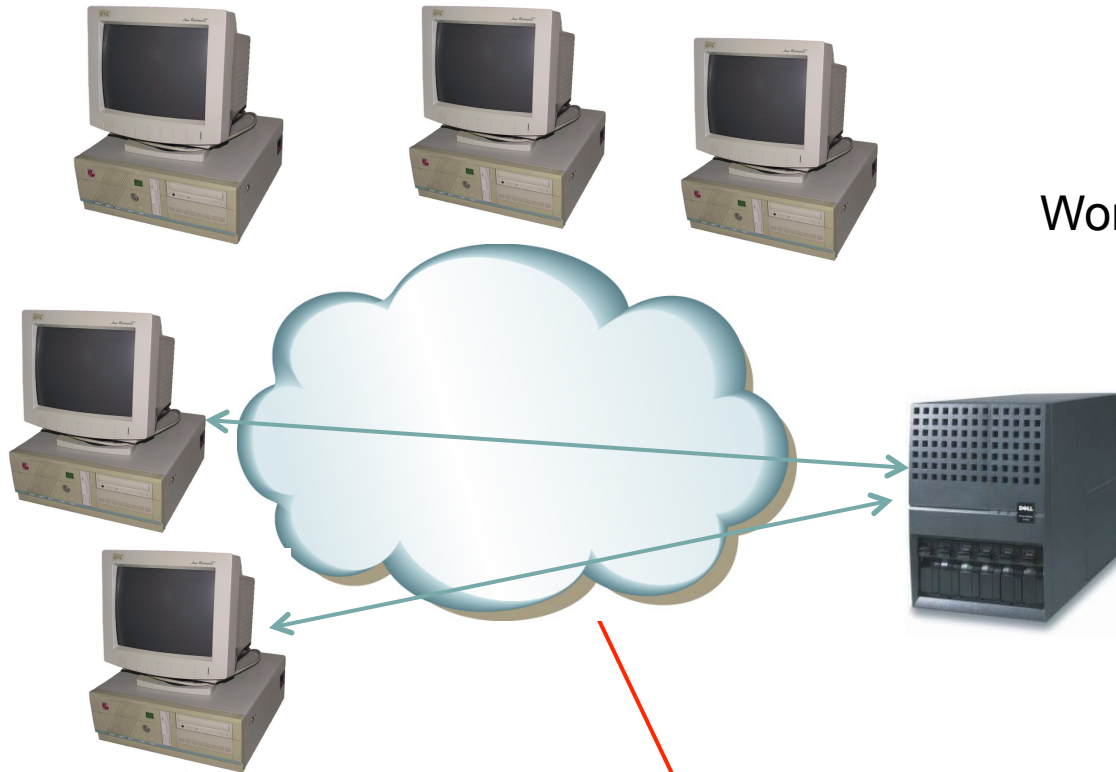
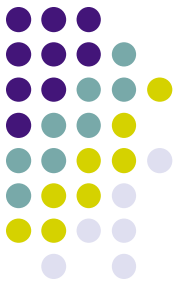
Reason #4: Constant Change!



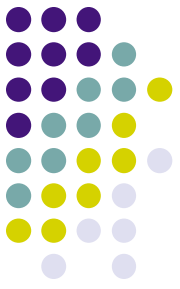
PC with
MS Windows
Color display
Intel 486/66MHz



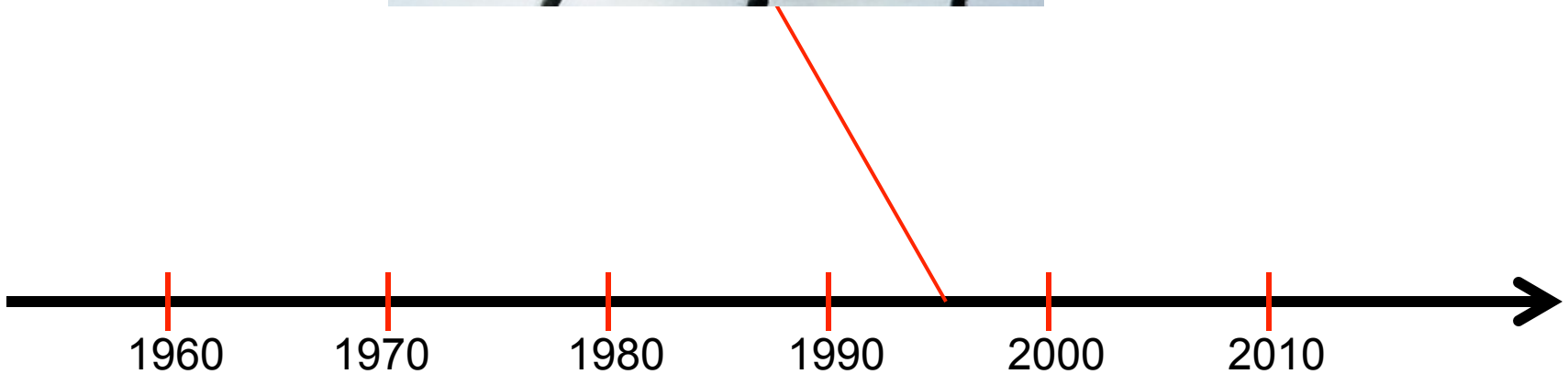
Reason #4: Constant Change!



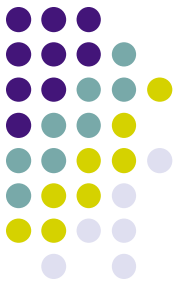
Aside



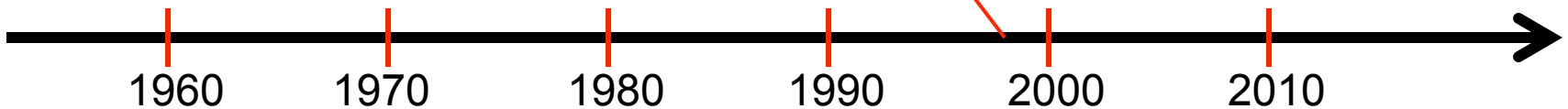
(You were born)



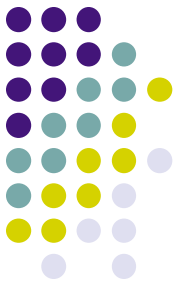
Reason #4: Constant Change!



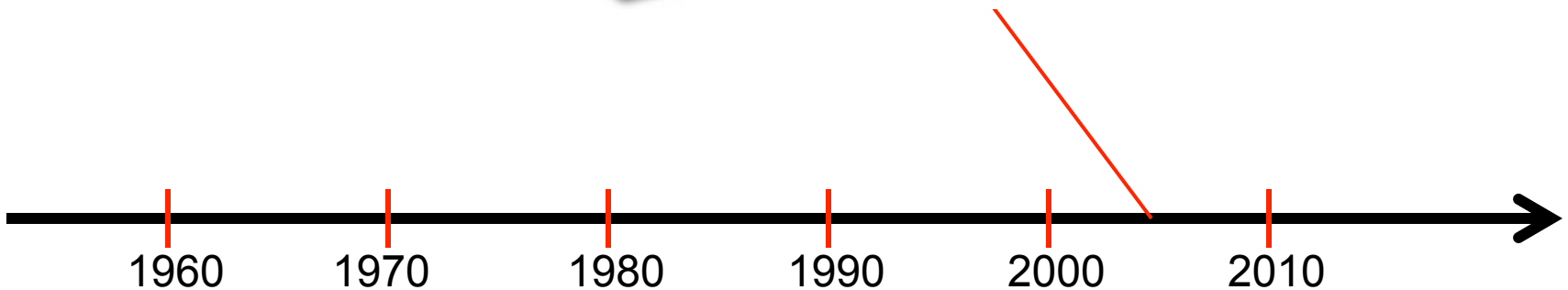
US Robotics
Palm Pilot



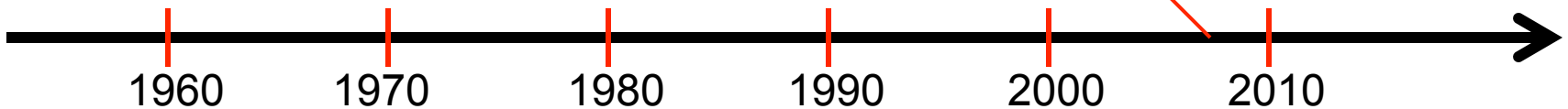
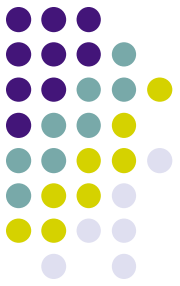
Reason #4: Constant Change!



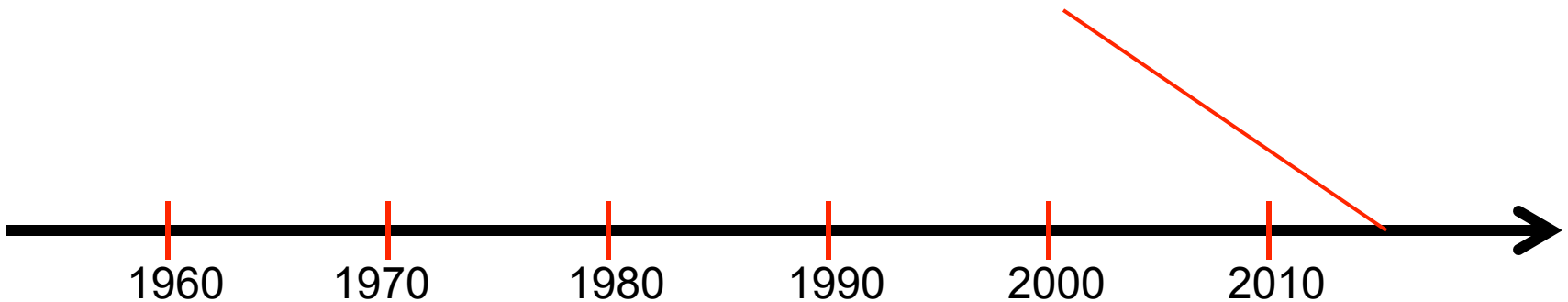
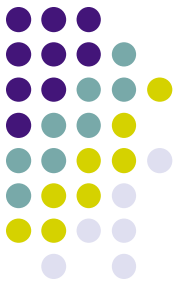
2-pound
Notebook
Computer w/ WiFi

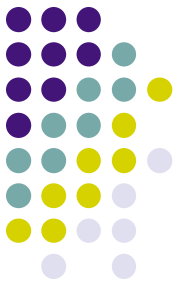


Reason #4: Constant Change!



Reason #4: Constant Change!



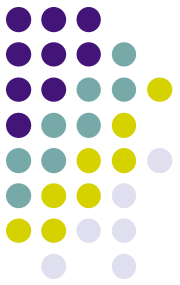


Reason #5: Interdisciplinary

- Cross-disciplinary
- Translational

google.com/culturalinstitute

chronicle.vis.uky.edu

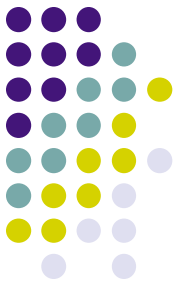


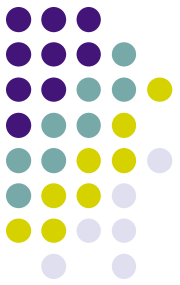
Reason #5: Interdisciplinary

- Finance
- Medicine
- Commerce
- Humanities
- Architecture
- Engineering
- Transportation
- Media
- ...

What's next?

You can help decide!





CS100 Action Items: Week 3

- Resume preparation
- Plan to attend Job Fair
- Review “CS Major” lecture and prepare “Ten Reasons” reading for next week
- Resolve any lingering “clicker” issues
- Stop by my office hours if you get a chance:
Tues 1-3, Wed 10-12