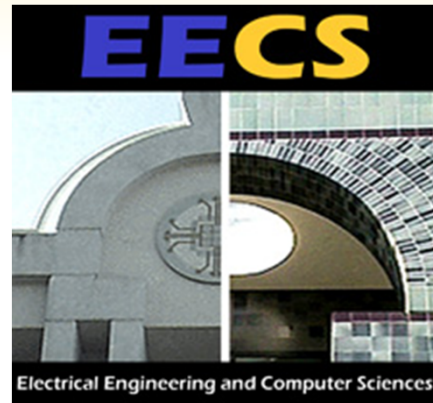# Overview of the Electrical Engineering and Computer Sciences Department at UC Berkeley

Prof. Tsu-Jae King Liu, *Chair*

Department of Electrical Engineering and Computer Sciences
University of California, Berkeley

A Brief History of EECS at UC Berkeley

- 1868: UC Berkeley chartered with Colleges of Mechanic Arts, Mining and Civil Engineering

- 1875: Frederick Hesse appointed to head the College of Mechanic Arts

photograph of Cory (right) in 1898

- 1892: Dean Hesse hired Clarence Cory as assistant professor of mechanical and electrical engineering.

- 1890s: Cory and Joseph LeConte installed electrical equipment for research, and extended service to supply light and power to the entire campus from the laboratory plant.

- 1901: Cory made dean of the College of Mechanics (until 1930)

- 1930: Colleges of Mechanics and Civil Engineering were combined to form the College of Engineering, containing the Department of Mechanical and Electrical Engineering.

- 1942: College of Mining was merged into the College of Engineering, containing the Division of Electrical Engineering.

- 1950: Cory Hall was completed and named after Clarence Cory.

- 1958: Division of Electrical Engineering became the Department of Electrical Engineering.

- 1968: Dept. of Computer Science was established in the College of Letters and Science.

- 1973: Department of Electrical Engineering and Computer Sciences was formed from a merger of EE and CS departments.
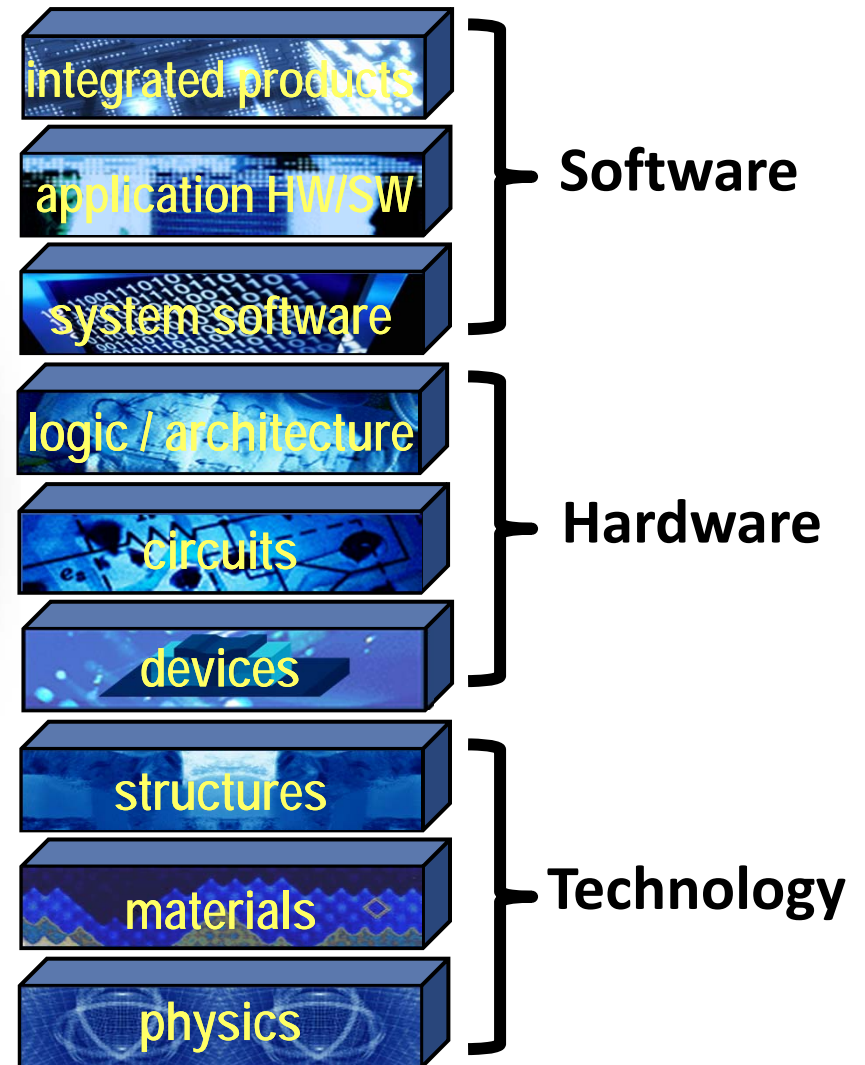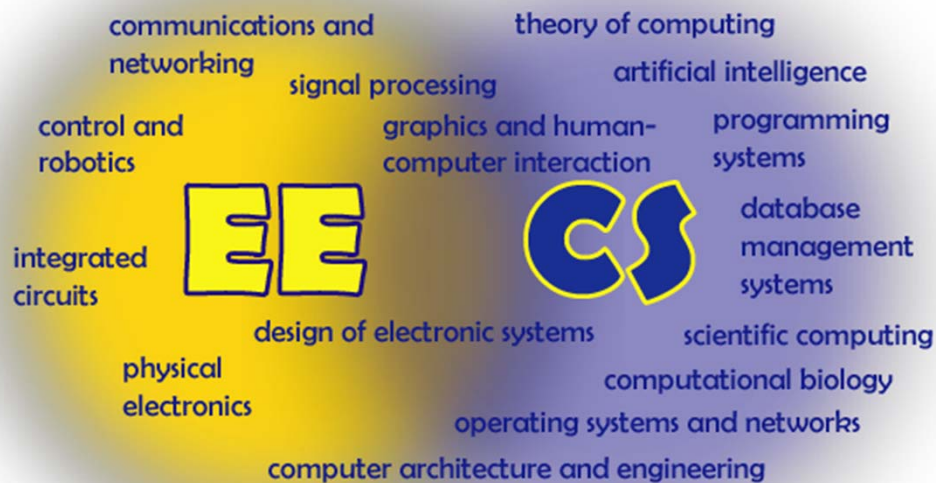
EECS @ UC Berkeley Today

- **~100 affiliated faculty, plus >20 active emeriti faculty, professors in residence and adjunct professors**
  - **We teach >95% of all student credit hrs within the dept!**
  - **>10 winners of UCB Distinguished Teaching Award**

- **~550 graduate students**
  - **~55% EE, ~45% CS**

- **~2,000 undergraduate students**
  - **includes ~750 upper-division students in the College of Letters & Science Computer Science program**

Information Science and Technology

communications and networking

signal processing

control and robotics

integrated circuits

physical electronics

theory of computing

artificial intelligence

graphics and human-computer interaction

programming systems

database management systems

design of electronic systems

scientific computing

computational biology

operating systems and networks

computer architecture and engineering

EE   **CS**

- integrated products
- application HW/SW
- system software

Software

- logic / architecture
- circuits
- devices

Hardware

- structures
- materials
- physics

Technology

Academic Reputation
US News & World Report University Rankings, 2014

Undergraduate Programs:

Electrical/Electronic/Communications Engineering

#1: MIT   #2: Stanford   #3: Berkeley

Computer Science

#1: Berkeley/CMU/MIT/Stanford (4-way tie)

Graduate Programs:

Electrical/Electronic/Communications Engineering

#1: Berkeley/MIT/Stanford (3-way tie)

Computer Science

#1: Berkeley/CMU/MIT/Stanford (4-way tie)

Our Mission

- Educate future leaders in academia, government, industry and entrepreneurial pursuit, through a rigorous curriculum of theory and application that develops the ability to solve problems, individually and in teams.

- Create knowledge of fundamental principles and innovative technologies, through research within the core areas of EECS and in collaboration with other disciplines, that is distinguished by its impact on academia, industry and society.

- Serve the communities to which we belong, at local, national and international levels, with an awareness of our ethical responsibilities to our profession and to society.
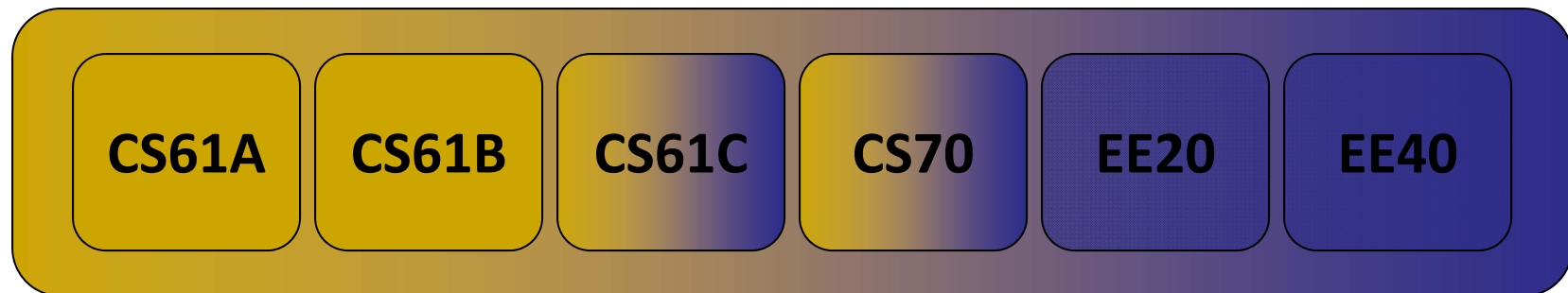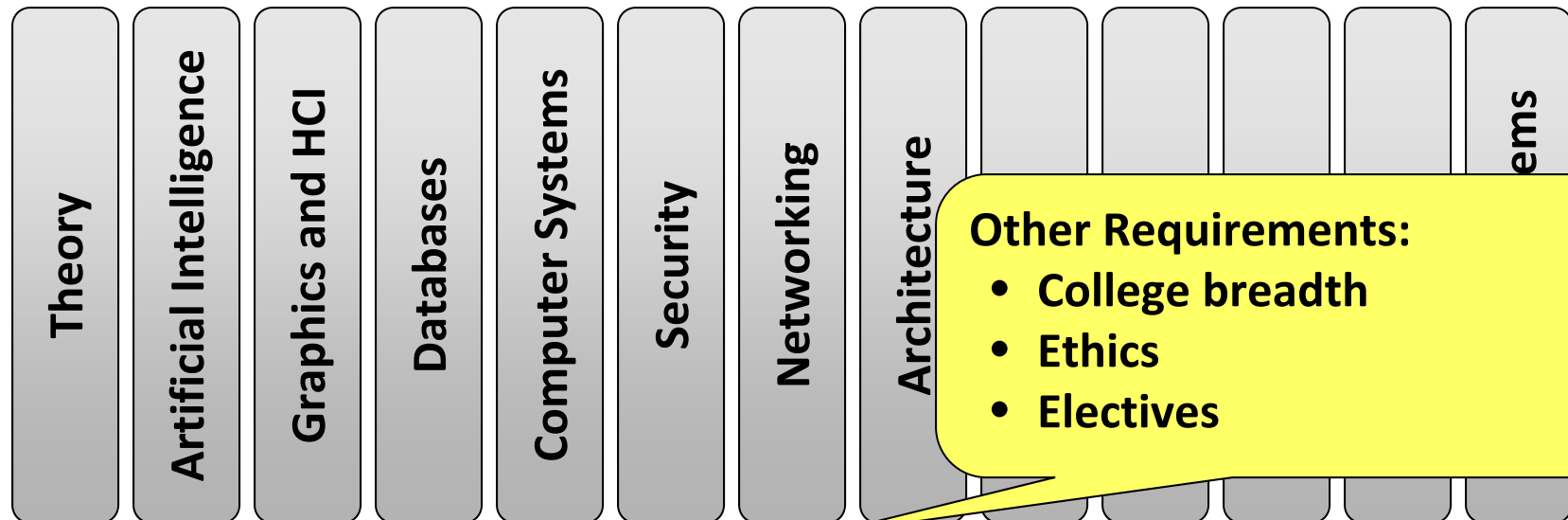
Undergraduate Programs

Two programs in two Colleges, one mission:

- BS in EECS (College of Engineering)
  - Greater emphasis on physics and math

- BA in CS (College of Letters and Science)
  - Greater emphasis on humanities and social sciences

The major coursework is the same!

EECS/CS Major Coursework

Deep Upper Division

Theory

Artificial Intelligence

Graphics and HCI

Databases

Computer Systems

Security

Networking

Architecture

ems

Other Requirements:
- **College breadth**
- **Ethics**
- **Electives**

| CS61A | CS61B | CS61C | CS70 | EE20 | EE40 |

Broad Lower Division

Lower Division Courses

- EE
  - EE 20N: Structure and Interpretation of Signals and Systems
  - EE 40: Introduction to Microelectronic Circuits

- CS
  - CS61A: Structure and Interpretation of Computer Programs
  - CS61B: Data Structures

- EECS
  - CS61C: Great Ideas of Computer Architecture
  - CS70: Discrete Math and Probability

Undergraduate Instructional Laboratories

Electronics Design Lab
(Cory Hall)

Computing Lab
(Soda Hall)

Culture: Competition vs. Collaboration

- **Project focus → teamwork**
- **Rigor and balance**

Faculty – Student Contact

- **Every EECS course is taught by a professor**

- **Each undergraduate student selects a faculty advisor**
  meet each semester

- **Faculty and TA office hours held weekly**

- **Undergraduates can participate in research projects**

- **Faculty-student social events**

Sample web page from HKN, the student honor society which manages course evaluations.

Tsu-Jae King

Title	Professor
Office	567 Cory Hall
Phone Number	643-9251
Email	tking@eecs.berkeley.edu
Home Page	http://www.eecs.berkeley.edu/~tking/
Research Interests	Solid-State Devices

Classes Taught

Sections	Teaching Effectiveness	How worthwhile was this course?
EE130 Fall 2013 Section 0	6.4 / 7	6.3 / 7
EE230A Fall 2013 Section 0	6.4 / 7	6.5 / 7
EE230M Spring 2013	7.0 / 7	7.0 / 7
EE130 Spring 2013	6.7 / 7	6.7 / 7
EE105 Fall 2008	6.2 / 7	6.1 / 7
EE105 Fall 2007	6.4 / 7	5.9 / 7
EE130 Spring 2007	6.2 / 7	6.3 / 7
EE40 Fall 2003	5.8 / 7	5.7 / 7
EE130 Spring 2003	6.4 / 7	6.2 / 7

Research Poster Session
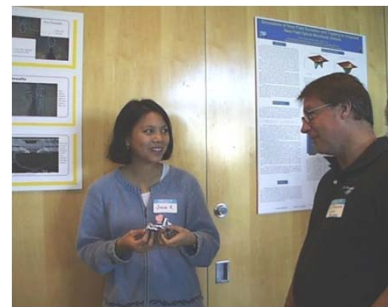
Undergraduate Social Hour
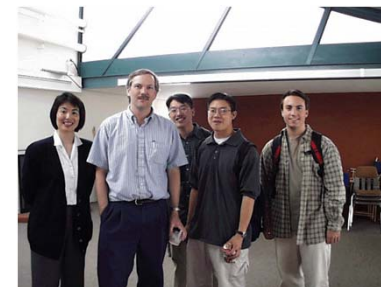
A History of Innovation in Addressing Societal-Scale Problems through Technology

Use-Inspired Fundamental Research

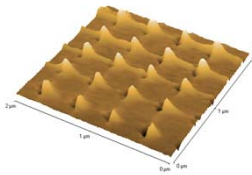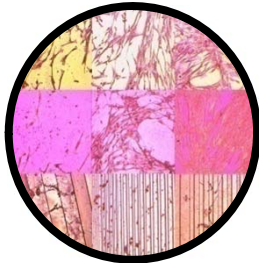**Societal Drivers**

Technology Creation

Engineering Science

The Marvell Nanofabrication Laboratory
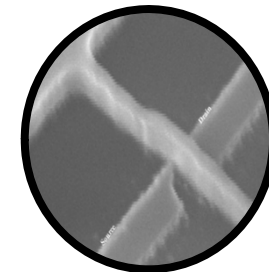## Distribution of Membership (474 total)
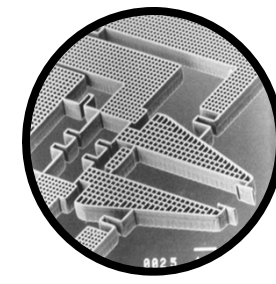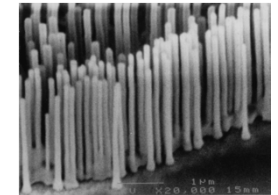

Bioelectronics

quantum dot growth

Optoelectronics

Nanoelectronics

15 nm FinFET (2001)

nanowire growth

MEMS

Pie chart:
- EECS 28%
- MechE 21%
- BNLA 11%
- Physics 8%
- LBNL 7%
- Chemistry 6%
- MatSci 6%
- Other UC 4%
- ChemE 4%
- Other Univ. 3%
- BioE 2%
- MCB 0%
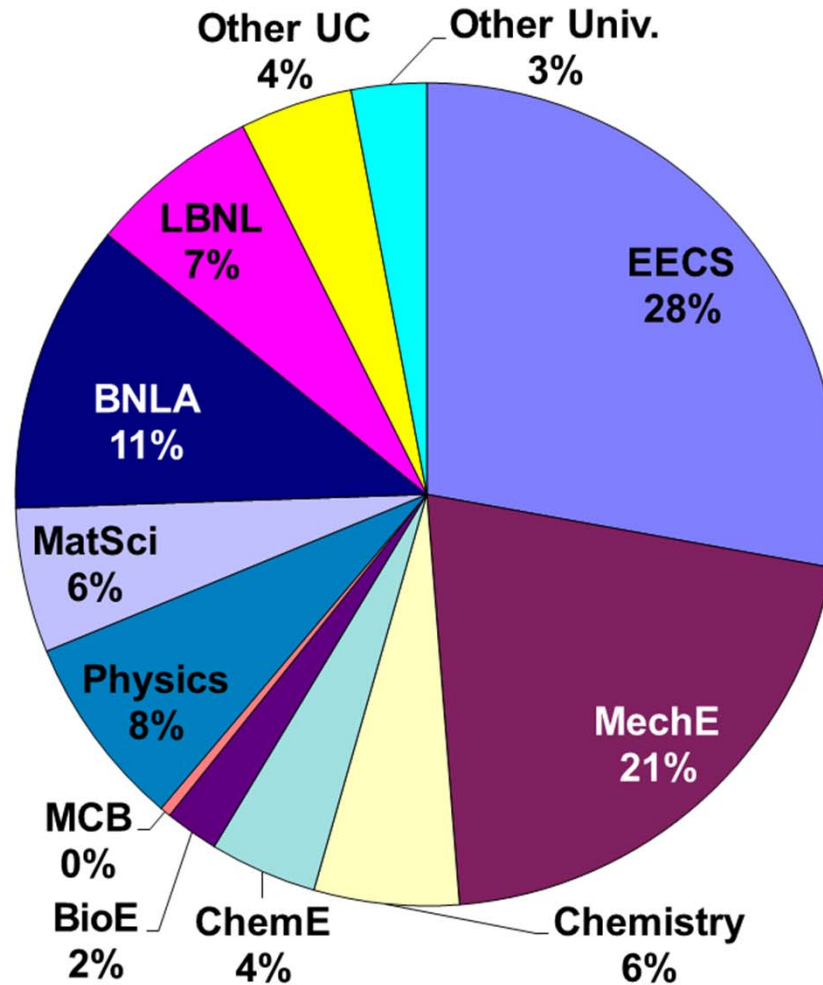
Berkeley Wireless Research Center
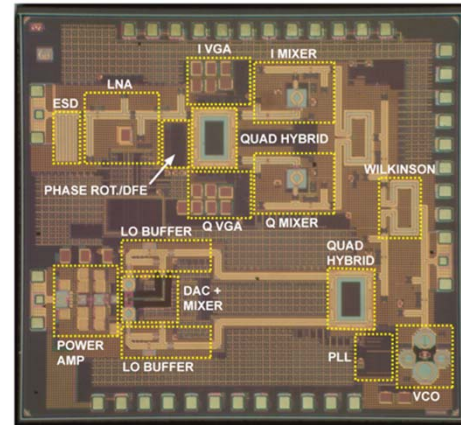
View of BWRC from outside

- **Established January 1999**
- **A Partnership of UC Researchers, Industry & Government**

Low-Power
60GHz
Transceiver

View of BWRC from inside

Industry members:
- **Intel Corporation**
- **STMicroelectronics**
- **Infineon Technologies**
- **Agilent Technologies**
- **NXP Semiconductors**
- **Marvell Semiconductor**
- **Qualcomm, Inc**
- **Samsung Electronics**
- **Fujitsu Laboratories**
- **Toshiba Corporation**
- **Nokia Research**
- **Panasonic Research**
- **KETI, Korea**
- **National Instruments**
- **InterDigital, Inc**
- **Robert Bosch LLC**

Design and deployment of new technologies for emerging regions:

- **Rural network coverage (long-distance low-cost links based on WiFi)**

- **Telemedicine**

- **Education**

- **Power issues (low-power network/computing, low-cost power)**

- **Funded by the National Science Foundation, with support from Intel, HP, Microsoft, United Nations Development Programme, IIT Delhi, IIT Kanpur, Grameen Bank, Markle Foundation**

Industry Partnerships

Benefits to industry:

- **Innovative ideas and research results**
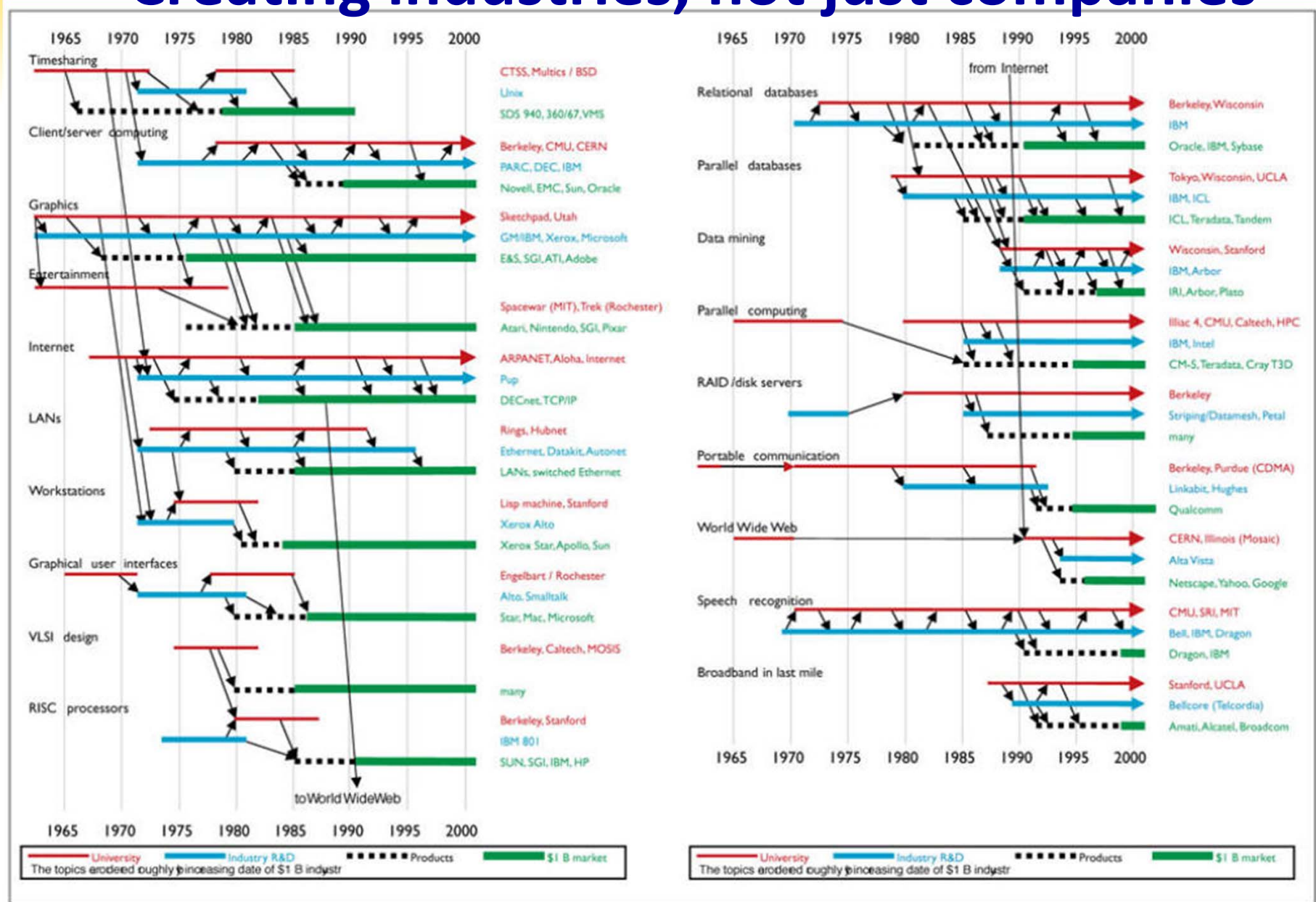- **Access to top students and faculty**

Benefits to university:

- **Insight into problems faced by industry and society**
- **Application of research to solve real-world problems**

Industry ⬇

- ✓ **Ongoing collaboration & knowledge transfer**
- ✓ **Mutual goals**
- ✓ **Shared leadership**
- ✓ **Commitment to long-term strategic partnership**

⬆ **UC Berkeley**

Industrial Affiliates

Creating industries, not just companies

Source: From [6], reprinted with permission from the National Academy of Sciences, courtesy of the National Academies Press, Washington D.C. © 2003.

Berkeley EECS Alumni

According to industry leaders, Berkeley grads:

"… stand out" as "self-starters" who "graduate with street smarts."

"… have more of a go-get-it attitude or a can-do attitude" than graduates from some other top schools.

"… form a very diverse mix of students, from a wide range of backgrounds."

..and (we hope)

exhibit honesty, leadership, courage, consideration for humanity, and high standards of professional ethics.

Summary

- **EECS spans Information Science and Technology**

- **Our integrated EE and CS undergraduate program offers students flexibility, with an emphasis on teamwork and research opportunities**

- **Berkeley EECS is a vibrant and dynamic community, distinguished by its impact on academia, industry, and society.**
  - Strong tradition of collaboration