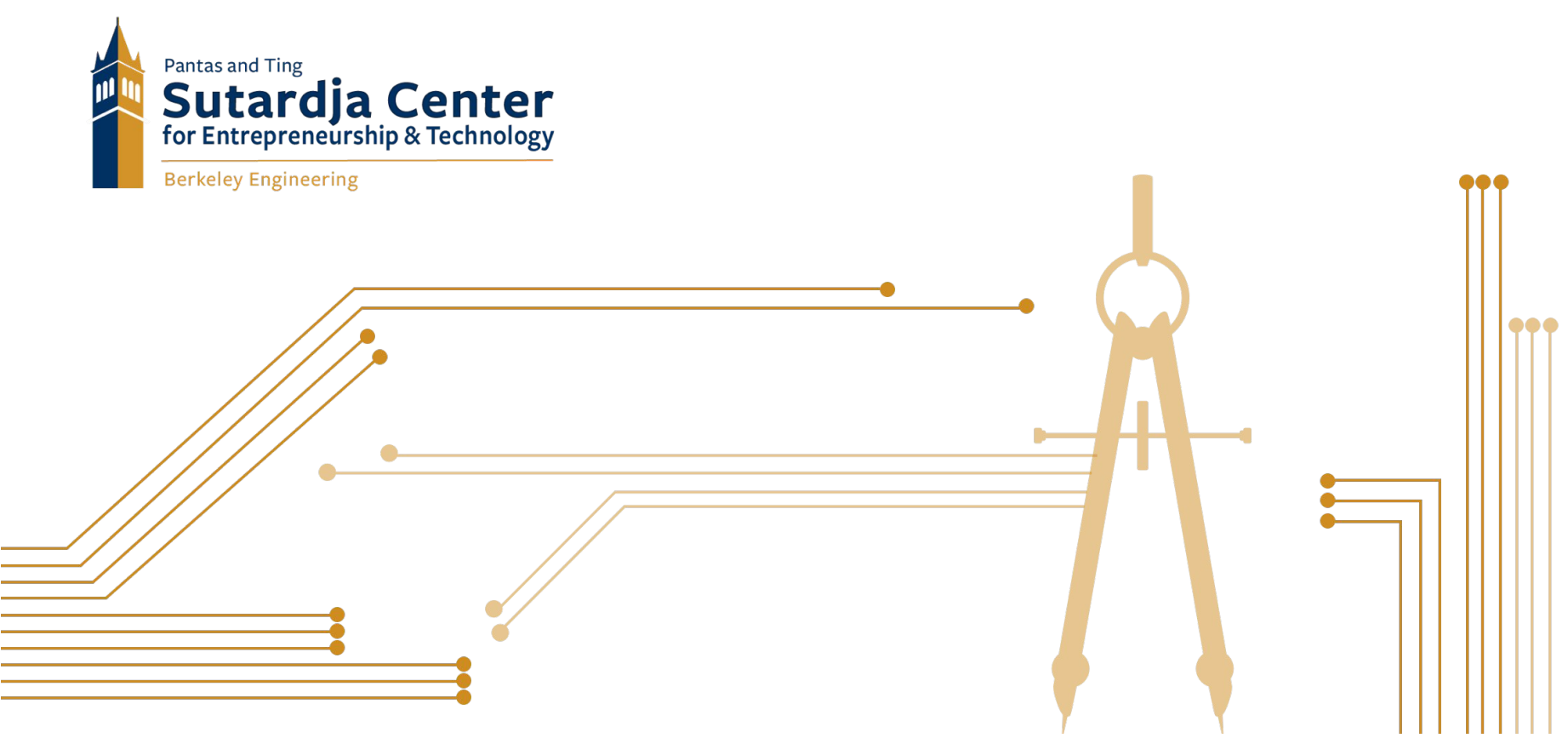


Efficient Education for Employment

Vivian Fernandez (Yahoo), Rayman Pon (Qualcomm), Subha Rajagopalan (VMWare),
Srinivas Ramanadham (WD/SanDisk), Jing Wang (Samsung SSI), Derrick Whittle (Yahoo)

This work was created in an open classroom environment as part of a program within the Sutardja Center for Entrepreneurship & Technology and led by Prof. Ikhlaq Sidhu at UC Berkeley. There should be no proprietary information contained in this paper. No information contained in this paper is intended to affect or influence public relations with any firm affiliated with any of the authors. The views represented are those of the authors alone and do not reflect those of the University of California Berkeley.

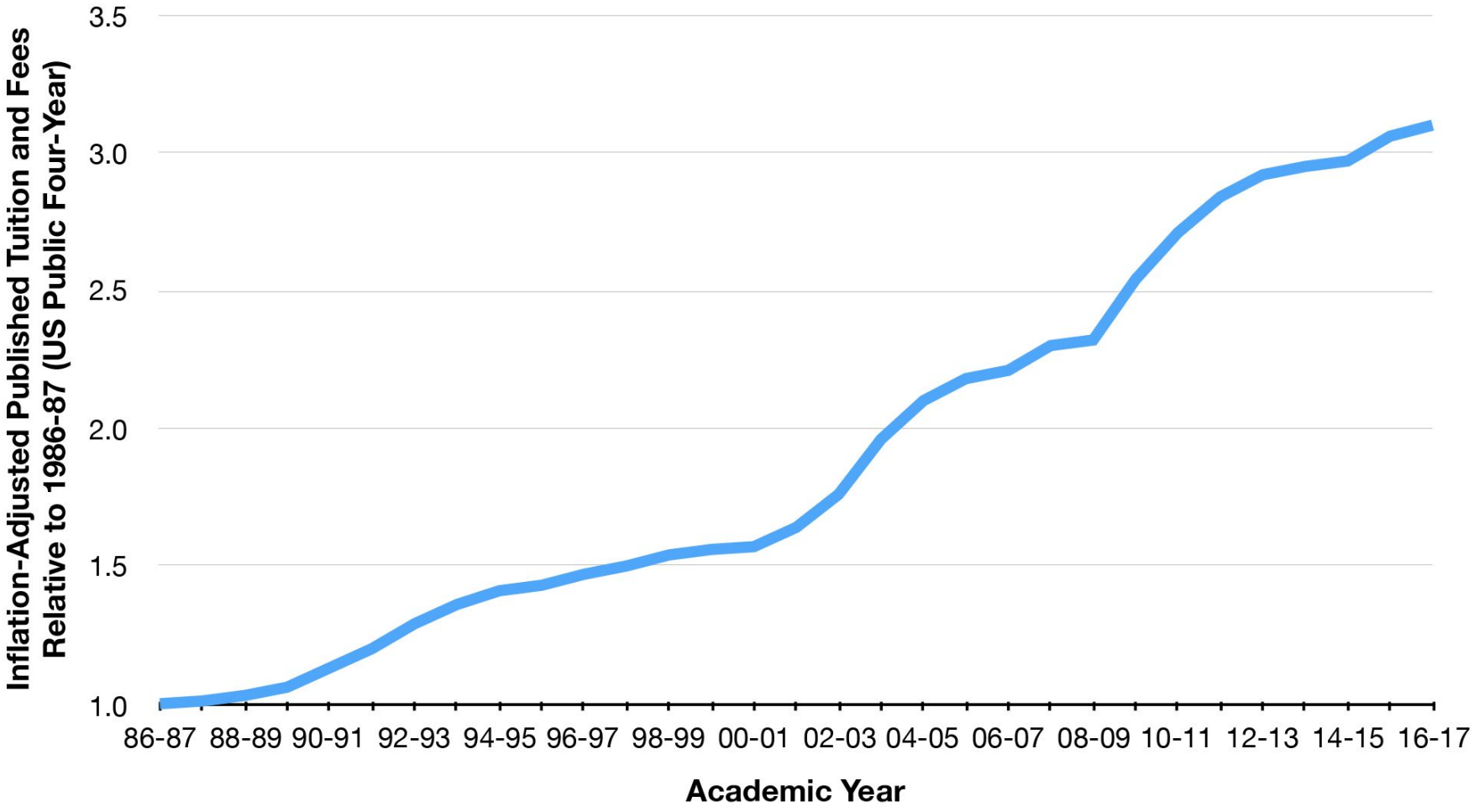
What does it cost to earn **$118,000** a year?

17 years

AutoScript III
from McKESSON

Trends Leading to Disruption

Rising Cost of Higher Education



SOURCE: The College Board, Trends in College Pricing 2016, Figure 5

Decreasing Industry Relevance

2016 Requirements for BS, Computer Science

Year 1

- Intro to Programming
- Intro to Data Structures

Year 2

- Intro to Computer Systems
- Programming in C

Year 3

- Data Structures & Algorithms
- Computer Architecture
- Technical Writing
- Operating Systems
- Object-Oriented Design
- Formal Languages & Computability

Year 4

- Programming Paradigms
- Software Engineering
- Options: Software Project, Computer Graphics, Bioinformatics, Compiler Design, Databases, Network Management

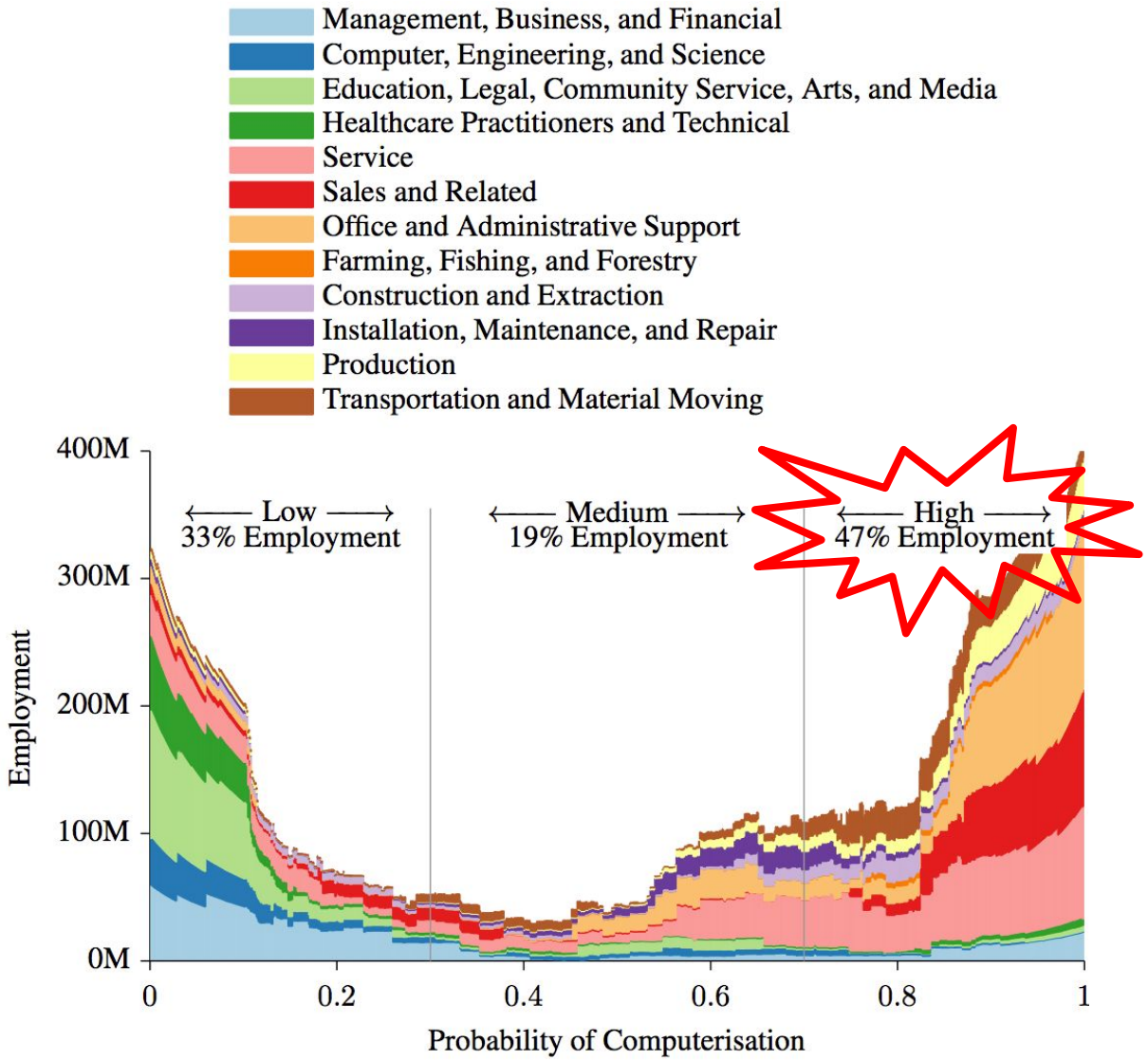
$70,000 + 4 Years == Job?

Class of 2015 (Bachelor's Degrees, all majors)

- 7.2% unemployed
- 14.9% underemployed

SOURCE: Economic Policy Institute, The Class of 2015 (employment rates); National Center for Education Statistics, Fast Facts for Digest of Education Statistics

Automation



SOURCE: Frey, C.B. and Osborne, M. (2013). The Future of Employment: How Susceptible are Jobs to Computerisation?

Unbundling

2016 Requirements for BS, Computer Science

Year 1

- **Intro to Programming**
- **Intro to Data Structures**
- *Discrete Mathematics*
- *American Civilization I*
- *English Composition: First Year Writing*
- *Calculus I*
- *American Civilization II*
- *Human Understanding & Development Elective*

Year 2

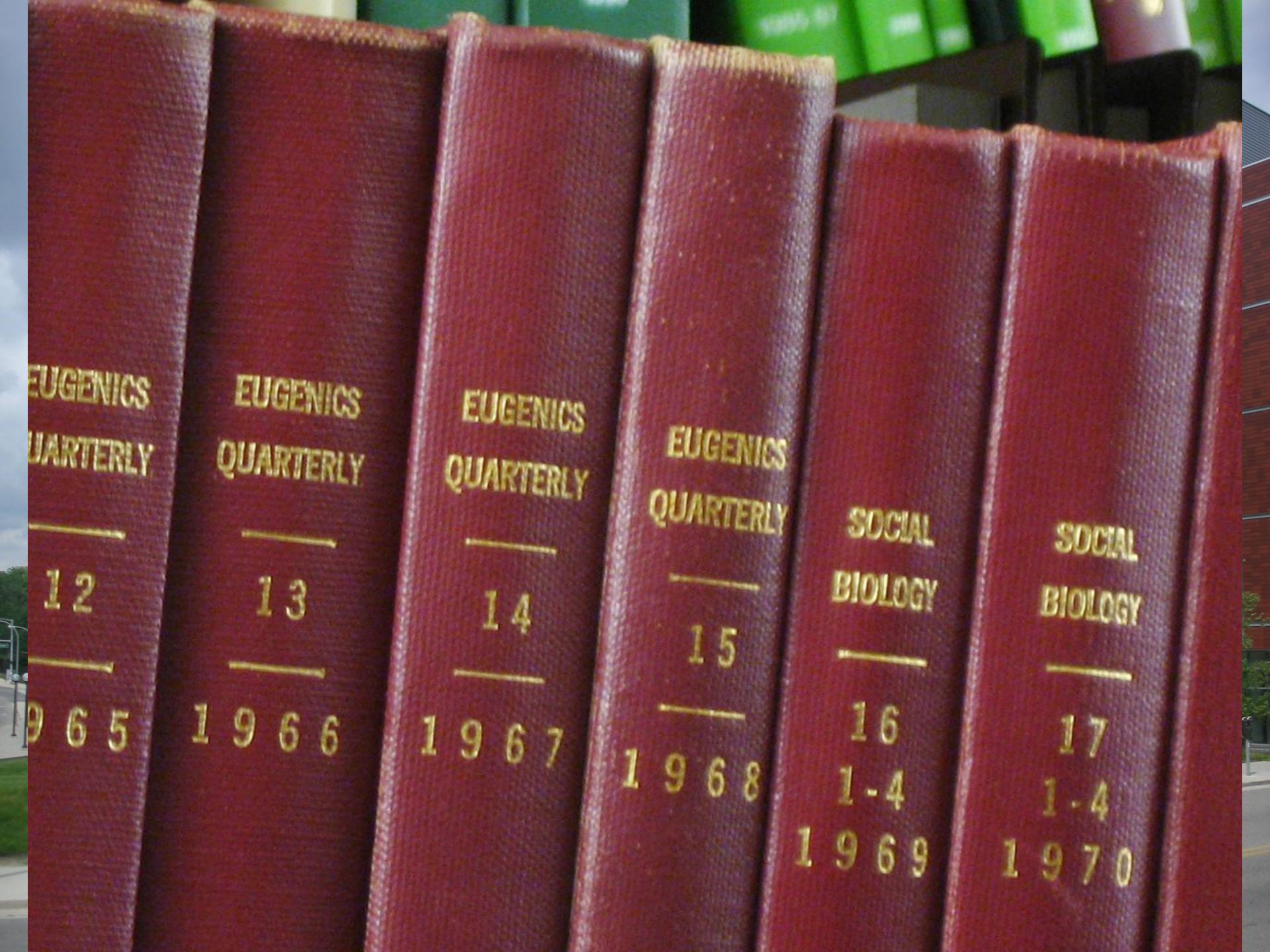
- **Intro to Computer Systems**
- **Programming in C**
- *Calculus II*
- *General Physics/Mechanics*
- *Oral Communication*
- *General Physics/Electricity & Magnetism*
- *Life Science Elective*
- *Arts or Letters Elective*
- *Critical Thinking & Writing Elective*

Year 3

- **Data Structures & Algorithms**
- **Computer Architecture**
- **Operating Systems**
- **Object-Oriented Design**
- **Formal Languages & Computability**
- *Technical Writing*
- *Linear Algebra I*
- *Kinesiology/Physical Education*
- *Calculus III or Combinatorics or Probability/Statistics*
- *Computers, Ethics and Society*
- *Earth & Environment Elective*

Year 4

- **Programming Paradigms**
- **Software Engineering**
- **Electives: Software Project, Computer Graphics, Bioinformatics, Compiler Design, Databases, Network Management**
- *Kinesiology/Physical Education*
- *Self, Society & Equality in the U.S. Elective*


EUGENICS
UARTERLY
12
965
EUGENICS
QUARTERLY
13
1966
EUGENICS
QUARTERLY
14
1967
EUGENICS
QUARTERLY
15
1968
SOCIAL
BIOLOGY
16
1-4
1969
SOCIAL
BIOLOGY
17
1-4
1970

Emerging Disruptors

Key Characteristics of Efficient Education for Employment

- Industry Relevance
- Affordability
- Speed
- Placement Assistance

Accredited

DEAC

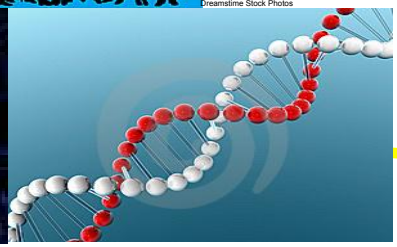
$4K Bachelor;
Aid/Grants/Scholarships

Associate (2 yr) or
Bachelor (4 yr)
Programs

UoPeople

Tuition Free
Online University

Business



CS

Health Sciences

Career Services
Internships
Global Employment Network

Quality Education for Everyone, Everywhere

Wide range of courses; In-demand fields
- Business & Management
- User Experience
- Energy Science

Courses 4-12 weeks
Programs comprise 4-6 courses

$50-500 advanced courses (Aid avail)
Many no cost

- XSeries Certificate
- Professional Certificate
- MicroMasters Certificate

Lacks Employment Assistance

coursera very similar to edX

UDACITY

Nanodegree Programs

Industry credentials for today's tech job

- 14 programs (all in tech)
- Online, self-paced ($199 per mo.)
- <12 months, <$2,000 (typical)
- External mentoring available
- Job guaranteed w/ Nanodegree+ (for some programs)

NANODEGREE PROGRAM

Android Developer by Google

Become an Android Developer

NANODEGREE PROGRAM

Data Analyst

Discover Insights from Data

CO-CREATED BY:

facebook mongoDB

NANODEGREE PROGRAM

Front-End Web Developer

Create Stunning User Experiences

CO-CREATED BY:

at&t Google GitHub HACK REACTOR

Choose your Nanodegree Program

Enjoy immediate support and reviews

Join an amazing community

Graduate with a valued credential

Land your dream job, launch your career!

Georgia Tech

3 Years

$7,000

OMS CS

Udacity

AT&T

launch_code

Get Skills

Get Verified

Get Placed

✓ No Degree Required

✓ No Cost

✓ Short Duration

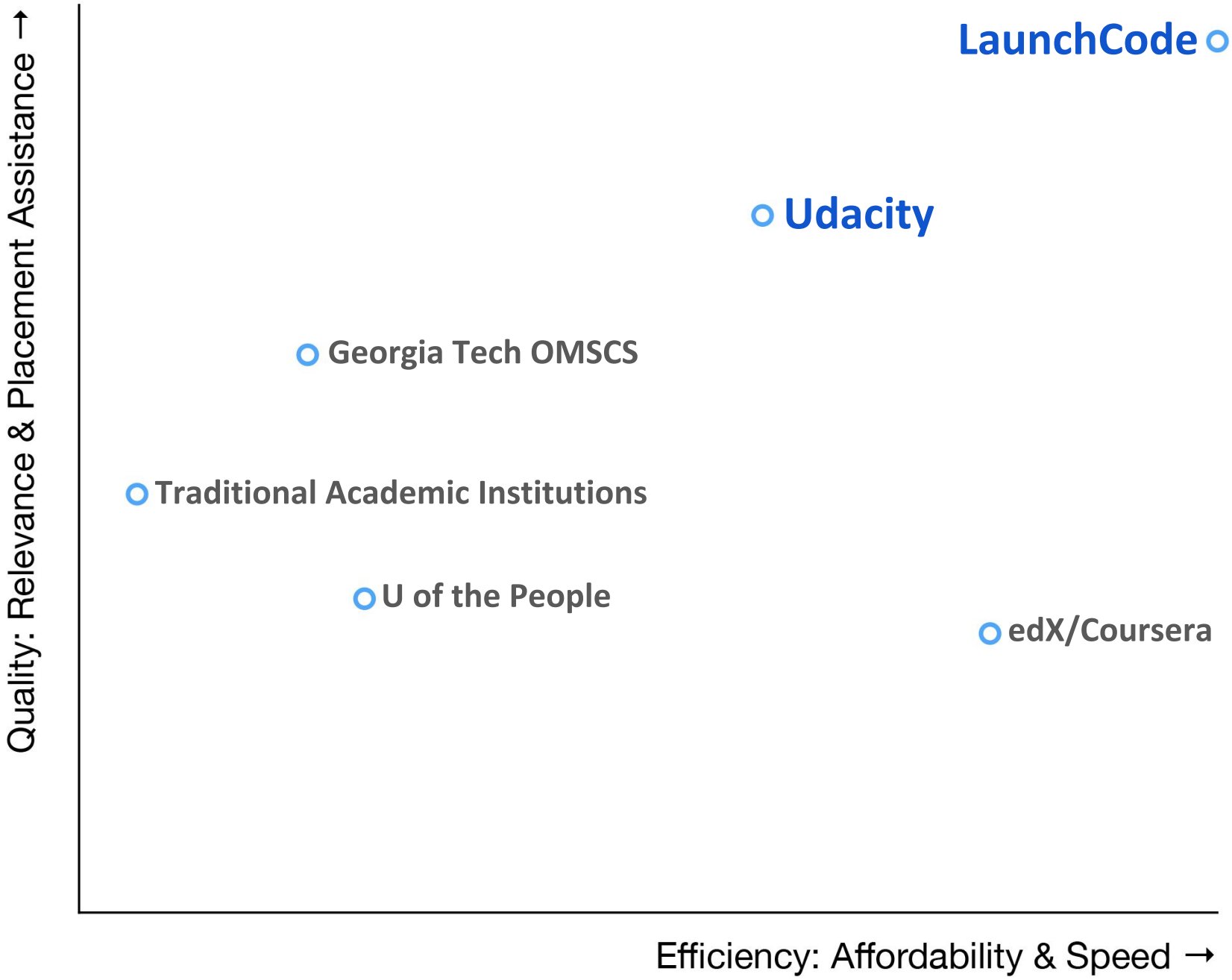
✓ Build Skills

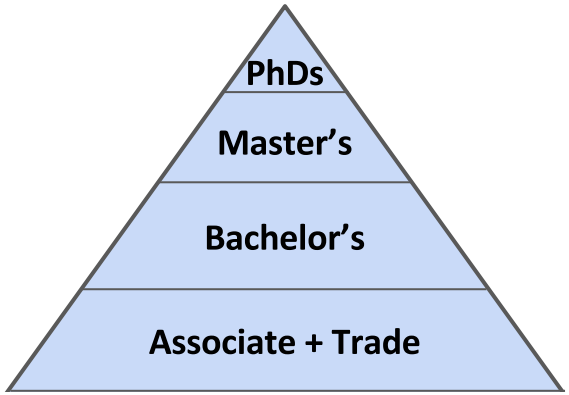
✓ 500+ Employers

✓ Placement Rates 90%

- Regional

- Highly Manual Placement


LaunchCode
Udacity
Georgia Tech OMSCS
Traditional Academic Institutions
U of the People
edX/Coursera
Quality: Relevance & Placement Assistance →
Efficiency: Affordability & Speed →



"A disruptive company starts by creating a large, new growth opportunity, almost always by allowing a broader group of people to do things that only experts or the wealthy could do in the past.… The new growth opportunities that disruptive companies spawn have historically been a primary source of improved consumer welfare."

— Clayton Christensen, Sally Aaron, and William Clark (2001)

Discussion

Appendix

Impediments to Disruption

3-sided, interdependent market: **Students × Education Suppliers × Employers**

- Must *simultaneously* change behavior of Students and Employers
  (hard to change behavior of just one side of the market)
- Employers were Students credentialed by incumbent Education Suppliers
  (have innate preference for incumbent credentials)

Unique Industry

- 1000s of distributed incumbents (independent yet with overlapping affiliations)
- Deeply embedded in society, individually and as an industry
- Regulated and subsidized by government/public

Last industry-wide disruption was about 500 years ago (printing press)

- *lecture: from medieval Latin lectura, from Latin lect- 'read, chosen,'*