Overview

• AI, Automation and unemployment
• Workplace changes
• Globalization
• The digital divide
• The “winner-take-all society”

Introduction

• Information technology and automation affecting workplace
  – Increases in productivity
  – Globalization of job market
  – Organization of companies
  – Telework
  – Workplace monitoring
• Impacts of information technology on society
  – Digital divide
  – Winner-take-all effects

Automation and Job Destruction

• Between 1979 and 2008...
  – U.S. population increased 35%
  – Manufacturing employment dropped 31%, from 19.4 million jobs to 13.5 million jobs
• Lost white-collar jobs
  – Secretarial and clerical positions
  – Accountants and bookkeepers
  – Middle managers
• Juliet Schor: Work week got longer between 1979 and 1990
  – Juliet Schor is Professor of Sociology at Boston College.

Automation and Job Creation

• Automation lowers prices
• That increases demand for product
• It also increases real incomes
• Increasing demand for other products
• Increased demand → more jobs
• Number of manufacturing jobs worldwide is increasing
• Martin Carnoy: Workers today work less than workers 100 years ago
  – Martin Carnoy is an American labour economist and Vida Jacks Professor of Education at the Stanford Graduate School of Education.

Automation Can Create Jobs, Too

Automation: Shrinking Middle Class

The Shrinking American Middle Class
Automation: Income Inequality

Since it’s typically cheaper to have a machine than a person on staff, this eliminates jobs that formerly existed to get that work done — the positions are “automated.” Automation eliminated many auto industry jobs in the 1980s when robot-driven car assembly was developed, and now jobs like store clerks and baristas are being threatened by smarter and cheaper machines. More than three million transportation industry jobs are at risk of displacement by the widespread adoption of self-driving vehicles, which will be present in 30 US cities by the end of 2016.

-- Jim Pugh

Automation: Jobs at Risk

A shift to automation affects higher paying jobs, too. The White House, in a recent economic report, found that people earning between $41,000 and $83,000 ($20 to $40 an hour) face a 31% median probability of being replaced by automation.

-- Computer World

Automation: Gender Inequality

There’s a lot of speculation on how robots taking over people’s jobs could impact the economy. After all, if nearly half of American jobs are automated in the next 20 years, what will people do? And while automation does include losses of jobs, it could also change what we value when it comes to skill sets.

For example, care-related work, like nursing and education, will likely remain human. Jerry Kaplan, a futurist and professor at Stanford University, thinks that automation could place a premium on the type of work that women tend to be good at, like person-to-person interaction, reading human emotion, collaboration, and creativity.

In this animation from The Atlantic, he and Saadia Zahidi of the World Economic Forum explore what the future could hold for the balance of power between genders and the distribution of labor at home.

Response: Luddites

An organised band of English mechanics and their friends, who set themselves to destroy manufacturing machinery in the Midlands and north of England between 1811 and 1816. The term has come to mean one who opposes the introduction of new technology, especially into a place of work.

Response: Creative Destruction?

“Process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one.”

-- Joseph Schumpeter

Joseph Alois Schumpeter was an Austrian political economist.

“Creative destruction occurs when something new kills something older. A great example of this is personal computers. The industry, led by Microsoft and Intel, destroyed many mainframe computer companies, but in doing so, entrepreneurs created one of the most important inventions of this century.”

Investopedia
Response: A World Without Work

http://www.youtube.com/watch?v=MsdweipynUs

Responsibility: Dignity and Option

"The economy must serve people, not the other way around. Work is more than a way to make a living; it is a form of continuing participation in God's creation. If the dignity of work is to be protected, then the basic rights of workers must be respected— the right to productive work, to decent and fair wages, to the organization and joining of unions, to private property, and to economic initiative."

— US Conference of Catholic Bishops

Backlash: The Great Unraveling

"The gap between what the tech boom promised and then delivered is another source of the rumbling national discontent that powered the rise this year of political outsiders Donald Trump and Bernie Sanders…. Instead, it stems from the idea that Americans expected larger economic gains from these amazing new machines and the companies that created them, not a widening between the haves and have-nots." — Wall Street Journal

Thought: Higher Education?

"Consider the number of college graduates today, who can't find work in their chosen field. Hundreds of thousands of highly educated twenty-somethings are either unemployed or getting paid a pittance to do something totally unrelated to the education they borrowed a fortune to acquire. Collectively, they hold 1.3 trillion dollars of debt, and no real training for the jobs that actually exist. Now, consider the countries widening skills gap— hundreds of thousands of good jobs gone begging because no one wants to learn a useful trade. It's madness. 'College For All' might sound good on the campaign trail, but in real life, it's a dangerous platitude that reinforces the ridiculous notion that college is for people who use their brains, and trade schools are for people who use their hands. As if the two can not be combined."

Thought: Smart or Lazy?

A programmer figured out how to automate his job and work 2 hours a week — but he’s not sure it's ethical

Is it wrong for workers to take advantage of automation?

Reddit User Claims He Automated His Job For 6 Years, Finally Is Fired, Forgets How To Code

Thought: Ramifications?

• Just because we could, does it mean we should?
• What social, ethical, and moral obligations do creators of technology have to society at large?
• How will you shape the brave new world that you will be building?
Effects of Increase in Productivity

- We have used higher productivity to achieve a higher material standard of living
- This is in contrast to medieval or ancient times (before modern capitalism)
- In medieval or ancient times
  - Low caloric intake meant pace of work was slow
  - Work was seasonal and intermittent
  - Laborers resisted working if they had enough money
  - When wages rose, laborers worked less

Rise of the Robots?

- Some experts suggest most jobs will be taken over by machines
- Artificial intelligence: Field of computer science focusing on intelligent behavior by machines
- Rapid increases in microprocessor speeds have led to various successes in AI
- What will happen as computers continue to increase in speed?

Notable Achievements in AI since 1995

- Computer-controlled minivan “drove” on freeways across USA in 1995
- IBM supercomputer Deep Blue defeated chess champion Gary Kasparov in 1997
- Honda’s ASIMO android can climb and descend stairs and respond to human gestures and postures
- Electrolux introduced robotic vacuum cleaner in 2001
- Five autonomous vehicles successfully completed 128-mile course in Nevada desert in 2005
- Watson trounced two most successful human Jeopardy! champions in 2011
- December 11, 2019 – Autonomous semi truck drives cross country to deliver butter.

Automation: Amazon

Amazon uses 45,000 small robots at about one-third of its U.S. warehouses to automate order processing. The robots look like bread boxes on wheels, lifting modular shelves stuffed with products and carrying the shelves to workers who pick out pieces.

Moral Question Related to Robotics

- Is it wrong to create machines capable of making human labor obsolete?
- Would intelligent robots demoralize humanity?
- Is it wrong to work on an intelligent machine if it can’t be guaranteed the machine will be benevolent toward humans?
- What if a malevolent human puts intelligent machines to an evil use?
- How would creative computers change our ideas about intellectual property?

Organizational Changes

- Information technology integration into firms
  - Automating back office functions (e.g., payroll)
  - Improving manufacturing
  - Improving communication among business units
- Results
  - Flattened organizational structures
  - Eliminating transactional middlemen (supply-chain automation)
Inexpensive Interactions Lead to Flexible Information Flow

Winners, Losers in the Workplace of the Future

<table>
<thead>
<tr>
<th>Higher Demand</th>
<th>Lower Demand</th>
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</thead>
<tbody>
<tr>
<td>Computer engineers</td>
<td>Bank clerks</td>
</tr>
<tr>
<td>Computer support specialists</td>
<td>Procurement specialists</td>
</tr>
<tr>
<td>Systems analysts</td>
<td>Financial records processing staff</td>
</tr>
<tr>
<td>Database administrators</td>
<td>Secretaries, stenographers, and typists</td>
</tr>
<tr>
<td>Desktop publishing specialists</td>
<td>Communications equipment operators</td>
</tr>
</tbody>
</table>

Telework

- Employees work away from traditional place of work
- Examples
  - Home office
  - Commuting to a telecenter
  - Salespersons with no office
- About 20% of Americans do some telework

Advantages of Telework
- Increases productivity
- Reduces absenteeism
- Improves morale
- Helps recruitment and retention of top employees
- Saves overhead
- Improves company resilience
- Helps environment
- Saves employees money

Disadvantages of Telework
- Threatens managers’ control and authority
- Makes face-to-face meetings impossible
- Sensitive information less secure
- Team meetings more difficult
- Teleworkers less visible
- Teleworkers "out of the loop"
- Isolation of teleworkers
- Teleworkers work longer hours for same pay
### Temporary Work

- Companies hiring more temporary employees
  - Saves money on benefits
  - Makes it easier to downsize
- Companies less committed to employees
  - Lay-offs not taboo as they once were
  - Long-term employment for one firm less common

### Monitoring

- 82% of companies monitor employees in some way
  - Purpose: Identify inappropriate use of company resources
  - Can also detect illegal activities
- Other uses of monitoring
  - Gauge productivity (10% of firms)
  - Improve productivity
  - Improve security
- Question: How to monitor teleworkers?

### Multinational Teams

- Software development teams in India since 1980s
- Advantages of multinational teams
  - Company has people on duty more hours per day
  - Cost savings
- Disadvantage of multinational teams
  - Poorer infrastructure in less developed countries

### Globalization Basics

- Globalization: Process of creating a worldwide network of businesses and markets
- Globalization causes a greater mobility of goods, services, and capital around the world
- Globalization made possible through rapidly decreasing cost of information technology

### Arguments for Globalization

- Increases competition
- People in poorer countries deserve jobs, too
- It is a tried-and-true route for a poor country to become prosperous
- Global jobs reduce unrest and increase stability
### Arguments against Globalization

- Makes the United States subordinate to the World Trade Organization
- Forces American workers to compete with foreigners who do not get decent wages and benefits
- Accelerates exodus of manufacturing and white-collar jobs from United States
- Hurts workers in foreign countries

### Dot-Com Bust Increases IT Sector Unemployment

- Dot-com: Internet-related start-up company
- Early 2000: stock prices of dot-coms fell sharply
- Hundreds of dot-coms went out of business
- Half a million high-tech jobs lost

### Foreign Workers in the IT Industry

- Visas allow foreigners to work inside U.S.
  - **H1-B**
    - Right to work up in United States to six years
    - Company must show no qualified Americans available
    - Congress still authorizes 65,000 H1-B visas per year, plus 20,000 more for foreigners with advanced degrees
    - Quota not filled in 2009 due to economic downturn
  - **L-1**
    - Allows a company to transfer a worker from an overseas facility to the United States
    - Workers do not need to be paid the prevailing wage
    - In 2006 about 50,000 foreigners in U.S. under L-1 visa

### Foreign Competition

- China is world’s number one producer of computer hardware
- IT outsourcing to India is growing rapidly
- Number of college students in China increasing rapidly
- ACM Collegiate Programming Contest provides evidence of global competition

### Growth of China’s Computer-Hardware Industry

![Graph showing growth of China’s computer-hardware industry](chart.png)

### Concept of the Digital Divide

- Digital divide: Some people have access to modern information technology while others do not
- Underlying assumption: people with access to telephones, computers, Internet have opportunities denied to those without access
- Concept of digital divide became popular with emergence of World Wide Web
Evidence of the Digital Divide

- Global divide
  - Access higher in wealthy countries
  - Access higher where IT infrastructure good
  - Access higher where literacy higher
  - Access higher in English-speaking countries
  - Access higher where it is culturally valued
- Social divide
  - Access higher for young people
  - Access higher for well-educated people

Models of Technological Diffusion

- Technological diffusion: rate at which a new technology is assimilated
  - Group A: highest socioeconomic status
  - Group B: middle socioeconomic status
  - Group C: lowest socioeconomic status
- Normalization model
  - Group A adopts first, then Group B, finally Group C
  - Eventually A use = B use = C use
- Stratification model
  - Group A adopts first, then Group B, finally Group C
  - A use > B use > C use forever

Critiques of the Digital Divide

- DD talk suggests the difference between “haves” and “have nots” is simply about access
- DD talk puts everyone in two categories, but reality is a continuum
- DD implies lack of access leads to less advantaged social position, but maybe it is the other way around
- Internet is not the pinnacle of information technology

Percentage of People with Internet Access, by World Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Africa</td>
<td>11.40%</td>
</tr>
<tr>
<td>Asia</td>
<td>23.80%</td>
</tr>
<tr>
<td>Middle East</td>
<td>31.70%</td>
</tr>
<tr>
<td>Latin America/Caribbean</td>
<td>36.20%</td>
</tr>
<tr>
<td>Europe</td>
<td>58.30%</td>
</tr>
<tr>
<td>Oceania/Australia</td>
<td>60.10%</td>
</tr>
<tr>
<td>North America</td>
<td>78.30%</td>
</tr>
</tbody>
</table>

Net Neutrality

- Tiered service: Charging more for high-priority routing of Internet packets
- Supporters of tiered service say it is needed to support Voice-over-IP and other services
- Opponents to tiered service (e.g., Google, Yahoo!) say it would hurt small start-up companies and lower innovation
- Others think companies controlling Internet might favor some content over other content
- Net neutrality legislation would require all Internet packets be treated the same
- Opponents of proposed legislation say consumers should be able to pay more to get higher quality service
The Winner-Take-All Phenomenon

- Winner-take-all: a few top performers have disproportionate share of wealth
- Causes
  - IT and efficient transportation systems
  - Network economies
  - Dominance of English language
  - Changing business norms

Reducing Winner-Take-All Effects

- Limit number of hours that stores remain open
- Businesses form cooperative agreements to reduce positional arms races
  - Example: salary caps on pro sports teams
- More progressive tax structures
- Campaign finance reform