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## What We Will Cover

- The Pace of Change.
- Change and Unexpected Developments.
- Themes of Technology Challenges.
- Ethics.

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## The Pace of Change

- **1940s:** First computer was built.
- **1956:** First hard-drive disk weighed a ton and stored five megabytes.
- **1991:** Space shuttle had a one-megahertz computer.
- Ten years later, some automobiles had 100-megahertz computers.
- Speeds of several gigahertz are now common.



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## Change and Unexpected Developments

### Cell Phones:

- Relatively few in 1990s. Approximately five billion worldwide in 2011.
- Used for conversations and messaging, also for:
  - Taking and sharing pictures.
  - Downloading music and watching videos.
  - Checking emails.
- Smartphone apps for many tasks, including:
  - Monitoring diabetes.
  - Chatting and video conferencing.



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## Change and Unexpected Developments

### Cell Phones:

- Location tracking raises privacy concerns.
- Cameras in cell phones affect privacy in public and non-public places.
- Talking on cell phones while driving is dangerous.



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## Change and Unexpected Developments

### Social Networking:

- First online social networking site was [www.classmates.com](http://www.classmates.com) in 1995.
- Founded in 2003, [Myspace](http://www.myspace.com) had roughly 100 million member profiles by 2006.
- Facebook was started at Harvard as an online version of student directories.
- Social networking is popular with hundreds of millions of people because of the ease with which they can share aspects of their lives.



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## Change and Unexpected Developments

### Social Networking:

- Businesses connect with customers.
- Organizations seek donations.
- Groups organize volunteers.
- Protesters organize demonstrations and revolutions.
- Stalkers and bullies stalk and bully.
- Jurors tweet about court cases during trials.



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## Change and Unexpected Developments

### Communication and the Web:

- In the 1980s, email messages were short and contained only text.
- People worldwide still use email, but texting, tweeting, and other social media are now preferred.



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## Change and Unexpected Developments

### Communication and the Web:

- Blogs (“Web log”) began as outlets for amateurs wanting to express ideas, but they have become significant source of news and entertainment.
- Inexpensive video cameras and many videos on the Web can violate copyrights owned by entertainment companies.



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## Change and Unexpected Developments

### Collaboration:

- Wikipedia: The online, collaborative encyclopedia written by volunteers.
- Informal communities of programmers create and maintain free software.
- Watch-dogs on the Web: Informal, decentralized groups of people help investigate crimes.



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## Change and Unexpected Developments

### E-commerce:

- [Amazon.com](https://www.amazon.com) started in 1994 selling books on the Web. It has grown to be one of the most popular, reliable, and user-friendly commercial sites.
- [eBay.com](https://www.ebay.com) facilitates online auctions.
- Traditional brick-and-mortar business have established Web sites.



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## Change and Unexpected Developments

### E-commerce and trust concerns:

- People were unwilling to provide credit card information to make online purchases, so [PayPal.com](https://www.paypal.com) grew out of need for trusted intermediary to handle payments.
- Encryption and secure servers made payments safer.



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## Change and Unexpected Developments

### Free stuff:

- Email programs and email accounts, browsers, filters, firewalls, encryption software, word processors, spreadsheets, software for viewing documents, software to manipulate photos and video, and much more.
- Phone services using VOIP such as Skype.
- University lectures.



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## Change and Unexpected Developments

### Free stuff:

- Advertising pays for many free sites and services, but not all.
- Wikipedia funded through donations.
- In order for companies to earn ad revenue to fund multimillion-dollar services, many free sites collect information about our online activities and sell it to advertisers.



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## Change and Unexpected Developments

### Artificial intelligence:

- A branch of computer science that makes computers perform tasks normally requiring human intelligence.
- Researchers realized that narrow, specialized skills were easier for computers than what a five-year-old does: recognize people, carry on a conversation, respond intelligently to the environment.



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## Change and Unexpected Developments

### Artificial intelligence:

- Many AI applications involve pattern recognition.
- Speech recognition is now a common tool.



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## Change and Unexpected Developments

### Discussion Questions:

- ❖ *How will we react when we can go into a hospital for surgery performed entirely by a machine? Will it be scarier than riding in the first automatic elevators or airplanes?*
- ❖ *How will we react when we can have a conversation and not know if we are conversing with a human or a machine?*
- ❖ *How will we react when chips implanted in our brains enhance our memory with gigabytes of data and a search engine? Will we still be human?*



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## Change and Unexpected Developments

### Robots:

- Mechanical devices that perform physical tasks traditionally done by humans.
- Can operate in environments that are hazardous for people.



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## Change and Unexpected Developments

### Smart sensors, motion, and control:

- Motion sensing devices are used to give robots the ability to walk, trigger airbags in a crash, and protect laptops when dropped.
- Sensors can detect leaks, acceleration, position, temperature, and moisture.



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## Change and Unexpected Developments

### Tools for disabled people:

- Assistive technology devices help restore productivity and independence to people with disabilities.
- Researchers are experimenting with chips that convert brain signals to controls for leg and arm muscles.



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## Themes of Technology Challenges

- Old problems in a new context: crime.
- Adapting to new technology: thinking in a new way.
- Varied sources of solutions to problems: natural part of change and life.
- Global reach of Net: ease of communication with distant countries.
- Trade-offs and controversy: Increasing security means reducing convenience.
- There is a difference between personal choices, business policies, and law.



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## Ethics

### What is Ethics:

- Study of what it means to “do the right thing”.
- Assumes people are rational and make free choices.
- Rules to follow in our interactions and our actions that affect others.



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## Ethics

### A variety of ethical views:

- **Deontological theories (نظريات الأخلاق):**
- **(1) Deontological:** emphasizes duty and absolute rules, to be followed whether they lead to good or ill consequences in particular cases.
- Example, “Do not lie”. An act is ethical if it complies with ethical rules and is chosen for that reason.



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## Ethics

- **(2) Utilitarianism (النفعية):** is the main example of consequentialist theory. Its guiding principle is to increase happiness or utility as expressed by John Mill. A person's utility is what satisfies the person's needs and values. We should consider the consequences.
- Utilitarianism has many variations:
  - Act utilitarianism: apply to individual actions and judge the action by its impact.
  - Rule utilitarianism: not to individual action but to general ethical rules.



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## Ethics

- **(3) Natural rights:** let people make their own decisions without interference by others.
- They think that they are doing what is best for people involved or for humanity in general.
- Called natural rights because they come from nature or can be derived from the nature of humanity.



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## Ethics

### A variety of ethical views:

- Negative rights (liberties):
  - The right to act without interference.
- Positive rights (claim-rights):
  - An obligation of some people to provide certain things for others.



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## Ethics

### A variety of ethical views:

- Golden rules:
  - Treat others as you would want them to treat you.
- Contributing to society:
  - Doing one's work honestly, responsibly, ethically, creatively, and well is moral.
- Social contracts and a theory of political justice:
  - People willingly submit to a common law in order to live in a civil society.



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## Ethics

### A variety of ethical views:

- No simple answers:
  - Human behavior and real human situations are complex. There are often trade-offs to consider.
  - Ethical theories help to identify important principles or guidelines.
- Do organizations have ethics?
  - Ultimately, it is individuals who are making decisions and taking actions. We can hold both the individuals and the organization responsible for their acts.



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## Ethics

### Some important distinctions:

- Right, wrong, and okay.
- Distinguishing wrong and harm.
- Separating goals from constraints.
- Personal preference and ethics.
- Law and ethics.



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## Ethics

### Discussion Question:

*Can you think of examples of liberties (negative rights) and claim-rights (positive rights) that are at opposition to each other?*



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