"If we'd given customers what they said they wanted, we'd have built a computer they'd have been happy with a year after we spoke to them—not something they'd want now..."

Steve Jobs,
Apple Computer
Learning Objectives

1. Explain what an information system is, contrasting its data, technology, people, and organizational components.

2. Describe types of jobs and career opportunities in information systems and in related fields.

3. Describe the dual nature of information systems in the success and failure of modern organizations.
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The Knowledge Worker
- Term coined by Peter Drucker in 1959
- An individual who is relatively well educated and who creates, modifies, and/or synthesizes knowledge as a fundamental part of a job

Knowledge Society
- New Economy/Digital World
  - Digital Divide
The Knowledge Society

Information is now as important as land, labor and capital resources.
Globalization is the integration of economies throughout the world, enabled by technological progress.

Globalization manifests itself through changes in economy, cultures, and technology.
Globalization: Economic Changes

- Economic Changes
  - Increase in international trade of goods and services
Globalization: Cultural Changes

- Cultural Changes
  - Increased access to other cultures (through TV, Internet, and so on)
Globalization: Technological Changes

- Technological Changes
  - Availability of low-cost computing platforms and communication technologies
Information Systems: Definition

- Combination of five key elements:
  - People
  - Hardware
  - Software
  - Data
  - Telecommunications networks
Data: The Root and Purpose of Information Systems

- Distinction between:
  - **Data**—raw, unformatted information
    - Example: 5433333353
  - **Information**—data that is transformed to have a meaning
    - Example: (543) 333-3353
  - **Knowledge**—body of governing procedures used to organize or manipulate data
  - **Wisdom**—accumulated knowledge
Data: The Root and Purpose of Information Systems (cont’d)

<table>
<thead>
<tr>
<th>Data</th>
<th>Information</th>
<th>Knowledge</th>
<th>Wisdom</th>
</tr>
</thead>
<tbody>
<tr>
<td>465889727</td>
<td>465-88-9727</td>
<td>465-88-9727 → John Doe</td>
<td>465-88-9727 → John Doe</td>
</tr>
<tr>
<td>Unformatted Data</td>
<td>Formatted Data</td>
<td>Data Relationships</td>
<td>Employment Records</td>
</tr>
<tr>
<td>Meaning:</td>
<td>Meaning:</td>
<td></td>
<td>Medical Records</td>
</tr>
<tr>
<td>???</td>
<td>SSN</td>
<td>SSN → Unique Person</td>
<td>Data Relationships for Multiple Domains</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Meaning:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SSN → Unique Person → Any Information About</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the person</td>
</tr>
</tbody>
</table>
• Relationship of computer-based information systems to information technology and technology in general
Any machine that can supplement or replace human manual work

- Examples:
  - Heating system
  - Surgical laser
• A type of technology that is controlled by or uses information
  ○ Example: Manufacturing robot
IT: The Components of Information Systems—Computer-based IS

- Systems using computers to provide useful data to people
  - Example: Specific software used to analyze data
# Learning Objectives

1. Explain what an information system is, contrasting its data, technology, people, and organizational components.

2. Describe types of jobs and career opportunities in information systems and in related fields.

3. Describe the dual nature of information systems in the success and failure of modern organizations.
People: The Builders and Managers of IS

- Career opportunities are strong and expected to grow
  - Computer/IT analyst and Computer & IS Manager both in the top 10 best jobs for the next decade
  - Median earnings for IS professionals: $101,580  
    (U.S. Bureau of Labor Statistics)
  - Entry level salary: $49,966  
    (National Association of Colleges and Employers)
  - IS Managers receive many benefits, including expense accounts, bonuses, and stock option plans
  - IS careers offer far above average opportunities for personal growth, stability, and advancement
# Best Jobs for the Next Decade

<table>
<thead>
<tr>
<th>Rank</th>
<th>Career</th>
<th>Job Growth (10-year forecast)</th>
<th>Average Pay (salary and bonus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Software engineer</td>
<td>46.07%</td>
<td>$80,427</td>
</tr>
<tr>
<td>2</td>
<td>College professor</td>
<td>31.39%</td>
<td>$81,491</td>
</tr>
<tr>
<td>3</td>
<td>Financial adviser</td>
<td>25.92%</td>
<td>$122,462</td>
</tr>
<tr>
<td>4</td>
<td>Human resources manager</td>
<td>23.47%</td>
<td>$73,731</td>
</tr>
<tr>
<td>5</td>
<td>Physician assistant</td>
<td>49.65%</td>
<td>$75,117</td>
</tr>
<tr>
<td>6</td>
<td>Market research analyst</td>
<td>20.19%</td>
<td>$82,317</td>
</tr>
<tr>
<td>7</td>
<td><strong>Computer/IT analyst</strong></td>
<td><strong>36.10%</strong></td>
<td><strong>$83,427</strong></td>
</tr>
<tr>
<td>8</td>
<td>Real estate appraiser</td>
<td>22.78%</td>
<td>$66,216</td>
</tr>
<tr>
<td>9</td>
<td>Pharmacist</td>
<td>24.57%</td>
<td>$91,998</td>
</tr>
<tr>
<td>10</td>
<td>Psychologist</td>
<td>19.14%</td>
<td>$66,359</td>
</tr>
</tbody>
</table>

## Careers and Salaries in the IS Field
(National Average)

<table>
<thead>
<tr>
<th>IS Activities</th>
<th>Typical Careers</th>
<th>Salary Ranges in Percentiles (25%–75%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop</td>
<td>Systems analyst</td>
<td>$50,000–$85,000</td>
</tr>
<tr>
<td></td>
<td>Systems programmer</td>
<td>$50,000–$80,000</td>
</tr>
<tr>
<td></td>
<td>Systems consultant</td>
<td>$80,000–$120,000</td>
</tr>
<tr>
<td>Maintain</td>
<td>Information systems auditor</td>
<td>$45,000–$75,000</td>
</tr>
<tr>
<td></td>
<td>Database administrator</td>
<td>$75,000–$100,000</td>
</tr>
<tr>
<td></td>
<td>Webmaster</td>
<td>$55,000–$80,000</td>
</tr>
<tr>
<td>Manage</td>
<td>IS manager</td>
<td>$60,000–$90,000</td>
</tr>
<tr>
<td></td>
<td>IS director</td>
<td>$85,000–$120,000</td>
</tr>
<tr>
<td></td>
<td>Chief information officer (CIO)</td>
<td>$150,000–$250,000</td>
</tr>
<tr>
<td>Study</td>
<td>University professor</td>
<td>$70,000–$180,000</td>
</tr>
<tr>
<td></td>
<td>Government scientist</td>
<td>$60,000–$200,000</td>
</tr>
</tbody>
</table>

Sources: www.salary.com; cnnmoney.com.
Careers in IS: Evolution of the CIO

- Chief Information Officer (CIO)—job title became popular in 1980s

- Early 1990s—people joked that CIO stands for “Career Is Over”
  - Primary reasons:
    - Tightened Budgets
    - Overblown Expectations

- Today: most large organizations have a CIO or an equivalent position
  - Role: business innovation leader
IS Personnel

- Changing trends
  - Higher prestige
  - More women

PAST

PRESENT
What Makes IS Personnel Valuable?

- Integrated knowledge and skills in three areas:
  - **Technical Competency**—skills in hardware, software, networking, and security
  - **Business Competency**—understanding of the nature of the business; this is key in addition to technical competency
  - **Systems Competency**—understanding of how to build and integrate large scale systems
## Hot Skills for 2010 and Beyond

<table>
<thead>
<tr>
<th>Domain</th>
<th>Hot</th>
<th>Cold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Domain</td>
<td>• Enterprise architecture</td>
<td>• Programming</td>
</tr>
<tr>
<td></td>
<td>• Project leadership</td>
<td>• Routine coding</td>
</tr>
<tr>
<td></td>
<td>• Business process modeling</td>
<td>• Systems testing</td>
</tr>
<tr>
<td></td>
<td>• Project planning, budgeting, and scheduling</td>
<td>• Support and help desk</td>
</tr>
<tr>
<td></td>
<td>• Third-party provider management</td>
<td>• Operations—server hosting, telecommunications, operating systems</td>
</tr>
<tr>
<td>Technology Infrastructure and Services</td>
<td>• Systems analysis</td>
<td>• Continuity and recovery</td>
</tr>
<tr>
<td></td>
<td>• Systems design</td>
<td>• Legacy systems development</td>
</tr>
<tr>
<td></td>
<td>• Network design</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Systems auditing</td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td>• IT security planning and management</td>
<td></td>
</tr>
<tr>
<td>Storage Application</td>
<td>• Storage administration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Customer-facing application development</td>
<td></td>
</tr>
<tr>
<td>Internet</td>
<td>• Customer-facing Web application systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Artificial intelligence</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Web mining</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Data warehousing</td>
<td></td>
</tr>
<tr>
<td>Business Intelligence</td>
<td>• Business intelligence</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Data warehousing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Data mining</td>
<td></td>
</tr>
</tbody>
</table>

Based on: Collett, 2006.
Many different types of systems are used in organizations
- Examples: Transaction processing systems, decision support systems, intelligent systems, and so on.

These systems used to be cleanly categorized—now the boundaries are fading due to:
- Internetworking
- Systems integration
Organizing the IS Function

- Early History: Poor Service and Worse Attitudes
  - Early systems were cumbersome to use, over budget, and late

- The Rise and Fall of End-User Development
  - Users developed their own applications or improved existing systems
  - Today’s complex systems designed by professionals (see Chapter 10)

- The Modern Information Systems Organization
  - Attitudes changed and service mentality emerged
The advent of the IBM PC and early applications packages led to end-user development.

Source: http://www-03.ibm.com/ibm/history/exhibits/pc25/images/6705PH04.jpg
Other Issues Facing the IS Function

• The spread of technology in organizations
• Downsizing (rightsizing) and outsourcing
  ○ Routine jobs
• Career prospects and opportunities
  ○ Need for people within organizations with analyst skills
  ○ Information systems are pervasive in society
Learning Objectives

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The Dual Nature of IS

- IS can make you or break you
- London Heathrow—The failure
  - Baggage handling system: original cost of $500 million
  - Disaster on opening day, costing $50 million due to over 28,000 bags being misrouted
- FedEx—The success
  - $38 billion family of companies—largest express transportation company
  - “Information hub for business where managing information is the business”
Both FedEx and London Heathrow were developing strategic information systems

Only strategic information systems can help sustain competitive advantage
Why Information Systems Matter

• Nicholas Carr article—“IT Doesn’t Matter”
  o IT no longer a source of advantage on the firm level
  o Companies should focus IT on cost reduction and risk mitigation
• Many experts disagree with his arguments
  o Abbie Lundberg—Interview with Carr
  o Don Tapscott—“The Engine That Drives Success: The Best Companies Have the Best Business Models Because They Have the Best IT Strategies”
    ▷ Many successful companies use IT to support a unique business strategy
End of Chapter Content
Opening Case—Managing in the Digital World: Apple Computer

- Apple changed the way in which everyday people use computers
- Long list of successful products
- Success of iPod: tight integration with iTunes and AppStore
Apple Computers

- A company’s survival may depend upon those employees who fail over and over as they try **new ideas** (Consultant & author Tom Peters)

- Apple has had many failures:
  - Mac TV, PowerMac G4 Cube, Lisa, Newton, etc.

- Apple’s overall success shows that a company without an interesting list of failures probably isn’t trying hard enough.
Bionic Contact Lens

- Bionic eye implants for blind and partially blind people are being developed

- Problems that must be solved first:
  - Plastics for electronic must be biocompatible
  - LED must be small enough to fit over the eye without causing discomfort, and yet must be functional
  - Where will the power for the device come from?
The Two Steves—Jobs & Wozniak

- Knew each other in high school
- Started selling Apple computers in 1976
- Both left Apple in 1985
- In 1996 Jobs returned to become Apple’s CEO
Worldwide Internet Usage

- In 2008 about 17 percent of active Internet users were located in the United States
- Internet usage:
  - Highest—North America: 74 percent of population
  - Lowest—Africa: 5.3 percent of population

<table>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>955,206,348</td>
<td>14.3%</td>
<td>51,065,630</td>
<td>5.3%</td>
<td>3.5%</td>
<td>1031.2%</td>
</tr>
<tr>
<td>Asia</td>
<td>3,776,181,949</td>
<td>56.6%</td>
<td>578,538,257</td>
<td>15.3%</td>
<td>39.5%</td>
<td>406.1%</td>
</tr>
<tr>
<td>Europe</td>
<td>800,401,065</td>
<td>12.0%</td>
<td>384,633,765</td>
<td>48.1%</td>
<td>26.3%</td>
<td>266.0%</td>
</tr>
<tr>
<td>Middle East</td>
<td>197,090,443</td>
<td>3.0%</td>
<td>41,939,200</td>
<td>21.3%</td>
<td>2.9%</td>
<td>1176.8%</td>
</tr>
<tr>
<td>North America</td>
<td>337,167,248</td>
<td>5.1%</td>
<td>248,241,969</td>
<td>73.6%</td>
<td>17.0%</td>
<td>129.6%</td>
</tr>
<tr>
<td>Latin America/Caribbean</td>
<td>576,091,673</td>
<td>8.6%</td>
<td>139,009,209</td>
<td>24.1%</td>
<td>9.5%</td>
<td>669.3%</td>
</tr>
<tr>
<td>Oceania/Australia</td>
<td>33,981,562</td>
<td>0.5%</td>
<td>20,204,331</td>
<td>59.5%</td>
<td>1.4%</td>
<td>165.1%</td>
</tr>
<tr>
<td>World Total</td>
<td>6,676,120,288</td>
<td>100.0%</td>
<td>1,463,632,351</td>
<td>21.9%</td>
<td>100.0%</td>
<td>305.5%</td>
</tr>
</tbody>
</table>

Note: Internet usage and world population statistics were updated for June 30, 2008. ©Copyright 2008, Miniwatts Marketing Group. All rights reserved.
Online Rights Not Always Universal

- Governments in some countries regulate access to information on the Web (e.g., China)
- *Reporters Without Borders* call this behavior unethical
- What is the role of companies such as Microsoft in dealing with these governments?
- Who owns Web-posted data?
- Should the Internet create its own laws?
Guerilla Wi-Fi

- Digital divide is the “haves” and the “have-nots” in the IT world
- One Laptop Per Child (OLPC) attempted to overcome this.
- Meraki Network was founded to provide affordable Wi-Fi for these new computers
- $50 Mini (wireless routers about the size of two stacked iPhones) can be piggy-backed so that one Mini connected to the Internet can relay the connection to other Minis, thus forming a large network
Globalization trend is increasing the need for “Global Skills”—What can you do?

- Gain international experience
- Learn more than one language
- Sensitize yourself to global cultural and political issues

In Addition—Immerse yourself into the culture:

- Learn about local food
- Watch locally produced television
- Read books and newspapers
In the News

SOPA-PIPA Protests

WHAT IS THE PROTESTING ALL ABOUT?
Bills in Congress

- PIPA
- SOPA
Protect IP Act - PIPA

- Bill in the US Senate
- IP = Intellectual Property
  - e.g., movies, music or writing
  - In the digital age, all can easily be copied and distributed freely over the Internet
  - Creators get no compensation for their work
Stop Online Piracy Act - SOPA

- Bill in the US House of Representatives
- Similar bill in the House
BIG Concept Behind the Bills

- Stop illegal copying of movies or music
  - Many believe illegal copying is threatening the US movie and music industry
  - Supporters (e.g.) include Country Music Association, U.S. Chamber of Commerce, Motion Picture Association of America, AFL-CIO
What’s Wrong With That Idea?

STOPPING SOMETHING ILLEGAL = GOOD
Objections to the Bills

- Online Web 2.0 sites would be held responsible for the actions of their users
  - Wikipedia, Google, Facebook, Twitter, Reddit and Tumblr say they would have to police their users from linking to pirated content

- ISPs would have to block (censor) websites that facilitate digital file sharing

- Search engines would have to be disabled from locating web sites that facilitate file sharing
  - e.g., Google, Yahoo, Bing
Quotes

- Sergey Brin, one of the co-founders of Google
  - “While I support their goal of reducing copyright infringement (which I don’t believe these acts would accomplish), I am shocked that our lawmakers would contemplate such measures that would put us on a par with the most oppressive nations in the world.”

- Leslie Harris, President and CEO of the Center for Democracy and Technology
  - “The United States cannot stand on the world stage and with a straight face urge other governments to stop blocking parts of the Internet when bills like SOPA and PIPA propose do the same thing in the name of copyright enforcement.”
Alternative Suggested Approach

- Carefully identify (with appropriate due process) sites that brazenly promote and enable large-scale piracy
- Cut these sites off from global financial and advertising networks
- From: Leslie Harris, President and CEO of the Center for Democracy & Technology
White House Response

14 Jan 2012

U.S. Chief Technology Officer

- “While we believe that online piracy by foreign websites is a serious problem that requires a serious legislative response, we will not support legislation that reduces freedom of expression, increases cybersecurity risk, or undermines the dynamic, innovative global Internet.”

- SOPA, the House bill, is on hold, a hearing to discuss how it would work technically is delayed

- PIPA procedural vote scheduled for Jan. 24
Resources

In-Class Activity

- Find one or two people with the same major as you
- Put all your names on the handout and state your common major
- Identify a type of information system common in the employment sector corresponding to your major
- Create an example, in the context of that information system, of data, information, knowledge, and wisdom – as defined in our text
- Explain one thing about the industry represented by your major that has been impacted by globalization
- Explain how intellectual property is important to the industry of your major
- Explain one way in which the Internet is important to the industry of your major
- Do you think SOPA/PIPA propose a sound approach to controlling piracy and theft of intellectual property?