

# Information Technology

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## Agenda:

- Nature and history of IT field
- Track record of IT predictions
- Major issue areas in which people seek predictions today

## Constituents of IT

- Hardware
- Software
- Customers
- Professionals

## Our Origins

- We have long historical roots as
  - mathematicians
  - logicians
  - scientists
  - engineers (especially electrical)
- We came together around 1940 to build electronic computers

- The computing field did not explode until the 1980s, when we began to realize the importance of computing is communication, not number crunching.

- We specialize in algorithmic thinking
  - representation of worldly objects by abstract digital objects
  - construction of algorithm to solve a problem in terms of digital objects
- Algorithm is a controller for a computer
- A computer is absolutely mindless, performing mechanical operations under algorithm control

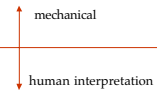
- We have developed a theory of complexity of algorithms.
- It says that almost all interesting problems are computationally intractable.
- And yet we routinely find ways to organize productive interactions between computers and humans.

- We continuously seek better tools and training to help professionals build complex systems that are reliable and dependable.

- Our algorithmic-thinking minds draw us to believe
  - everything solvable has an algorithmic solution
  - information is fundamental in nature (biology, economics, science, engineering, etc.)

### Base Terms

- data (bits)
- algorithm
- information
- knowledge
- practices



### Growth of IT Industry

- 1950s -- electronic brain
- 1960s -- business engine
- 1970s -- software applications, engineering
- 1980s -- PCs, LANs, distributed computing
- 1990s -- Internet
- 2000s -- E-Commerce

### IT in Higher Education

- 1940s -- first computer labs
- 1950s -- first computing degrees
- 1960s -- first computer science & information science departments
- 1980s -- proliferation of departments and programmes
- 1990s -- acceptance of discipline, start of IT Schools

## IT Education in Industry

- Strong growth of “Corporate Universities” with concentrations in IT
- 2000 members of Corporate Universities Xchange -- a federation of CU’s.
- Total spending comparable with public education
- Little interchange with traditional universities

## IT and Internet

- 1970-1981 -- ARPANET, grew to 200 nodes, closed to gov’t contractors
- 1981-1989 -- NSF CSNET, then NFSNET, then Internet backbone, grew to 160,000 nodes, ARPANET closed down quietly
- 1990-present -- continued growth, many ISPs, business communities, now 135M nodes
- 1992-present -- World Wide Web -- 1B pages

## IT Trends

- What are the major claims about the future of IT that we should pay attention to?

- Which claims to believe?
- What actions to take?
- Better: how to think about these claims
- Main value of predictions: allows us to choose whether to work for or against possible future worlds

- What is our track record with claims about IT influence and impact?
- Quick look at two sources
  - 2000 from 1990 (John Seely Brown and Paul Duguid, *The Social Life of Information*, 2000)
  - 1993 from 1893 (Dave Walter, *Today Then*, 1992)

## 2000 from 1990

- Advocates of “Internet phenomenon” predicted the ends of
  - the newspaper, television, and mass media
  - big businesses and bureaucracies
  - paper
  - the office
  - the university
  - taxation and the nation state

### **2000 from 1990**

- None of these predictions happened
- If anything, all the doomed institutions are stronger and in bigger demand
- Advocates had tunnel vision
- Saw only the advance of technology
- Did not consider the social context

### **1993 from 1893**

- 74 commentaries in US newspapers prior to 4th Columbian Exposition, Chicago, in 1893
- What will the world be like in 1993?

### **1993 from 1893**

- Almost all predictions were wrong!
  - Technology did not right wrongs or make human beings better
  - railroads and pneumatic tubes popular
  - only three foresaw air transportation -- military only
  - no one foresaw auto and air transport for the masses, antibiotics, radio/TV industries
  - or the computer

- The predictions tell us more about the observers than the events they forecast.

### **Why are we (technologists) so poor at predictions?**

- faith in power of technology to make better human beings
- easy to trace the logic of technology rather than logic of humanity
- in IT, easy to reduce everything to information, then extrapolate information

### **What Claims to Watch?**

- Numerous Big Claims extant
- Many involve interaction with other fields
- Twelve claims considered

**1**

- Wireless microchips will hook everything to Internet (including your refrigerator, socks, and brain -- and untold numbers of sensors).

**2**

- A revolution toward human-centered design will finally allow us to make software reliable and dependable.

**3**

- Moore's Law will continue indefinitely, in media other than silicon.

**4**

- Quantum computers will render all current methods of cryptography obsolete.

**5**

- We will eventually face social conflicts with robots -- if we survive that long.

**6**

- Information will be accepted as the basic principle of biology.

**7**

- Ubiquitous computers will promote energy conservation and make green living become fashionable.

**8**

- Electricity usage will grow proportional to the Internet.

**9**

- Computation will become the third paradigm of science.

**10**

- All software, books, documents, and information will be free.

**11**

- Armies of robots will explore outer space, planet earth, and the interiors of our bodies.

**12**

- Implants and bionic body parts will significantly extend lifespan.

## Evaluating the Claims

- Instead of extrapolating a trend, examine the social consequences if the claim becomes true. Will people accept or reject the consequences?

