IT and Our Future

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What is IT?

“…all the technology, both hardware and software, used to store, process and transport information in digital form.”


# Falling Costs of Computing (US $)

<table>
<thead>
<tr>
<th>Costs of computing</th>
<th>1970</th>
<th>1999</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mhz of processing power</td>
<td>7,600</td>
<td>0.17</td>
<td>&lt;0.02</td>
</tr>
<tr>
<td>1 megabyte of storage</td>
<td>5,260</td>
<td>0.17</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>1 trillion bits transmitted</td>
<td>150,000</td>
<td>0.12</td>
<td>&lt;0.01</td>
</tr>
</tbody>
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A Fourth Dimension?

- Processing, storage, transport and...
- Information capture
  - Key pad
  - Touch screen
  - Microphone
  - Scanner
  - Camera
  - Heat sensor
  - Motion sensor
  - Electromagnetic wave sensor
  - (Texture, taste, smell…?)
Mirror Worlds

“What if there were two worlds, the real one and its digital reflection? The real one is strewn with sensors, picking up everything from movement to smell. The digital one, an edifice built of software, takes in all that information and automatically acts on it.”

- It’s a Smart World, The Economist, Nov. 4th, 2010
- Mirror Worlds: or the Day Software Puts the Universe in a Shoebox…How It Will Happen and What It Will Mean (1992), David Gelernter
Information Capture

- Bridge between virtual and real world
- Reverse bridge is mostly through displays
  - Screens
  - Holograms?
- Also through computer voice
  - Telephone menus
  - Car navigators
Processing

- Models of complex physical systems
  - Car crashes
  - Chemical reactions
  - Airplane flight
  - Financial markets
  - Climate change
  - Tectonic plates
  - Economies
Storage

- Progression of complexity/size
  - Text
  - Images
  - Music
  - Video
- Entertainment
- Education
- Work
Transport

- Information sharing and communication
- “Death of distance”
- Interaction
  - Education
  - Entertainment
  - Socializing
  - Work
  - E-commerce
- Mobility – “death of location”
  - Immediacy
  - Information on demand
Capture

- Characteristics
  - Location
  - Movement
  - Appearance
  - Voice
  - Temperature
- “Identity”
- “State” (normal/expected or not)
Smart Systems

- Feedback loop:
  - Real $\rightarrow$ Virtual $\rightarrow$ Real

- Examples
  - Assembly lines
  - Cars
  - Airplanes
  - Buildings
  - Water systems
  - Power grids
Hybrid Smart Systems

- People and IT intertwined
  - Cities
  - Social networks (communities)
  - Firms
  - Collectives

- Resource efficiency

- New forms or levels of activity

- New challenges
  - Privacy
  - Inequality
Conclusion

- There is none....