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Some Thoughts on Technology

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"Hannibal got elephants over the Alps. Bearing that in mind, somebody think of something."



Some Thoughts About Technology

- 3D Printing/Additive Manufacturing
- Internet of Things
- Shared Economy
- What is Happening
 - Participatory Users
 - Lower Friction Transactions
- A Final Thought About Technology Impact



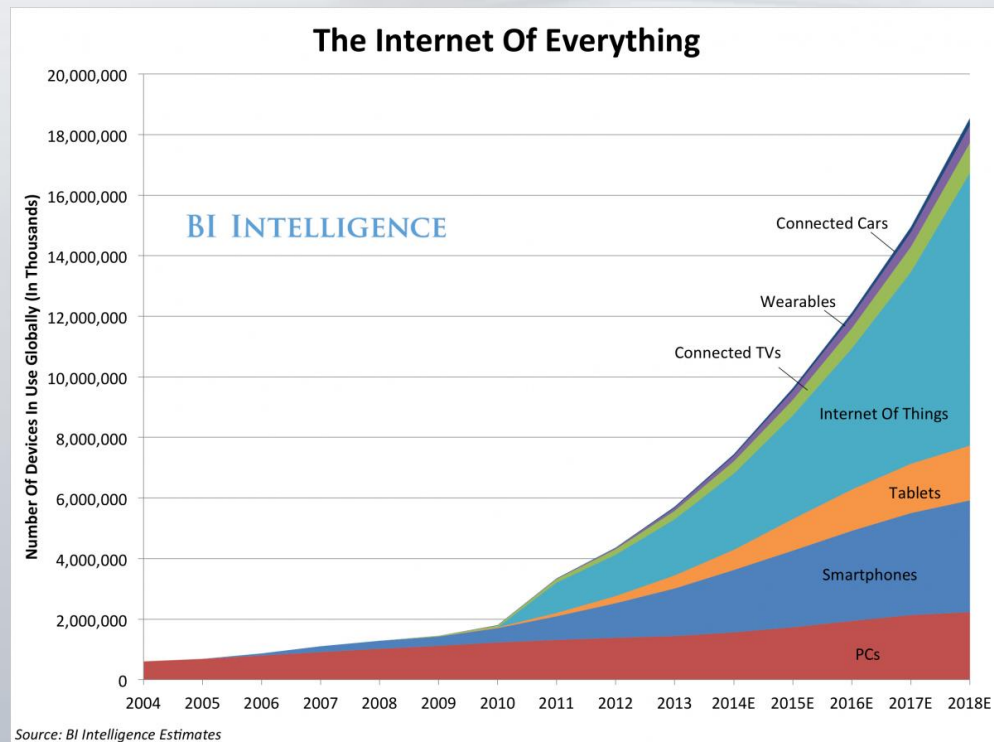
3D Printing/Additive Manufacturing

- Mary Huang started a company called Continuum in Brooklyn
 - She prints shoes using 3D printers
 - She is looking to email her designs to 3D printers overseas to be printed there
- An Italian shoe manufacturer sells 3D printed shoes for \$99/pair or one can get the model for free and print it at home
- In healthcare, it will be possible to print livers, ears, hands and eyes. In the next few years, it will be possible to print skin for skin grafts or to create custom fitted prosthetics
 - One of the big advantages is the ability to produce customized implants for surgery, currently useful for implants in particular hearing aids
 - 90% of the people on the transplant list are waiting for kidneys
- Prototyping cars
- Beginnings of a revolution in manufacturing, how it is capitalized, regulated and taxed



Internet of Things (IoT)

- 2013: close to 10 billion connected devices
- 2020: in 2014 estimated 30-50 billion connected devices, now Intel estimates 200 billion
- Over 1 trillion sensors by 2017 (per HP Labs)
- In the NFL, every football player will wear two sensors (left shoulder pad and right shoulder pad)
- Every hour Walmart collects 50 million filing cabinets of information on customer interactions
- Two other thoughts:
 - Integration of sensors and systems
 - Not enough thought to security and privacy issues



OTOH IoT -> Behavioral Control

- Fitbit, controlling temperature (NEST), ensuring correct medication usage
- Smartphone which prevents texting if the user is driving
- Face recognition system which prevents a car from starting if the person is not recognized
- Safeguard Germ Alarm – if someone uses a bathroom stall, sets off an alarm if the soap dispenser is not used



Shared Economy

- Examples
 - Uber, Lyft
 - AirBnB
 - Peerby.com – 500K members by the end of 2015, Neighborgoods.com
 - Borrowmydoggy.com, DogVacay – 20K sitters
 - RelayRides, Getaround
- Required robust Internet, many users, high speed connections to mobile devices, apps, audience that was comfortable with the concept



Participatory Users

- Co-creation (or co-production) results when an organization and its customers are both involved in creating the resulting product
- A commercial example is YouTube where the company basically provides the infrastructure to load, search for and view video's. Customers produce almost all of the actual content
- In the Government space
 - NOAA uses citizens to provide data for weather reports
 - NASA has solicited customer input to help analyze photographs
- We may find over time that the definition of services will change
 - it took 20 years before people realized that TV was not radio with pictures, we are just starting to learn that a service organization + the Internet is different than just on-line services



Lower Friction Transactions

- In 1937 a British economist Ronald Coase wrote *Nature of the Firm*
 - To understand economic systems one needs to understand the costs of performing a transaction
 - He asked the question ‘why should a company have an internal purchasing department’
- The Internet reduces transaction costs
 - Thus over time activities that typically were performed internally within organizations potentially could move outside



Everything That Implies Friction Is Under Siege

- Technology
- Culture
- Gender
- Class
- Borders
- Regulation
- Lots of pushback from those uncomfortable with change



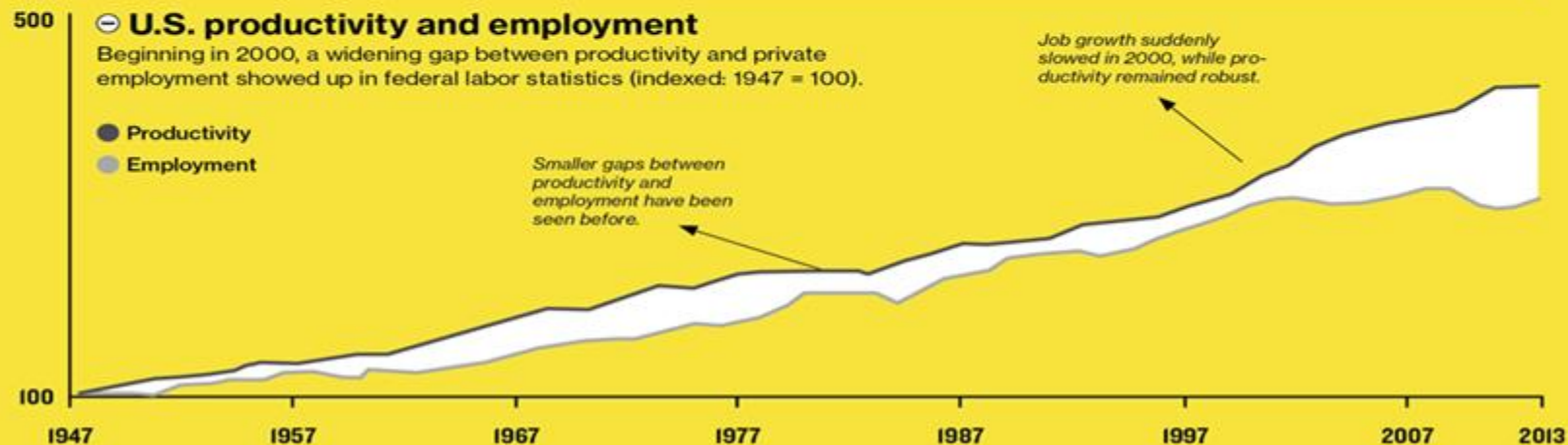
A Final Thought About Technology Impact

- Historically technology destroyed and created jobs, but now ...
- “Almost all jobs being eliminated by technology are middle-class” – Associated Press Study
- Examples:
 - Automated Meter Reading
 - Southern California Edison has all but 20K of its 5.3 million customers have direct readings
 - Cars that drive themselves, commercial applications first
 - 3.1 million people drive trucks, 573K drive buses, 342K drive taxis
 - North Carolina State University has bookBots to retrieve books in their library



Decoupling Productivity and Employment

Digital technologies have boosted productivity in the United States without also spurring the expected job growth, argue Erik Brynjolfsson and Andrew McAfee. A result of this decoupling is that while gross domestic product (GDP) has risen, median income has not, and inequality has grown.



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A Few Comments About My Experience at UMUC



Thank-You

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