

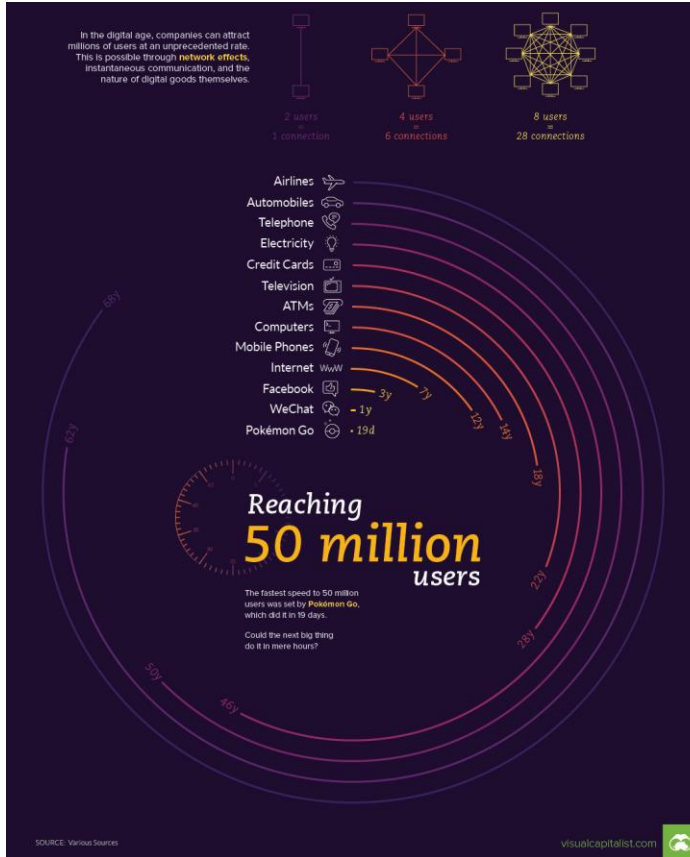


ENGINEERING
TEXAS A&M UNIVERSITY

The Growth of Commercial Technologies for Instrumentation and Analytics in Campus Infrastructure

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The Growth of Commercial Technologies for Instrumentation and Analytics in Campus Infrastructure



Product / Technology	Time it Took to Hit 50 Million Users
Airlines	64 years
Automobiles	62 years
Telephone	50 years
Electricity	46 years
Credit Cards	28 years
Television	22 years
ATMs	18 years
Computers	14 years
Mobile Phones	12 years
Internet	7 years
Facebook	4 years
WeChat	1 year
Pokemon Go	19 days



- The rate of change in the adoption of technology within the Commercial market is driving a huge change in the amount of data available for analysis.
- Key Factors driving the growth and complexity of the data sources
 - Number of devices per person
 - Variety of devices per person
 - The speed of the network supporting the devices
 - The lowering of the cost of participation



- Examples of the growth in the new Zachry Engineering Education Complex this fall
 - 37,000 unique wireless clients
 - Over 50 different types of devices
 - Over 2.1 million wireless sessions
 - Between 4500 and 5000 active wifi connections in the building during prime time hours.
 - Approximately 18.5 TB of wireless traffic inbound and 16 TB outbound.
 - Over 618,000 pages printed on 12 shared student printers



- Key Technologies driving the growth and complexity of the data sources
 - Facial and Biometric recognition
 - At 15 airports, including Atlanta's Hartsfield-Jackson, Chicago's O'Hare and Dulles, cameras do facial scans of travelers before they leave the country. Facial recognition has been used in more than 3 million instances by Customs and Border Protection since June 2017.
 - Health monitoring (Fitbit, tele-medicine, Diabetes testing, etc)
 - To screen passengers for swine flu and other contagious diseases, some airports use thermal imaging cameras to see whether travelers have fevers. Recordings from these cameras show up on video screens with hotter objects looking brighter. The systems are very sensitive, measuring temperatures down to a fraction of a degree Fahrenheit, Thermal cameras were rolled out during the SARS outbreak in 2002 and 2003, and airports in Singapore and China have been using them continuously since.
 - Autonomous things (home automation, personal robots)
 - Cheap data



- Key Consumer Technologies driving the growth and complexity of the data sources
 - Autonomous things (home automation, personal robots)
 - Smart light bulbs
 - Smart thermostats
 - Smart TVs
 - Smart “assistants” (Echo, Alexa, Bixby, etc)
 - Smart Security systems (Ring, Blink, etc)



- How new data combined with new technology opens up huge data opportunities in the classroom.
 - LMS / Lecture / Active learning
 - Distance / Remote participation (student / Faculty)
 - Adapting to new delivery methods, new pedagogical approaches
 - Renewed focus on student outcomes
- How new data sources open up research needs / opportunities
 - Huge data lakes
 - Huge unstructured data
 - Computational demand based on the data model vs “what we own” – Cloud based access to computation.



- Impact from an IT point of view.
 - Huge increases in storage needs
 - Significant increases in network speeds needed
 - Massive AI and Machine Learning computational needs
 - Surge modeling – burst mode computational
 - Must move to a segmented network design from a flat design
 - Much tighter integration between PI's and IT.



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