The Industrial Awakening: The Internet of Heavier Things

EE392n Intelligent Energy Systems: Big Data

April 2016

Personal

- Joint MBA/MS 2008
- 3 years in Oil & Gas and Chemicals investing
- Currently Partner at KPCB (Joined ‘08)
- Areas of Interest: Intersection of IT and Sustainability
  - Industrial IoT
  - Smart Grid
  - Wind
  - Efficiency
  - Buildings (including lighting)

Investing at the Intersection of Innovation and Industry

ENABLING TECHNOLOGY INNOVATIONS

MOBILE

MACHINE LEARNING

SENSORS

CLOUD COMPUTING

ROBOTICS

REMOTE SENSING

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BIG DATA

BLOCKCHAIN

BATTERIES

GGF

TRADITIONAL INDUSTRY

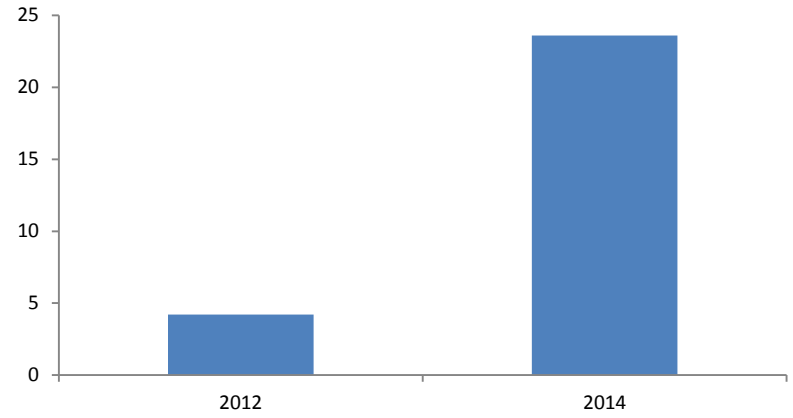
NEW BUSINESS MODELS: SaaS, Apps, P2P, Service-ization, Marketplaces

SECULAR TRENDS: Climate Change, Urbanization, Population Growth, Regulation, Consumer Behavior

Industrial Data: Machine Generated Data Vastly Outpacing Human Data

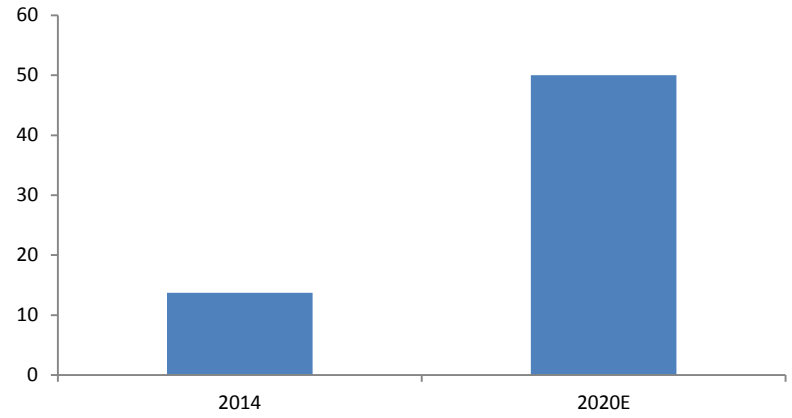
MORE SENSORS

Digital Sensor Shipments (B)



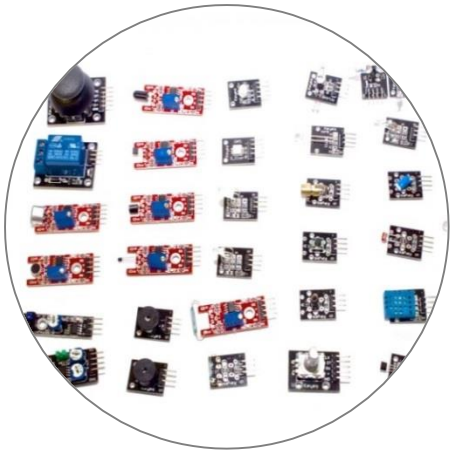
GREATER CONNECTIVITY

Connected Endpoints (B)



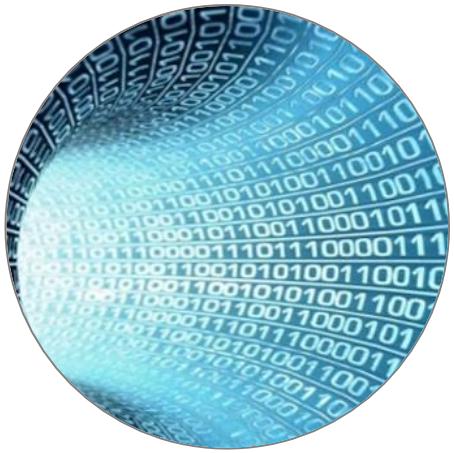
NETWORK SENSING → **DATA AGGREGATION** → **ADVANCED ANALYTICS** → **CONNECTED SERVICES** *(tools)* → **CONNECTED SERVICES** *(solution)*

IoT disruption enabled by megatrends



Pervasive, cheap, and tiny sensing

Decreasing compute and storage costs

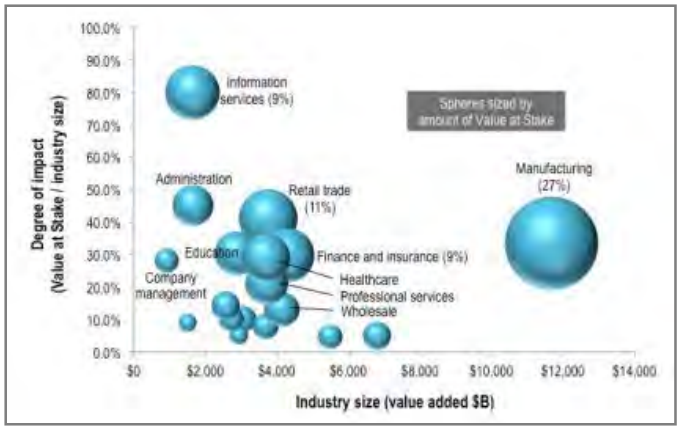


New abilities to process and analyze data

Ubiquitous connectivity

Convergence of key enablers indicate coming demand for pervasive sensing and vertical-specific analytics applications

Research indicates industrial IoT has huge value creation potential



- According to Cisco, manufacturing (includes oil and gas production and process industries) represents the **largest industry-specific IoT value creation opportunity** over the next ten years (in terms of revenue enhancement and cost savings)
- **50% of value creation (~$2T) stems from implementation of "smart factories,"** including analytics-enabled integration of labor, capital, and technology

- Gartner estimates the **IoT will have a cumulative economic value add of $1.9T between 2014 and 2020**; $290B of this will be in manufacturing / oil and gas
- GE estimates **IoT-enabled services and maintenance constitutes $20B in annual savings**, while the "Industrial Internet" will be responsible for $10-15T increase in GDP over next 20 years; Morgan Stanley estimates GE's Predix platform has an annual revenue run rate of $1B
- Cisco estimates that 99.4% of physical objects are unconnected, and that the **number of connected objects will increase from 14.4B today to 50B in 2020** (23% CAGR)

IoT benefits clear and material at smaller scale

"Shell estimates that **predictive condition monitoring…could save it 50% of its cost** in maintenance in terms of labor and spares." – J.P. Morgan

"It takes **313M labor-hours a year to service gas turbines, engines, freight**…the total estimated value of this work is $20B…Consider how much time and effort is ultimately lost." – GE

"An oil and gas producer could anticipate **benefits of $326M over ten years** per field…[by] integrating and managing data streams from throughout the field." – IBM

By reviewing its operational data, "a chemical company was able to **reduce its waste of raw materials by 20% and its energy costs by 15%."** – McKinsey

Tremendous value capture opportunity -- from data sources that largely exist today

Ten Specific Areas of Interest

- Security
- Payments
- Network
- Retrofits
- Connected Services
- Translation
- Product as a Service
- Vertical Applications
- Insurance
- The Platform

Security

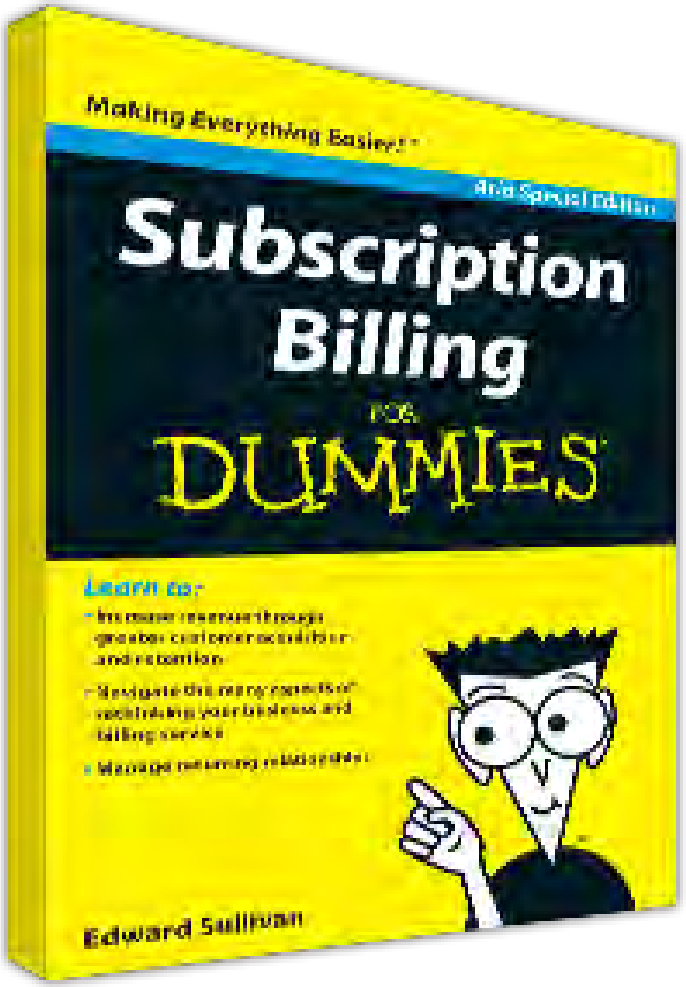
Network

Connected Services

Product as a Service

Insurance

Payments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Retrofits

Retrofits


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140
-40
160
3 PSIG
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Translation

Vertical Applications

The Platform

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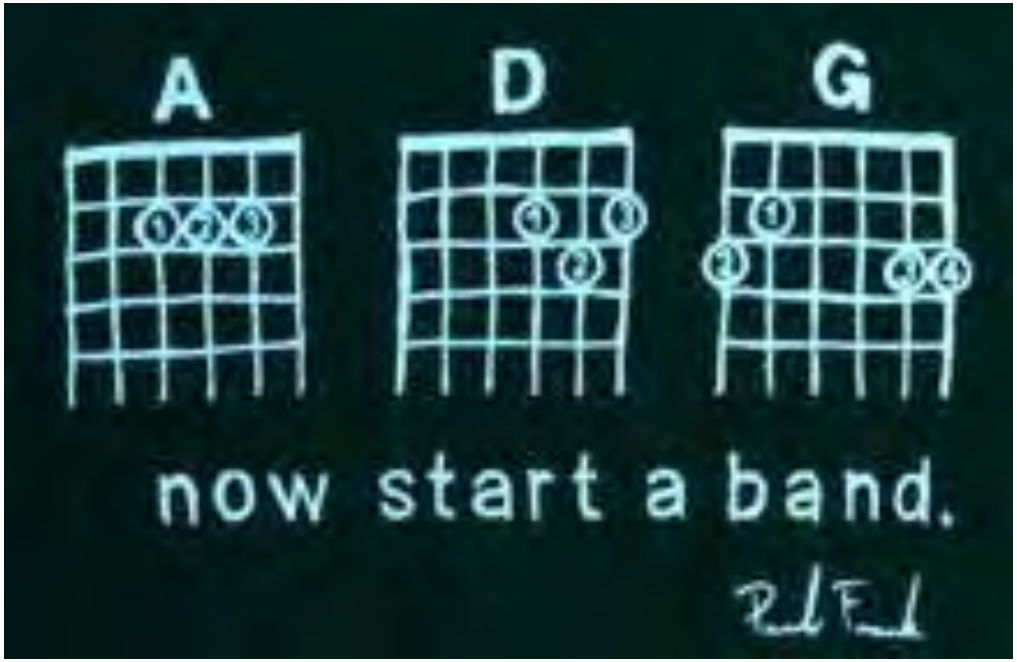
Questions?



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