GLOBAL VALUE CHAIN DATA STRATEGY, CONNECTIVITY, ANALYTICS, GOVERNANCE, SECURITY AND RISK ASSESSMENT – INDUSTRY TRENDS AND PRACTICES

Industrial Internet

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Global Macroeconomic Drivers: Details Changing Fast

India
- Low cost IT/engineering
- E-services
- New market
- Outsourcing

Russia
- Raw materials
- Domestic market
- Tech Transfers

China
- Hi Tech Mfg
- Retail sales reform
- Venture capital
- Retail sales reform
- Robotic Factories
- Silicon fab

Europe
- Large Open Markets
- Digitization
- Social contract questioned
- Outsourcing

US
- Brands & Distribution
- Export high tech-high value to China
- Small business creation
- New business models
- Brazil
- Sudan
- Africa

Business systems are global and vulnerable
Oil pricing, Regulations, Natural Disasters, Lack of Trust
Metcalfe’s Law: ethernet, cell phones, telematics
The value of a network of N devices scales to roughly $N^2$.

The value of a network exceeds its cost at the critical point.
The race to connect everything
The Evolution of Connectivity

Products Morph into Decision Systems that Learn and Integrate Information from Divergent Sources
The End of the “Information Age”.

- Information **content** is readily available, **commoditized** and can be downloaded wirelessly to a variety of mobile memory devices.
- **Contradictory information** is available from multiple outlets in real time.
- The world is awash in so much information and content that without **Powerful Decision Systems** to store, sort, validate and manage the data, people and businesses become paralyzed with confusion.

Welcome to the “Systems Age”!
GE as a computer company

GE-400 Mainframe series (ERMA) Electronic Recoding Machine Accounting system
General Purpose Business Machine, 1963-1968

Began the introduction of General Purpose Computing into the financial Industry

Grew out of project in the 1950’s to automate check clearance with Magnetic Ink Character Recognition (MICR) for Bank of America
GE constantly evolving from Physical to Digital

When the internet was forming and distributing IPv4 addresses
GE got the third block.

During and after the Dot Com boom we were building new business models and technology to help implement the Internet of Things

1997 GE Plastics, GE Operations Consulting Services
1999 GE Industrial Solutions, GE Ener.ge
2003 GE Capital, GE Asset Intelligence
2004 GE Power Systems, E-tags
2005 GE Capital, Railwise
2007 GE Fleet Services, GE Fleet Telematics
2007 GE Power Systems, GE Wind telematics (Mainland China)
2009 DARPA Crowdsourcing Environment for Evolutionary Design
2010 GE Industrial Solutions, Watt station
2014 Industrial Internet Consortium
2014 Digital Manufacturing Commons (DMDII)

Building Service Industries
Monitor, Manage, Optimize
The World Needs Digitized Transparent Logistics Networks

Current Demands- Mobile asset tracking plus RFID Systems
Big Box Retail Sector - Wal-Mart, Target
U.S. DOD - Military
FDA - Pharma

Food Scares - Salad, Spinach, Ground meat, Tomatoes
Health Risks - Bird Flu, Mad Cow, Heparin, Milk, Pet food

“Who steals my purse, steals trash, but he that filches from me my good name robs me of that which not enriches him and makes me poor indeed.”
William Shakespeare

Need Farm-to-Fork transparency!

Must Soon Label and Track Trillions of Objects
And Manage trillions of transactions
Macro Trends Create Environment Ripe for “Creative Destruction”

- Global Central Bank policy
  - Interest rates: Low to below zero
  - Wealth distribution skews
  - Income stagnation for decades
  - Rise of Populists

The "gale of creative destruction" unleashes a "process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one"

Joseph Schumpeter
Low Growth World Creates a Universal Desire for Innovation

- **US**
  - Silicon Valley (software and IT tech)
  - NMMI, DMDII (manufacturing)
  - Venture, Incubators

- **Europe**
  - Industry 4.0

- **China**
  - Internet+, Manufacturing 2025

- **GE - The Digital Industrial**
  - GE Digital business unit formed 3Q 2015
  - GE moves main headquarters to Boston
GE is transforming itself to become the world's premier Digital Industrial company

**Predix the platform for the Industrial Internet**

“As GE transforms itself to become the world’s premier digital industrial company, this will provide GE’s customers with the best industrial solutions and the software needed to solve real world problems. It will make GE a digital a software and analytics enterprise from $6B in 2015 to a top 10 software company by 2020,”

Jeffrey Immelt, Chairman and CEO of GE.

At the intersection of people, machines, big data, and analytics stands Predix.
Obama announces the Digital Manufacturing and Design Innovation Institute

White House Announcement
2/25/2014

GE and partners form Digital Innovations Network for $320 Million
What constraints are there today on the Internet?

- Much of the Data on todays internet is transferred in packets on a best effort basis
- No guarantee for authentication, timing or bandwidth availability.
- Can we rely on this type of network to interrogate and control mission critical equipment in our factories?

- We need an “Industrial Internet”
Let’s build an Industrial Internet

- Design principles:
  - Modularity
  - Layering
  - End-to-End argument
  - Guaranteed Timing,
  - Bandwidth and Identity

Rapid product development and flexibility
Reliability, Predictability and Security

GE is committed to the Industrial Internet
The Industrial Internet Consortium

Industrial Internet: Pushing the Boundaries of Minds and Machines

Created March 27th 2014
An Open Membership Consortium, 3500 members, 250+ current organizations from 25 countries!

IIC Founder Companies
The Industrial Internet connecting them all….

Wind farms
Locomotives
Aircraft engines
Machine to machine networks will become **collaborative**

The TrueNorth chip by IBM. Widely regarded as a “synaptic supercomputer”

**Distributed Digital Intelligence Needs a Secure Network**
Do you suppose there’ll be a third Industrial Revolution?

...A third one what would it be like?

“I don’t know exactly. The first and second ones must have been sort of inconceivable at one time....

I guess the third one’s been going on for some time, if you mean thinking machines...

First the muscle work, then the routine work and then, maybe, the real brainwork.”

Player Piano, Kurt Vonnegut 1952

Absolutely! Welcome to the Industrial Internet