Industrial Internet of Things: Unleashing the Potential of Connected Products and Services

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Project Objectives

Industrial Internet of Things:

- How big and how far
- Which areas that will be most impacted
- What are the implications: business models, industry structures and the role of actors within each of these eco-systems
- What are opportunities – short and long term
- What are the key risks and concerns
- What are societal impact such as privacy, security, and employment
- What are pragmatic steps that can be taken to work towards those benefits and to address risks/concerns
Project Approach

- **Guiding Principles**
  - **Engaging with the ecosystem**: Involving multiple stakeholders in strategic conversations on issues critical to future development of the Industrial Internet
  - **Asking the right questions**: Developing a set of key questions to guide such a cross-ecosystem dialog

- **Approach**
  - Combine macro and micro (top-down and bottom-up) approaches
  - Develop a macro-level framework for assessing impact and opportunities
  - Develop industry-specific use cases
  - Understand the opportunity, the risks & barriers and the changing role of actors in each case
  - Explore the broader set of societal & economic impacts, as well as common insights and recommendations
Framework of the study

**Impact on Business, Economy and Jobs**
- What new business models, industry ecosystems and overall economic growth will the Industrial Internet create?
- How will the increasing automation as a result of adopting the Industrial Internet transform the future job market and skill sets required to succeed in the new economy?
- How can businesses and governments best deal with the near- and intermediate-term transitions?

**Key Enablers**
- Cloud
- Ubiquitous Connectivity
- Embedded Sensors
- Real-time Analytics
- Maturing Software Industry
- Investments by big IT firms

**Key Inhibitors**
- Security
- Legacy OT & Infrastructure
- Interoperability
- Privacy
- New Investment
- Perceived Risks

**Public Policies**
What are appropriate public policies to accelerate the development and adoption of the Industrial Internet across multiple industries, e.g., energy, manufacturing, healthcare, transportation and public sectors?
Asking the right questions…

**Impact of Industrial Internet**

- **Enterprise**
  - New Products/Services
  - New Business Models
  - Value Chain Disruptions
  - New Ecosystems

- **Industry**
  - Jobs Creation/Loss
  - Productivity Gains
  - Transparency/Privacy
  - Sustainability
  - Education

- **Economy**
  - What new products/services can Industry Internet enable?
  - What disruptions can Industrial Internet cause to the dominant business model underlying the industry?
  - What does the new industry structure look like?
  - What are the new control points and how will they be distributed?
  - What jobs will be replaced, transformed or created as a result of the increasing adopting Industrial Internet?
  - How will the increased productivity lead to higher wages and standard of living?
  - How will individual privacy be protected in an increasingly connected world?
  - How will Industrial Internet enable a more sustainable society?
  - What new skills are required to succeed in this emerging environment and how can they best be acquired?
  - What new approaches and tools are required to secure physical systems?
  - What types of standards are needed to ensure the interoperability between various IT and OT systems?
Workshops and Participating Organizations

Davos, Switzerland
22 January, 2015

San Jose, California, USA
21-22 July 2014

Munich, Germany
4 November 2014

Tianjin, China
11 September 2014

New York, New York, USA
22 October 2014

Manila, Philippines
21 May 2014
# Project Steering Committee and Working Group Members

## Steering Committee Members

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## Taskforce – The Forum

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## Working Group Members

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Munich Workshop: Industrie 4.0 & Future Manufacturing
Industrial Internet will have disruptive impact on many industries. More importantly, such disruption could happen within next five years. Yet, most organizations are not yet ready for it.

**Key High-level Findings**

**Operational Efficiency**
Improving uptime and utilization of capital assets and skilled human resources

**Outcome Economy**
Shift form products to outcome-based services redefines the basis of competition

**Connected Platforms**
New ecosystems coalescing around software platforms to deliver outcomes

**Integrated Digital and Human Workforce**
Humans collaborating with machines augmenting skills and increasing productivity

**Key Recommendations for Business, IT and Government leaders**
The vast potential of the Industrial Internet is tampered with significant future risks

- Security vulnerabilities due to connectivity to the global network (92%)
- Privacy breaches due to increasing availability of personal data (88%)
- Disruptions in business model or disintermediation (88%)
- Job losses and social dislocation due to increasing automation (55%)
- System breakdowns due to complexity while human life is at stake (39%)
Industrial Internet of Things: Unleashing the Potential of Connected Products and Services

72% believe that the Industrial Internet is disruptive

78% say that the disruption will occur within five years

88% indicate that businesses are not ready for it now

7% have a funded IIoT strategy

The adoption of the Industrial Internet will be driven by incremental benefits in a near-term and transformational new business models over a long term.

Industrial Internet could add up to **US$14 trillion** to the global economy by 2030.  
- Source: Accenture Analysis, 2014

1. **Operational Efficiency**
   - Asset Utilization
   - Operational cost reduction
   - Worker productivity

2. **New Product & Services**
   - New business models
   - Software-based services
   - Data Monetization

3. **Outcome-based Economy**
   - Pay-per-outcome
   - New connected ecosystem
   - Platform-enabled market place

4. **Autonomous Pull Economy**
   - Continuous demand sensing
   - End-to-end automation
   - Resource optimization and waste reduction

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Workforce Transformation

Ecosystems & Platforms

**ROI & Business Models**
The emergence of the outcome economy will redefine industry boundaries and create a new winners and losers.
The increasing use of connected products & smart machines will transform the job market and the skill mix in the future workforce. 93% agree with the above statement.
Some notable quotes from participants...

• “Early successes (e.g. GE business benefits) will do more to 'scare' other large corporations into action that any evolutionary approaches.”

• “Standards are a red herring that could greatly stall the adoption of the industrial internet. Industry organizations should avoid putting that as the centerpiece.”

• “'Disrupt or be disrupted' is the right mantra for the IIC.”

• “A few examples of 'killer apps' will kick-start the industry because everyone will see that being a laggard will be a deathwish as the world stops buying industrial products and starts buying solutions and services.”

• “Technologies must be open and unspoiled by government imposed weaknesses (eg. back doors for snooping).”

• “WEF has an opportunity to encourage development of public/private collaboration in all global regions and should use the North American and EU models to prod other regions to replicate R&D and investment initiatives.”
Recommended actions for key stakeholders

**Technology Adopters**
- Reorient overall business strategy around the Industrial Internet
- Orchestrate organization’s ecosystems
- Start with pathfinder projects

**Technology Providers**
- Establish security commons
- Drive technology test-beds
- Cultivate brownfield innovation
- Help adopters address opportunities & risks

**Public Policymakers**
- Clarify data regulations
- Update industry regulations
- Invest in digital infrastructure
- Raise awareness among policymakers

**Joint Actions among Stakeholders**
- Invest in strategic R&D
- Collaborate on lighthouse projects
- Accelerate digital reskilling
The path forward: WEF and its partners will continue efforts and the momentum in advancing the Industrial Internet

**WEF’s Ten Global Challenge Initiatives for 2015 & Beyond**

1. Agriculture and Food Security
2. Economic Growth and Social Inclusion
3. Employment, Skills and Human Capital
4. Environment and Resource Security
5. International Trade and Investment
6. Infrastructure, Long Term Investing and Development
7. Future of the Internet
8. Future of the Global Financial System
9. Gender Parity
10. Global Crime and Anti-Corruption

IIC can play an important part in future WEF efforts…
Other findings

• **Data is the new currency.** Creative minds are getting access to data and revolutionizing the way traditional companies look at things and instilling business model innovation.

• **Regulation from governments may interfere with technological progress.** Businesses must go as far as they can go and governments should go as far as they need to go.

• **Machines are getting smarter and will continue to impact the labor market.** There will be some elimination and some creation of jobs enabled by IIoT but the net effect is unknown.

• **A blended workforce combining humans and machines that will blur the lines between blue and white collar workers,** and increase productivity, flexibility and the safety of work environments.
Industrial Internet of Things will enable organizations to drive unconventional revenue

**Commercial offering categories**
- Information Services
  - Machine maintenance services
  - Soil, plant and equipment analysis results
  - Partner in agricultural information service marketplace
- Equipment services
  - Remote diagnostics and optimization services
  - Partner in agricultural services
- Products
  - Farm equipment
  - More Intelligent Farm equipment with sensors
  - Partner agricultural products

**Pre-digital product line**
- Farm equipment

**Digital product line**
- More Intelligent Farm equipment with sensors

**New market segment**
- Partner in agricultural services

**Go to market approach**
Transformation toward outcome-based services provide tremendous opportunities.

More advanced business models and higher level of disruption.
The Industrial Internet of Things will enable the capture of significant value – of which operational efficiency is only a small part.

**Value Categories**
- Unconventional Revenues
- Incremental Revenues
- Operational Efficiency

**Strategic Approach**
- Product as a Platform
- NextGen Products/Services
- Most Valuable Information Provider
- New Business and Operating Models
- Operations and Predictive Maintenance
- Commercial Optimization
- New Customer Experience and M2M Applications
- Preventive Maintenance
- Process Automation
- Operation Optimization
- Global Asset Visibility

**Examples:**
- Enabling third parties to create information services
- Treating Services as R&D for products
- Locking customers into the information services
- Sensors, analytics, and real time data for insights
- Flexible production techniques to boost productivity
- Data to work as digital service for equipment performance
- Gain opportunities to create customer touch points
- Avoiding unnecessary product shutdowns
- Computerize repetitive tasks and workflows
- Reduce costs of energy, maintenance, repair etc.
- Improved supply chain and logistics performance