



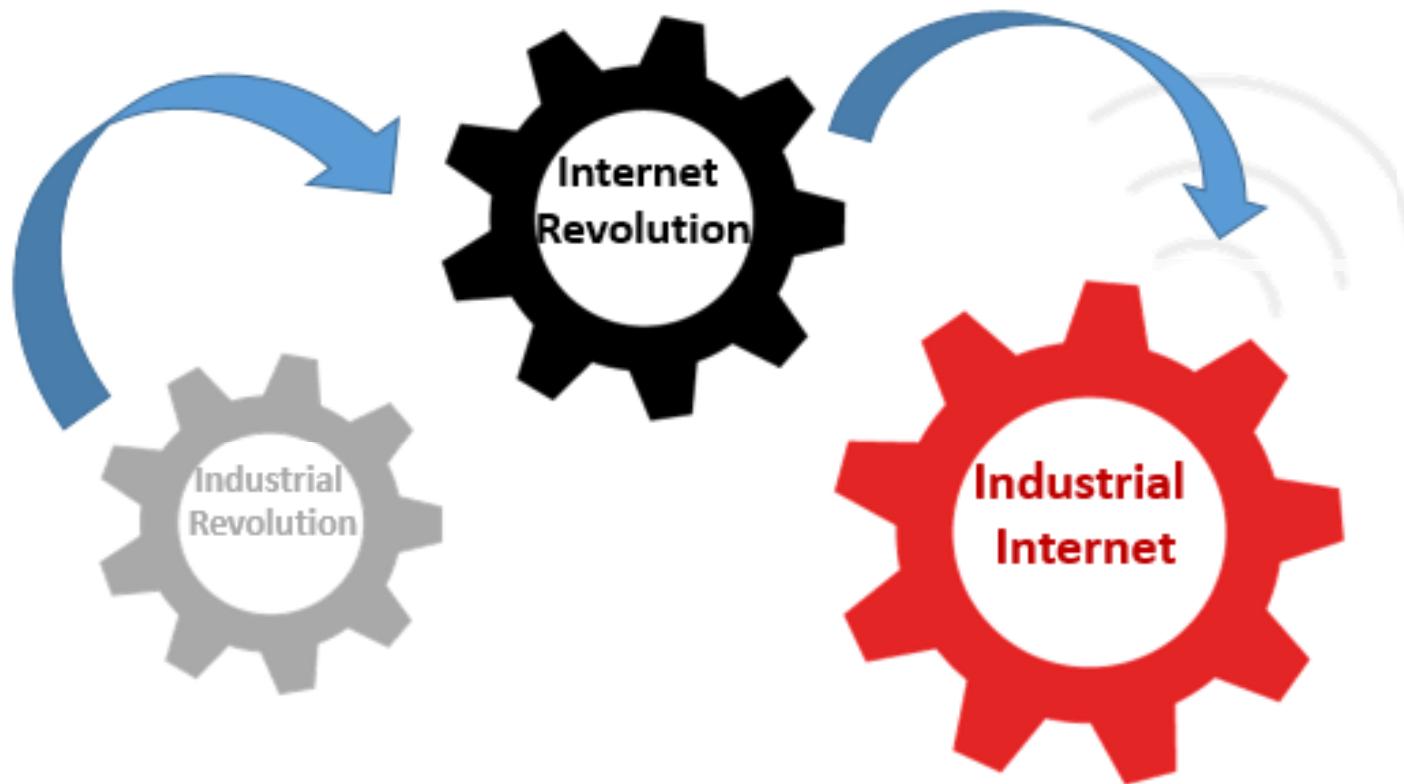
The Industrial Internet: Creating Ties Throughout the Value Chain

11 July 2017





The Industrial Internet is leading the next economic revolution





The Measurable Outcome will be in the Trillions of Dollars

GE: \$32.3 trillion opportunity representing 46% share of GDP today.

Cisco: Internet of Things (IoT) will increase private sector profits 21% and add \$19 trillion to the global economy by 2020

Gartner: IoT product and service suppliers will generate incremental revenue exceeding \$300 billion in 2020.

McKinsey Global Institute: \$36 trillion operating costs of key affected industries could be impacted by IoT

The convergence of *Internet of Things, Industrie 4.0, Cyber-Physical Systems, Industrie du Futur, Internet+* presents an enormous opportunity.



The IIC: Things are coming together





Industrial Internet Consortium

Mission

The Industrial Internet Consortium is a global, member supported, organization that promotes the accelerated growth of the Industrial Internet of Things by coordinating ecosystem initiatives to securely connect, control and integrate assets and systems of assets with people, processes and data using common architectures, interoperability and open standards to deliver **transformational business and societal outcomes** across industries and public infrastructure.

Launched by OMG in March 2014 with five founding companies:



Approaching 300 Member Organizations
Spanning Dozens of Countries



The IIC is an open, neutral “sandbox” where industry, academia and government meet to collaborate, innovate and enable.



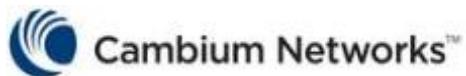
IIC Founders, Contributing Members, & Large Industry Members

IIC Founding and Contributing Members





IIC Small Industry Members



amplia)))

iiot





IIC Small Industry Members



Rubicon



IoTium

Predikto

QIO⁺

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INTERNATIONAL

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MICROMEM APPRED SENSOR TECHNOLOGIES, INC.

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Creating Solutions

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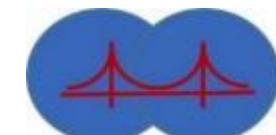
Sophic

WIBU
SYSTEMS

KYLAND

Toumetis

WATERFALL[®]
Stronger Than Firewalls



TWINOAKS[®]
COMPUTING INC.
PRACTICAL MIDDLEWARE EXPERTISE



IIC Nonprofit, Academic, & Government Members



NATIONAL ASSOCIATION
OF ELECTRICAL DISTRIBUTORS

ICT Austria
Center for Business Technology

YNU 横浜国立大学
YOKOHAMA National University

CNCC 广州中国科学院计算机网络信息中心
Computer Network Information Center Chinese Academy of Sciences, Guangzhou

TIA
ADVANCING GLOBAL COMMUNICATIONS

GS1
Peru

i2cat

m2m
alliance

KEDGE
BUSINESS SCHOOL

SINTEF

HellenicSIA
The Greek Semiconductor Industry Association

JOHNS HOPKINS
UNIVERSITY

VANDERBILT
UNIVERSITY

TECHNISCHE
UNIVERSITÄT
DARMSTADT

tecnalia
Inspiring
Business

Rensselaer

**RG
IT** REPRESENTATIVE
of German Industry + Trade
BDI
DIHK

DSAG

THM
TECHNISCHE HOCHSCHULE MITTELHESSEN

HUMBER

**Agency for
Science, Technology
and Research**
SINGAPORE

**CASE SCHOOL
OF ENGINEERING**
CASE WESTERN RESERVE
UNIVERSITY

III 財團法人資訊工業策進會
INSTITUTE FOR INFORMATION INDUSTRY

BNC
ITRI
Industrial Technology
Research Institute

fimecc



中国电子技术标准化研究院
China Electronics Standardization Institute

PURDUE
UNIVERSITY

LOSEC
LEADERS IN SECURITY

UI LABS

Wireless Research Center
OF NORTH CAROLINA



TAMPERE UNIVERSITY OF TECHNOLOGY

MITRE

DRAPER
LABORATORY

BEIJING UNIVERSITY OF TECHNOLOGY

Newcastle
University

CIT

MD PnP
ICE ALLIANCE
MGH
1811

cea

CSIRO

UPenn

UL



Why now?

Driving the OT – IT Convergence:

Low cost, powerful technology

- Cheap sensors & devices
- Low-cost processing power, data storage

Connected everything

- By 2020, the number of things connected to the internet will be approximately 7x the number of people on earth today.¹

Big Data

- Collecting, storing and analyzing data is now more cost effective

Smarter Machines

- Equipment is increasingly embedded with sensors & software



¹Source: Cisco Systems



The IIC and Standards Organizations

The IIC is **not** a standards organization. We evaluate and organize existing standards to :

- advocate for open standard technologies, and
- influence the global standards development

The IIC has a formal Liaison team that evaluates potential formal agreements with other organizations.

We are an open membership organization and we work collaboratively on an informal basis with many other organizations, including Industrie 4.0.

The Technology Working Group is currently:

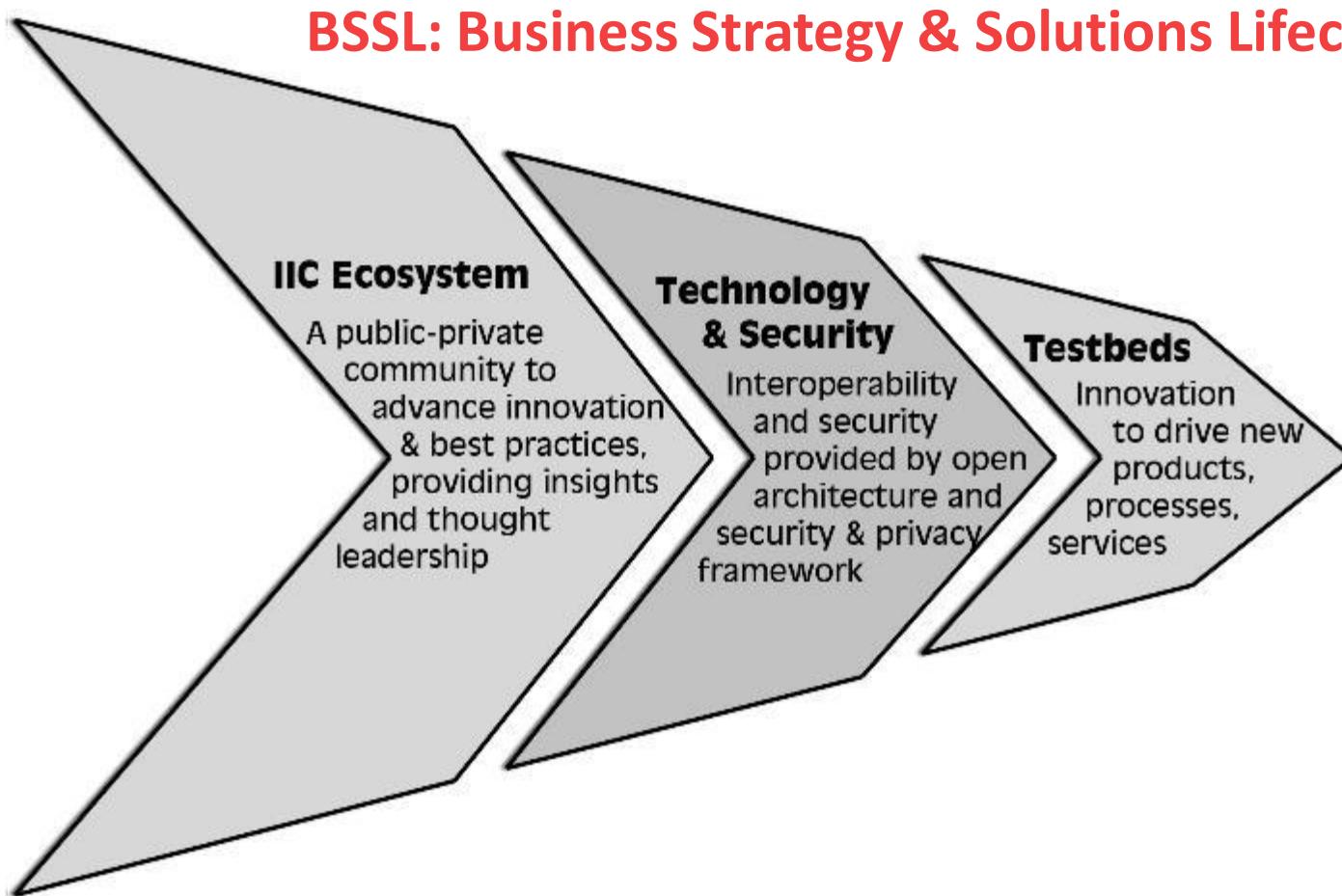
- Evaluating existing standards
- Identifying requirements for the Industrial Internet

IIC Formal Liaisons as of June 2015





The IIC has three primary areas of activity: Community Engagement, Technology & Security, and Testbeds





Testbed Working Group

Charter: To accelerate the creation of testbeds for the Industrial Internet.

IIC Testbed Lifecycle Phases



Current Priorities:

- Assist members in identifying, defining and gaining approval for their testbeds
- Identify and communicate funding resources for IIC testbeds
- Provide processes and infrastructure for efficient & effective operations



Current Publicly Announced Testbeds



Asset Efficiency Testbed



Condition Monitoring Testbed



Connected Care Testbed



Edge Intelligence Testbed



FA PaaS Testbed



FOVI Testbed



High-Speed Network Testbed



Industrial Digital Thread Testbed



INFINITE Testbed



Intelligent Urban Water Supply



Microgrid Testbed



Precision Crop Management Testbed



Security Claims Evaluation Testbed



Smart Airline Baggage Management



Smart Energy Management Testbed



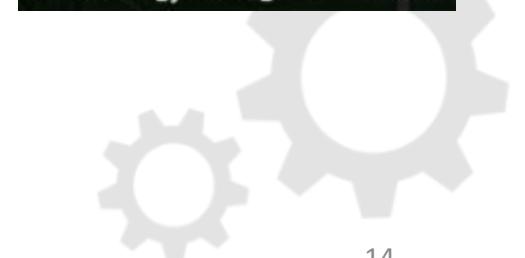
Smart Water Management Testbed



Time-Sensitive Networks Testbed

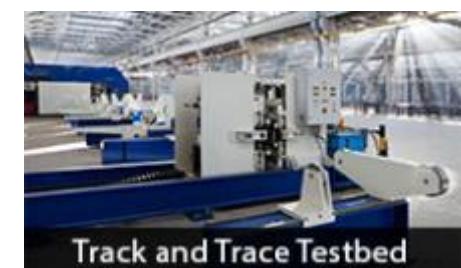


Track and Trace Testbed





Track and Trace: Results from our first testbed





Example IIC Testbed: Track & Trace

Industrial Internet Consortium Member participants:

- Bosch, TechMahindra, SAP, National Instruments

Market Segment

- Industrial Manufacturing
- Power Tool Fleet Management

Goal

- Manage smart, hand-held tools in manufacturing, maintenance and industrial environments

Features & Commercial Benefits

- Asset Management, Work Management
- Integration with Factory Manufacturing Systems
- Improved Safety and Operational Performance
- Monitor/Control Quality



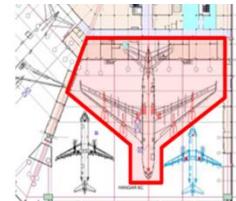
Industry



Handheld Power Tools



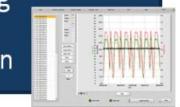
Mobile Workers



Indoor Tracking

Applications:

- Asset Management
 - Tool Fleet Status & Utilization
 - Indoor geo-fencing & alarms
- Quality Control
 - e.g. torque recording
- Work management
- ERP/MES integration





INFINITE: Learning from the data



Asset Efficiency Testbed



Condition Monitoring Testbed



Connected Care Testbed



Edge Intelligence Testbed



FA PaaS Testbed



FOVI Testbed



High-Speed Network Testbed



Industrial Digital Thread Testbed



INFINITE Testbed



Intelligent Urban Water Supply



Microgrid Testbed



Precision Crop Management Testbed



Security Claims Evaluation Testbed



Smart Airline Baggage Management



Smart Energy Management Testbed



Smart Water Management Testbed



Time-Sensitive Networks Testbed



Track and Trace Testbed





Example IIC Testbed: International Future Industrial Internet (INFINITE)

Participants:

- Members: EMC Corporation and Cork Institute of Technology
- Other Participants: Vodafone, Irish Government Networks, Asavie, and Cork Internet Exchange

Market Segment:

- The scale and scope of the project means INFINITE can be used across a wide and diverse range of industries and sectors

Solution:

- Completely virtual domains that are able to be connected via mobile networks
- A solution that allows multiple virtual domains to securely run via physical network.

Commercial Benefits:

- Ideal for mission-critical systems
- Industrial Internet applications in an environment that resembles real-world conditions





Designing a new testbed: top-down or bottom-up?





The Future: Enabled by Systems Engineering

How will we reduce jet engine failure & maintenance costs?



How will we reduce passenger fatalities?



How will we minimize unplanned factory downtime?

Things are coming together.

How will we reduce waste of natural resources?



How will we save lives through better patient care?





Community. Collaboration. Convergence.

Things are coming together.

www.iiconsortium.org





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For more IIC information

- **About IIC:** <http://www.omg.org/intro/IIC-flyer.pdf>
- **IIC Fact Sheet:** http://www.iiconsortium.org/pdf/IIC_FACT_SHEET_2015.pdf
- **IIC Smart Factories:** <https://workspace.iiconsortium.org/kws/public/download/5350/IIC-Smart-Factory-1-pager.pdf>
- **IIC Quarterly Update:** http://www.iiconsortium.org/pdf/IIC_Progress_Report_2016_July.pdf
- **IIC and Industrie 4.0:** <https://workspace.iiconsortium.org/kws/public/download/5351/IIC-4-0-1-Pager-web-Final.pdf>
- **Industrial Internet Interoperability Coalition:** <http://www.iiconsortium.org/accelerating-innovation.htm>
- **IIC meetings and on stage:** <http://www.iiconsortium.org/events.htm>





For information about OMG

- About OMG: <http://www.omg.org/intro/OMG-Backgrounder.pdf>
- OMG and the IIoT: <http://www.omg.org/intro/IIoT.pdf>
- OMG Consumer Device Safety:
http://www.omg.org/intro/Consumer_Device_Safety.pdf
- Data-Distribution Service: <http://www.omg.org/intro/DDS.pdf>
- Modeling Languages at OMG: <http://www.omg.org/intro/MLS.pdf>
- OMG Quarterly Technical Meetings:
<http://www.omg.org/news/schedule/upcoming.htm>

