

PURPOSE AND AUDIENCE

This document provides an update to [Engineering: The First Steps](#) published in July 2014. This document has the same audiences:

- Members:** What is happening in the engineering-related IIC Working Groups to date.
- Prospective Members:** Overview of the IIC engineering activities and where members can engage.
- Standards Groups:** New specifications and potential collaboration points.
- Analysts & Media:** An overview of IIC activities and progress towards goals.

OVERVIEW

This update outlines work in each of the areas listed in *Engineering: The First Steps*, including the charter for each Working Group and descriptions of where we're heading. The goal is for the reader to understand the direction the engineering work is taking, as shown in the two cones on the right, leading to innovative new products.

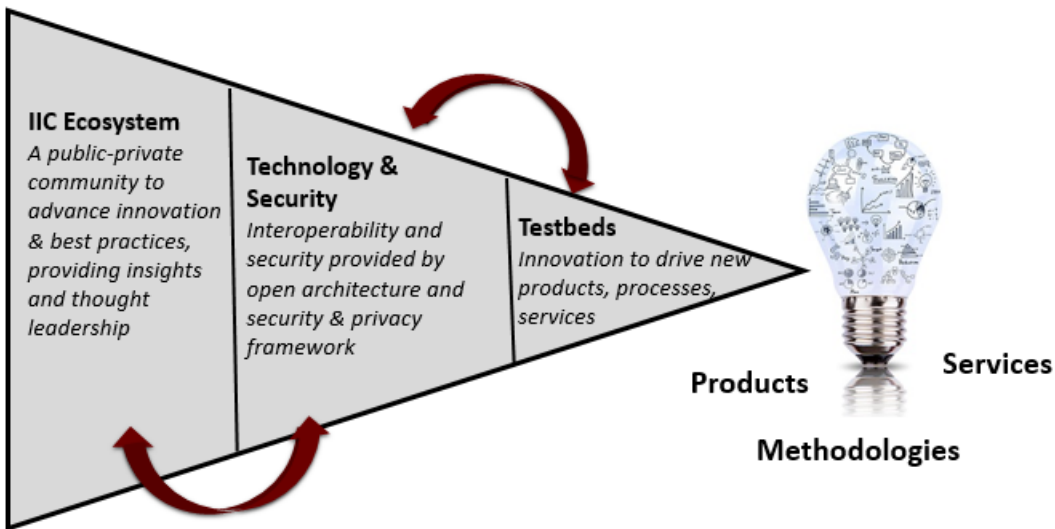


Figure 1: The goal of the IIC is to drive innovation by leveraging the collective ecosystem.

The IIC is now just over seven months old and the membership has grown to over 90 companies in 22 countries. These members have contributed greatly towards the works in process in all the Working Groups. The first set of deliverables will be published by the first quarter of 2015.

TECHNOLOGY WORKING GROUP

The charter for the Technology Working Group is:

“The Technology Working Group will define and develop common architectures, by selecting from standards available to all, from open, neutral, international, consensus organizations and reviewing relevant technologies that comprise the ecosystems that will make the Industrial Internet work.

To meet this goal, we shall:

- identify industry needs, technology gaps and architectural requirements
- define multi-view reference architecture(s) including operational and cognitive models
- identify technologies to be integrated into such an architecture
- evaluate technologies and adopt those deemed suitable
- define reference test beds requirements to validate industrial internet architectures and de-risk technologies
- define a common vocabulary and vernacular

We shall continuously seek out appropriate ways to put this work into effect.”

To accomplish the goals of the charter, several teams have been established as described below.

Use Cases Team

The Use Cases team has almost doubled the number of use cases that have been written and reviewed since July. Representative use case areas include Connectivity, Logistics, Transportation, and Healthcare.

The team is now considering how to:

- incorporate what has been learned as requirements on the reference architecture
- establish what additional use cases are required to ensure the requirements are complete
- correlate proposed testbeds to additional use cases.

Currently, the priority is to identify use cases in different vertical application domains to ensure the reference architecture requirements are met for a wide variety of applications.

The use cases are accessible to IIC members only.

Framework Team

The Framework team is now building a white paper entitled *Industrial Internet Reference Architecture*. It will document a standard-based open Reference Architecture for Industrial Internet systems with specific consideration to key capabilities system characteristics including resilience, safety and security.

It also:

- establishes interoperability requirements for the Reference Architecture and identifies existing standards that are applicable to the Industrial Internet, and
- surveys key IoT-related technology components that are required to implement concrete architectures for real world use cases based on the Reference Architecture.

Any identification of technology, practices and standards gaps in the process will help motivate the industry to address these technical deficiencies in a collaborative and timely manner.

The audience for the whitepaper includes technology and solution providers who can use it as a tool to guide the development of interoperable technologies and solutions based on open standards with assurance of meeting resilience, safety and security requirements. It can also be used by system implementers as a common starting point of system conception and design. The framework will be used to build and select interchangeable technologies and solutions to appropriately address operational risks and reduce developmental costs and time to deploy. The whitepaper thus aims to create a broad industry consensus around Industrial Internet system architectures and development approaches that can help drive product interoperability and the deployment of systems appropriate for their intended uses.

Several points of view are being taken on this work:

- Key System Characteristic
- Intelligent and Resilient Control
- Operations Support
- Connectivity
- Integration and Orchestration
- Security, Trust and Privacy, and
- Business Viewpoint

These points of view will be written, integrated and available review by IIC members at its December 2014 meeting. This work represents the collective input of nearly every IIC member organization, with specific workstreams being led by Cisco, Enterprise Web, GE, Intel, Mitre, and RTI. As the IIC membership grows, this work is expanding.

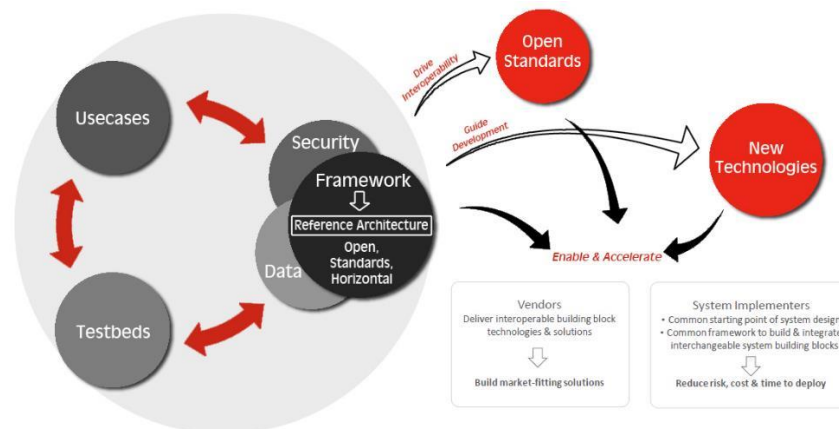


Figure 2: Collaboration within the Industrial Internet Consortium will lead to new standards & technologies

Vocabulary Team

The Vocabulary team is engaged in an ongoing activity. Its work is embedded throughout the IIC teams as new terms are identified and defined. Draft definitions of the Vocabulary team have been provided to the National Institute of Standards and Technology CPS Public Working Group.

Data Management and Analytics (DMA) Team

The Data Management and Analytics team was established in July 2014. It will define the properties of a data service framework for the Industrial Internet. Its purpose is to provide a ubiquitous data-sharing integration backbone for all architecture elements defined by the Technology Working Group. The Data Management and Analytics team will also be deeply involved as a cross-cutting concern for the reference architecture(s).

SECURITY WORKING GROUP

The Charter for the Security Working Group has been finalized, as follows:

The Security Working Group will define a security and privacy framework to be applied to technology adopted by the IIC. The framework will establish best practices and be used to identify security gaps in existing technologies. Specifically, it will:

- Describe a security and privacy framework for the reference architecture(s)
- Identify possible threats and make resulting security recommendations and propose best practices for mitigating controls, countermeasures, and remediation
- Identify any perceived security gaps and construct requirements to forward to standards organizations as needed
- Recommend what steps providers of solutions and their users can take to increase the level of security and privacy to a specified minimum level of compliance
- Recommend how providers of solutions and their users can objectively measure and document the level of security and privacy implemented”

The group has focused on completing the General Security Use Case, which lists possible security threats at multiple points in multiple levels from sender to receiver. In many ways, this use case is a checklist for implementation of application-oriented use cases used to check that security has been considered at each step.

To ensure the security use case is complete, it must be checked against a representative set of use cases to establish whether anything might have been missed. Consequently, the Security Working is checking each of the IIC use cases for missing elements.

TESTBED WORKING GROUP

Testbeds are the ultimate goal of IIC members, driving new revenue streams and new levels of operational efficiency. They involve a process of identifying and developing use cases to be tested; identifying components of the reference architecture; finding funding; and establishing the necessary legal structures. All IIC testbeds must be approved by the Steering Committee.

The Testbed Working Group is focused on four main tasks:

- Facilitate approved IIC testbeds
- Identify and gain approval for new IIC testbeds
- Identify and communicate funding resources for IIC testbeds
- Establish operational infrastructure

Engineering Update

To date, two testbeds have been approved and are progressing. One represents a horizontal infrastructure application, while the other is a large-scale, longer term scenario focused in one vertical market. Additional testbeds have been identified and defined. Specific details about these and other activities will be communicated publicly in the future.

CONCLUSION

Tangible progress has been made across all of the IIC Working Groups, as the focus has shifted to creating deliverables. This work is being carried out by most of the membership, which itself represents a broad ecosystem of public and private organizations. Work takes place through weekly meetings by teleconference and in person at the quarterly members meetings. The September 2014 members meeting in Austin, Texas had over 150 attendees at its working sessions. The next meeting will be in [Long Beach, CA](#) December 9-11.

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