PURPOSE AND AUDIENCE

This Industrial Internet Consortium (IIC) document provides an update to the *Engineering: The First Steps*, and Engineering Update: November 2014 reports. This document has the same audiences:

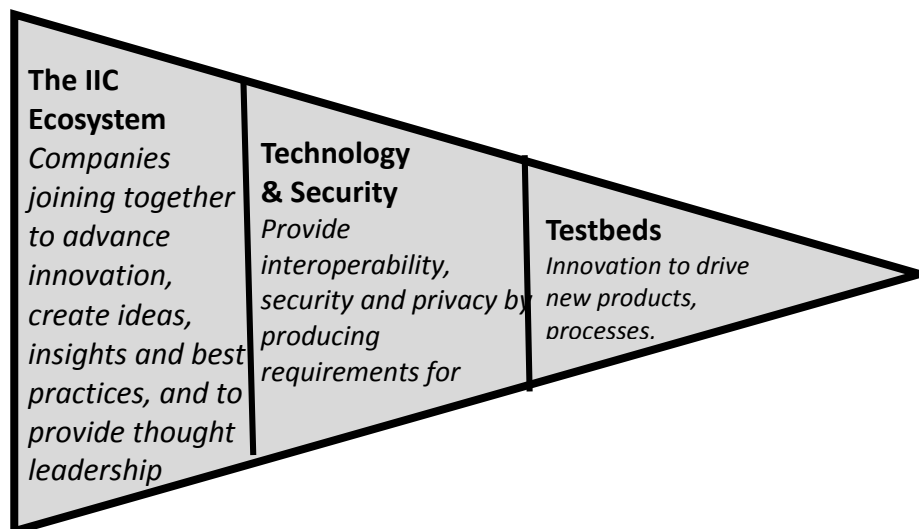**IIC Members**: What is happening in the IIC Working Groups to date.
Nonmembers: Overview of the IIC activities and deliverables.
Other Groups: Potential collaboration points and upcoming specifications.
Analysts & Media: An overview of IIC activities and progress towards goals.

OVERVIEW

This update looks back at our progress as a consortium in all the work within the IIC ecosystem over the last nine months. The diagram below illustrates these various initiatives. The first element on the left concerns the ecosystem in general and membership in particular. Then we look at the ongoing work in technology and security. All this work leads to innovative products and services through the IIC testbed activities.

The IIC Ecosystem
Companies joining together to advance innovation, create ideas, insights and best practices, and to provide thought leadership

Technology & Security
Provide interoperability, security and privacy by producing requirements for

Testbeds
Innovation to drive new products, processes.

This update follows this same structure, starting with the IIC ecosystem.

INDUSTRIAL INTERNET CONSORTIUM ECOSYSTEM

Membership

In our last report, membership totaled 90 companies, representing public and private organizations across the world. As of January 29th, membership totaled 136 organizations including large global leaders, start-up companies, system integrators, research institutions, universities, government institutions and market researchers.
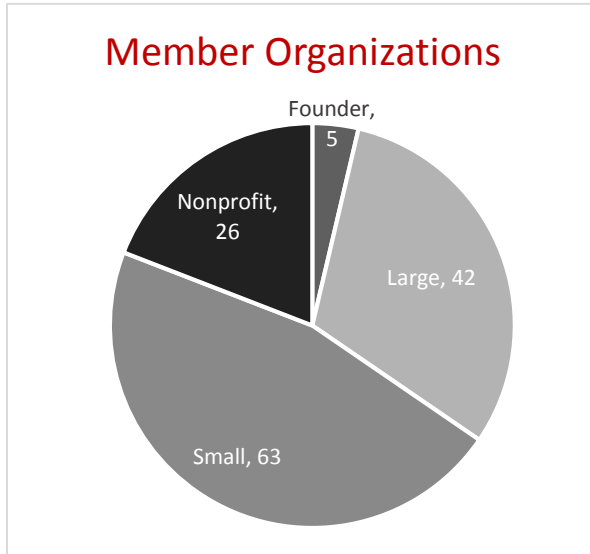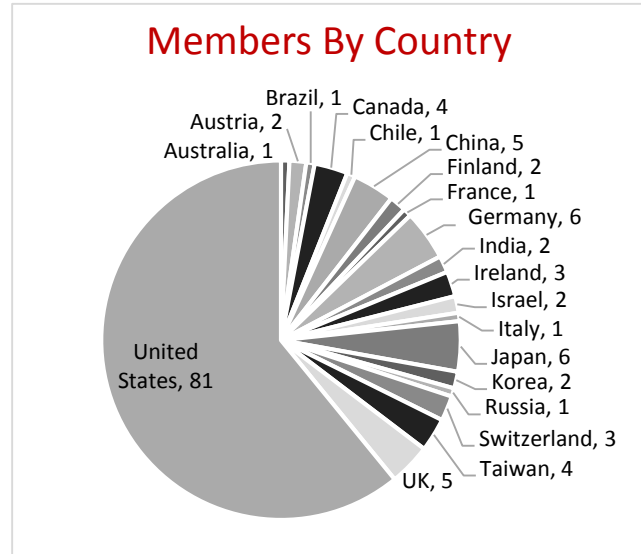

Figure 1 – IIC Member companies

Figure 2 – Geographic breakdown of IIC membership

Marketing

The Industrial Internet train has left the station. While it's not yet on the high speed rail, it has started to transform the industry through new processes and connected products and services. The goal of the Marketing Working Group is to create awareness of the innovation that is happening today, with a look at what is to come.

The Marketing Working Group has over 80 individual representatives. Its formal mission is to establish the Industrial Internet Consortium as a community that champions innovation in connected intelligent machines and processes. The group focuses on developing content that drives awareness of the Industrial Internet and its members to external audiences.

Sample activities including teaming with the World Economic Forum on its January 2015 report on Industrial Internet of Things: Unleashing the Potential of Connected Products & Services; keynotes and talks at more than 20 conferences in North America, Europe and Asia; hosted IIC information days in Boston, Austin and Long Beach; published case studies from IIC members; driving digital conversation on Twitter, LinkedIn and YouTube; and more. To access this content, please visit www.iiconsortium.org.

TECHNOLOGY AND SECURITY

The Technology and Security Working Groups are working together in shared membership teams to provide interoperability, security and privacy requirements and guidelines for standards in open architectures.

Framework Team

The flagship deliverable was originally intended to be a white paper entitled *Industrial Internet Reference Architecture*, but it has grown significantly in size and scope over the intervening months. Because of the huge amount of detail required, we have decided to make it a more formal "Technical Report" and divide it into three separate papers. The first of these papers is nearly drafted and it defines the elements that make up the reference architecture. The second part will identify existing standards and technologies that fit into each of the elements of the reference architecture defined in the first report, and the third will identify gaps and requirements that need to be filled.

Use Cases Team

The use cases team continues to gather use cases. As it does so, it is reconciling each use case against the developing reference architecture, which means extending each use case to identify required technology. For example, a use case may have a particular technology requirements in data storage, volume or usage; communications latency, throughput and reliability; resiliency and reliability; performance; security trust and privacy. Each of these technological requirements drives the reference architecture.

Accordingly, the use case "template" (an outline for each use case that is reused each time to ensure completeness and consistency) has been extended to incorporate these technological requirements.

Data Management and Analytics Team

The Data Management and Analytics (DMA) team is working to make the charter and DMA contribution more concrete. To that end, they defined a set of deliverables, as follows:

- Review and finalize the data management "cross-cutting concern" of the *Industrial Internet Reference Architecture* Technical Report
- Propose an approach to Security in the context of the data management framework
- Propose a "DMA compliance list" for all proposed testbeds
- Propose a component model, identifying the different framework elements and their responsibilities
- Identify technology candidates to use, and assess the suitability of applying them
- Produce vocabulary elements and contribute them to the vocabulary team

The purpose is to create both a coherent Data Management and Analytics framework, and to contribute that as a "cross-cutting concern" to the *Industrial Internet Reference Architecture.*

Security Working Group

As can be seen from the above, there is a lot of work focused around providing input as a "cross-cutting concern" to the *Industrial Internet Reference Architecture* Technical Report*,* and no more so than with Security. The General Security Use Case (UC004) suggested an outline for the organization of the security elements that need to be addressed by every single element of the reference architecture. A grand reconciliation of these two outlines is happening now.

In addition to the coordination and cross-pollination with the Reference Architecture, it is a requirement that security also be considered in each of the testbeds. Accordingly, the Security Working Group is establishing how best to ensure that each testbed is secure. The approach is to make best use of the shared membership between all the teams and working groups and appoint liaisons between each Testbed team and the Security Working Group. We hope to refine and extend this liaison model for each of the activities underway. For example, as mentioned above, Data Management and Analytics must have a clear relationship to the Reference Architecture, and use cases too. There are many threads to be woven together here.

Liaison Team

In addition to these internal liaisons, we have also chartered a new team under the Technology WG that will, as its charter reads:

> The Liaison Team will act as the gateway for formal liaisons with other organizations, such as standards organizations, open-source organizations, other consortia and alliances (either technology-focused or industry-focused), certification and testing bodies, and government entities or agencies.
>
> The purpose is to generate requirements for new standards from every part of the IIC process—from use cases to Reference Architecture to testbeds, by maintaining continuing communication channels, identifying domain expertise in user and industry groups that can provide use cases that help ensure our testbeds serve their domain. We may also facilitate code sharing with open-source organizations to support test beds.
>
> For each such body, the Liaison Team will determine expectations for the liaison, and the "rules of engagement" for what and how information is shared and owned, all with the approval of the Steering Committee.
>
> The deliverables for the Liaison Team are lists of identified bodies, the determination of what kind of liaison is appropriate, and specific agreements that formalize the liaison. Its activities will include maintaining continuing communication channels, gaining approval from the Steering Committee for acceptance and release of materials, and feeding back questions and issues to IIC working groups and teams."

The intention of the Industrial Internet Consortium is to collaborate and cooperate with other organizations. If you are working in a standards group, open-source organization, consortium or alliance, please contact Stephen Mellor.

During the last nine months, the IIC has established the following liaisons:

- The Eclipse Foundation
- GS1
- OASIS
- Object Management Group
- The Open Group
- Open Interconnect Consortium
- Smart Grid Interoperability Panel (SGIP)

Further details on these liaisons, and updates to that list, can be found on the IIC Liaison page.

TESTBEDS

Since our last report, the IIC Steering Committee has approved two new testbeds, bringing the total number of official IIC testbeds to four. Details on these four testbeds are not available to the public at this time. The first IIC testbed will be publicly announced in the mid-February timeframe.

In addition to specific testbed ideas and activities, IIC members have been collaborating on first of a kind initiatives that are sponsored by external funding agencies. One such effort is around SAFTI, or Semi-Autonomous Freight Transportation Initiatives, where a coalition of 13 IIC member companies are working with the IIC and various government agencies and academics on opportunities and innovation in this emerging area.

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 the IIC 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 December 2014 members meeting in Long Beach, California had over 150 attendees at its working sessions. The next meeting will be in Reston, Virginia, the week of March 23, 2015. Interested parties are welcome to attend the public forum on Thursday, March 26th.

For updates on this event or other activities described in this report, please visit www.iiconsortium.org and follow us on Twitter and LinkedIn.