2017

ANNUAL IIoT MATURITY SURVEY
Adoption of IIoT in Manufacturing, Oil and Gas and Transportation
Industrial IIoT in Manufacturing, Oil and Gas and Transportation

As an ever-growing population of industrial equipment becomes connected, organizations in the manufacturing, transportation, and oil and gas (O&G) industries are broadly adopting Industrial Internet of Things (IIoT) solutions to drive digital transformation. Industrial companies are finding that they can save millions of dollars by establishing clear business goals like predicting and remediating failures before they occur and by improving operational processes such as repair and maintenance.

The burgeoning IIoT market shows no signs of slowing. Gartner predicts that businesses will have over 3 billion connected devices deployed by the end of 2017, growing to more than 7.5 billion by 2020. Industrial companies stand to reap increasing levels of benefit as more connected machinery comes online and they expand and deepen their IIoT capabilities.

Bsquare surveyed more than 300 senior-level IIoT influencers and decision-makers across the manufacturing, transportation, and O&G industries for their 2017 Annual IIoT Maturity Survey and found that IIoT has progressed well beyond being just a catchphrase to a technology that is driving measurable business value.

1 https://www.gartner.com/newsroom/id/3598917
The Bsquare IIoT Maturity Index outlines the stages commonly associated with Industrial IoT technology adoption. Each phase typically builds on the previous one, allowing organizations to drive maximum value as they progress through the index.

Evolution of a Connected Business Model: Stages of IIoT Maturity

1. **Device Connectivity & Data Forwarding**
   Sensor data is transmitted and stored for analysis and action.

2. **Real-Time Monitoring**
   Data is monitored and visualized to initiate use cases for desired business outcomes. Achieves awareness of equipment status and refines business processes.

3. **Data Analytics**
   Delivers insight, prediction, and optimization with applied data analytics, such as machine learning and artificial intelligence.

4. **Automation**
   Orchestrates automated, complex actions across multiple internal systems such as inventory, support, or service ticketing systems.

5. **Enhancing On-Board Intelligence**
   Processing data on or very close to the connected equipment, sometimes called distributed intelligence or edge computing.
The Current State of IIoT Adoption

Respondent organizations are taking a staged approach to IIoT adoption, based on their responses when asked how they are using IIoT. This aligns with the Bsquare Maturity Model, which outlines a multi-stage framework for IIoT advancement and return on investment (ROI) realization in industrial environments. Respondents validated that IIoT is a maturity progression, starting with basic device connectivity and advancing to fully automated business processes.

IIoT Maturity Model

<table>
<thead>
<tr>
<th>IIoT Use (by % of response)</th>
<th>Least Mature</th>
<th>Most Mature</th>
<th>Overall Average</th>
<th>Transportation</th>
<th>Manufacturing</th>
<th>Oil and Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device connectivity and simple data forwarding</td>
<td>78%</td>
<td>28%</td>
<td>42% decrease</td>
<td></td>
<td></td>
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<tr>
<td>Real-time dashboards and monitored activity through constant data stream</td>
<td>56%</td>
<td>48%</td>
<td>42% decrease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced analytics, such as machine learning, cluster analysis, and artificial intelligence, from data scientists</td>
<td>48%</td>
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<td></td>
<td></td>
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<tr>
<td>Automated simple, single-step actions such as service-ticket requests</td>
<td>28%</td>
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</table>
The vast majority of respondents (86%) already have a solution in place and 91% of those adopters say that their solutions are very or somewhat important for their company. Twelve percent plan to implement a solution this year, bringing the total of respondents who either have or plan to have one to nearly 100%.

Adopters select their implementation method based on business needs. More than three-fourths (77%) prefer a cloud-based solution, most likely due to its ease of use and lower cost of entry. Twenty-three percent have an on-premise deployment.

12% plan to implement an IIoT solution this year

Solution implementation is based on business needs:

- **77%** Cloud-based
  - Preferred method, likely due to ease of use and lower cost
- **23%** On-premise
- **42%** have used IIoT for 12 months or more
- **45%** established their IIoT solution in the past 12 months
- **91%** of adopters indicate their solutions are very or somewhat important for their company
Enhancing Operations Performance with IIoT

Companies want better visibility into their business-critical equipment as evidenced by more than 90% of adopters citing device health-related goals as top drivers for IIoT adoption. Other goals included operating cost reduction (24%), increased production volume, and better compliance (18% each).

IIoT is working, according to those who have adopted it. Eighty-four percent said their IIoT solutions have been extremely or very effective, and 91% indicated a significant or fair amount of organizational performance improvement. Nearly all transportation respondents noted significant solution effectiveness and organizational improvement. Only about three-fourths of O&G respondents felt that their solutions were very or extremely effective, likely due to the relatively recent uptake of IIoT in their industry.

Current adopters cite these top business challenges targeted by IIoT solutions:

- **91%** Equipment Health
- **24%** Operating costs
- **18%** Production volume increases
- **18%** Improved compliance

Considered Industry Impact at a Global Level

95% consider IIoT to provide a tremendous or significant industry impact at a global level

- 99% Oil and Gas
- 98% Transportation
- 90% Manufacturing
A Connected Future

Companies plan to continue their investment into IIoT as they see its positive impacts. Nearly 100% of respondents expect to invest the same or more over the next 12 months, with nearly three-fourths projecting an increase. Eighty-five percent of transportation and 78% of manufacturing respondents expect to increase their investment. Slightly less than half of O&G respondents expect to increase spending, possibly due to their more nascent adoption.

Most companies plan to continue their existing focus over the next 12 months, with 79% citing data analytics and 71% real-time monitoring as their core planned uses for IIoT. They also project an increase in advanced uses, including a 35% increase in automating simple, single-step actions and a 29% increase in real-time monitoring capabilities.

Businesses see IIoT’s impact and are responding in kind

73% projected 12-month investment increase

- 85% Transportation
- 78% Manufacturing
- 56% Oil and Gas

35% Automating simple, single-step actions
29% Real-time monitoring
MANUFACTURING
Manufacturing

IIoT IMPACT IN MANUFACTURING
Digital transformation and Industry 4.0 are vital to optimizing manufacturing processes in an environment of automated machines and systems. IIoT helps advance these initiatives by enabling manufacturers to connect critical assets, extract data, and improve factory operations.

CURRENT IIoT ADOPTION IN MANUFACTURING
IIoT is already making a difference in manufacturing environments. Manufacturers have a strong commitment to IIoT and believe it is very important to their organization.

77% currently have an IIoT solution in place

44% have used IIoT for 12 months or more
33% established their IIoT solution in the past 12 months
98% of adopters indicate their solutions are very or somewhat important for their company

20% plan to implement an IIoT solution this year

Solution implementation is based on business needs:

76% Cloud-based
Preferred method, likely due to ease of use and lower cost
24% On-premise

20% plan to implement an IIoT solution this year


Manufacturing

EVOLUTION OF THE MANUFACTURING BUSINESS MODEL

In keeping with the Bsquare Maturity Model framework, manufacturing respondents indicated their use of the IIoT adoption stages:

<table>
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<td>67%</td>
<td>32% decrease</td>
</tr>
<tr>
<td>Real-time dashboards and monitored activity through constant data stream</td>
<td>62%</td>
<td>67%</td>
</tr>
<tr>
<td>Advanced analytics, such as machine learning, cluster analysis, and artificial intelligence, from data scientists</td>
<td>47%</td>
<td>32%</td>
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<tr>
<td>Automated simple, single-step actions such as service-ticket requests</td>
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ENHANCING MANUFACTURING OPERATIONS WITH IIoT

Logistics-related items and machine health are the top business challenges manufacturers target with their IIoT solutions, indicating that maintaining and optimizing equipment and operational parameters are closely tied to supply chain efficiency.

Current adopters cite these top business challenges targeted by IIoT solutions:

- **95%** Logistics (including factory floor)
- **82%** Machine Health
- **34%** Operating Costs

84% consider their IIoT solutions to be extremely/very effective

Improving Performance with IIoT:

For manufacturing and industrial environments, maintaining and optimizing equipment and operational parameters are essential for an efficient supply chain. Respondents rated the impact of IIoT on their business as:

- **44%** Significant
- **44%** A Fair Amount
- **10%** A Little
- **1%** Don’t know/Not applicable
Manufacturing

THE FUTURE OF DIGITAL TRANSFORMATION IN MANUFACTURING

Manufacturers plan to continue their investment into IIoT, and the majority plan to invest more. Within the next 12 months, 78% plan to increase their investment and 20% plan to spend about the same as the past 12 months. None plan to decrease their investment, indicating that there is a clear ROI with IIoT.

12-month projections:

- 78% Investment will increase
- 20% Investment will not change
- 0% Investment will decrease

- 29% Orchestrating complex actions across multiple systems (such as equipment to inventory)
- 11% Orchestrating single-step actions (such as service ticket requests)
- 8% Using data streams to populate real-time dashboards
Conclusion

IIoT is entrenched and growing in the transportation, manufacturing, and O&G industries and is delivering solid business benefits. The vast majority of respondents in Bsquare’s annual survey believe that IIoT has an important positive impact on their industry and already have effective solutions in place.

A key driver of deployment maturity and ROI is the establishment of clear business goals prior to deployment, such as reducing operating costs, better managing devices, or increasing production. Yet almost every respondent acknowledged that implementing IIoT is complex and requires solutions that help simplify initiatives. Device health-related uses were by far the primary reason organizations are embracing IIoT. Manufacturing and Transportation lead O&G in terms of maturity and results but O&G is adopting IIoT faster than the more widely connected manufacturing industry.

Over the next 12 months, almost all respondents plan to invest the same or more in IIoT and will continue to focus on existing business objectives and processes. They also plan to increase focus on more mature applications of IIoT such as advanced analytics and automation that allow simple and complex actions to be orchestrated across their organizations.
For more than two decades, Bsquare has helped its customers extract business value from a broad array of physical assets by making them intelligent, connecting them, and using the data they generate to optimize business processes. Bsquare DataV software solutions can be deployed by a wide variety of enterprises to create business-focused Internet of Things (IoT) systems that more effectively monitor device data, automate processes, predict events, and produce better business outcomes. Bsquare goes a step further by coupling its purpose-built DataV software with comprehensive analytic and engineering services that help all types of organizations make IoT a business reality.