The Internet of Things Has Finally Arrived
(Unfortunately, Most Manufacturers Aren’t Ready)

Executive Summary
MPI Internet of Things Study

The MPI Group
People. Purpose. Profits.
Introduction

The MPI Internet of Things Study was designed to evaluate the readiness of U.S. manufacturers to incorporate smart devices and embedded intelligence within their plants and processes. We’re particularly interested in executives’ plans to improve business performance via the Internet of Things (IoT) — and for developing and selling products with embedded intelligence. The study looks deeply into how manufacturers will leverage IoT capabilities, along with the challenges they face.

The MPI Internet of Things Study was conducted by The MPI Group, and sponsored by Rockwell Automation, QAD, and BDO. In August and September 2015, 350 manufacturers participated in the study.

This Executive Summary highlights:

- **IoT Awareness and Expectations (page 2):** Manufacturers rate their companies’ awareness of the IoT and the expectations they have for the IoT to impact business and their companies.
- **Intelligent Plants and Processes (page 3):** Manufacturers detail the extent to which smart devices and embedded intelligence are incorporated into their operations.
- **Intelligent Products (page 5):** Manufacturers discuss plans to develop IoT-enabled products.
- **Study Participants (page 7):** Manufacturer participants are described by type and age of company, revenues, industry, markets, location of facilities, and progress toward world-class manufacturing status.

The IoT era is here — even if many manufacturers aren’t ready. Find out if your company is ready by reading on.

John R. Brandt
CEO
The MPI Group
IoT Awareness and Expectations

Most manufacturing companies have limited understanding of the IoT or how to apply it to their businesses (Figure 1). That’s unfortunate, because using the IoT wisely is a key strategic initiative for most manufacturing executives:

- 71% of study participants say the IoT will have a significant impact (24%) or some impact (47%) on business in general over the next five years.
- 64% of study participants believe the IoT will have a significant impact (17%) or some impact (46%) on their businesses over the next five years.¹

Alas, only a few manufacturers have a strategy to apply IoT technologies within their businesses. More than one-third of manufacturers have no plans (really?) to develop an IoT strategy for processes or products (Figure 2).

Most manufacturing companies have limited understanding of the IoT or how to apply it to their businesses.

¹ Percentages in the Executive Summary may not sum due to rounding of decimals.
Intelligent Plants and Processes

Manufacturers have incorporated smart devices or embedded intelligence in 25% (median) of their production equipment and processes as well as non-production processes (e.g., back office). Yet 76% will increase the use of smart devices or embedded intelligence in production processes in the next two years; 66% will increase non-production IoT applications.

Shipping, warehousing, and document management are the best opportunities to leverage the IoT in operations (Figure 3).

The top five objectives for incorporating smart devices or embedded intelligence are to:

- Improve product quality (58%)
- Increase speed of operations (57%)
- Decrease manufacturing costs (57%)
- Improve maintenance/uptime (47%)
- Improve information for business analytics (42%).

The top five IoT capabilities that present the biggest challenges are:

- Identifying opportunities/benefits of the IoT (44%)
- Network capabilities to handle the IoT (38%)
- Budget/resources to develop or expand the IoT (37%)
- Incorporating smart devices or embedded intelligence (37%)
- Adapting existing technologies (36%).

Only 30% of study participants think that security is an IoT challenge. Roughly half have implemented, developed, or are considering a BYOD (bring your own device) policy for non-corporate devices (e.g., smartphones) in plants.

Figure 3. Processes that represent best opportunities to leverage the IoT (% of manufacturers)

<table>
<thead>
<tr>
<th>Process</th>
<th>Excellent Opportunity</th>
<th>Good Opportunity</th>
<th>Fair Opportunity</th>
<th>No Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping/logistics/transportation</td>
<td>27%</td>
<td>36%</td>
<td>22%</td>
<td>15%</td>
</tr>
<tr>
<td>Warehousing</td>
<td>22%</td>
<td>36%</td>
<td>21%</td>
<td>20%</td>
</tr>
<tr>
<td>Document management</td>
<td>22%</td>
<td>41%</td>
<td>22%</td>
<td>15%</td>
</tr>
<tr>
<td>Assembly</td>
<td>18%</td>
<td>28%</td>
<td>27%</td>
<td>26%</td>
</tr>
<tr>
<td>Packaging</td>
<td>18%</td>
<td>29%</td>
<td>27%</td>
<td>27%</td>
</tr>
<tr>
<td>Additive manufacturing</td>
<td>9%</td>
<td>21%</td>
<td>23%</td>
<td>48%</td>
</tr>
<tr>
<td>Fabrication/stamping</td>
<td>7%</td>
<td>24%</td>
<td>20%</td>
<td>49%</td>
</tr>
<tr>
<td>Welding</td>
<td>6%</td>
<td>14%</td>
<td>24%</td>
<td>56%</td>
</tr>
<tr>
<td>Heat-treating</td>
<td>6%</td>
<td>13%</td>
<td>20%</td>
<td>62%</td>
</tr>
<tr>
<td>Plating or painting</td>
<td>4%</td>
<td>16%</td>
<td>19%</td>
<td>61%</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
<td>9%</td>
<td>8%</td>
<td>78%</td>
</tr>
</tbody>
</table>
Only a few manufacturers have the network infrastructure to accommodate IoT machine-to-machine (e.g., sensors in one machine trigger actions of another machine) or machine-to-enterprise communications (i.e., machine sensors send data to corporate business systems). Many manufacturers will require major upgrades or overhauls for either (Figure 4).

Effective use of the IoT requires more than just technology: operations technology (OT) staff need to collaborate with information technology (IT) staff. Yet most OT and IT departments don’t currently get along (Figure 5).

Operations leadership is most likely to lead an IoT strategy (26%), followed by a cross-functional leadership structure (19%) or IT leadership (17%).

About two-thirds of manufacturers have invested 2% or less of sales in implementing the IoT. Yet 77% of manufacturers expect to increase investments in the next two years.

Roughly two-thirds of manufacturers believe that the IoT will increase profitability over the next five years.

### Figure 4. Current capability of network infrastructure (% of manufacturers)

<table>
<thead>
<tr>
<th></th>
<th>Machine-to-machine communications</th>
<th>Machines-to-enterprise communications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently capable</td>
<td>10%</td>
<td>13%</td>
</tr>
<tr>
<td>Some upgrades required</td>
<td>41%</td>
<td>38%</td>
</tr>
<tr>
<td>Significant upgrades required</td>
<td>32%</td>
<td>35%</td>
</tr>
<tr>
<td>Network overhaul required</td>
<td>18%</td>
<td>14%</td>
</tr>
</tbody>
</table>

Roughly two-thirds of manufacturing executives believe that the application of the IoT to plants and processes will increase profitability over the next five years.
Most manufacturers have plans to embed smart devices within their products (Figure 6).

Manufacturing executives hope that embedding smart devices or intelligence will:

- Increase revenue from new products (39%)
- Increase market share (39%)
- Access data from products or services in the field (34%)
- Increase profit margins per product (34%)
- Improve branding/market awareness (27%)
- Access new markets/sectors (26%).

The top five challenges faced by companies pursuing IoT-enabled products are:

- Identifying opportunities/benefits of IoT-enabled products (44%)
- Clear understanding of customer needs/value (36%)
- Technologies needed to embed smart devices into products (35%)
- Budget/resources to develop IoT-enabled products (32%)
- Where/how to get started with IoT-enabled products (29%).

A majority of manufacturers see finished goods as the best opportunities to create IoT-enabled products (Figure 7).

| Figure 6. Company effort to embed smart devices and/or intelligence in products (% of manufacturers) |
|--------------------------------------------------|---|---|---|---|
| Significant focus of our product innovation plans | 14% |   |   |   |
| Some plans to embed smart devices in products     | 26% |   |   |   |
| Limited plans to embed smart devices in products  | 30% |   |   |   |
| No plans to embed smart devices in products       | 30% |   |   |   |
Roughly 63% manufacturers believe that applying the IoT to products will increase profitability over the next five years.

About three-fourths of manufacturers have invested 2% or less of sales in embedding IoT technologies in products. But more investment is likely: 67% of manufacturers expect to increase investments in the next two years.
Profile of IoT Study Participants

Some 60% of manufacturers participating in the MPI Internet of Things Study are private companies. A large majority (84%) have been in business for more than 20 years.

Participants represent a range of annual revenues: 35% have revenues of $50 million or less, while another 36% have revenues that exceed $1 billion.

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The top five industries in the study are:
- Machinery manufacturing (21%)
- Food manufacturing (14%)
- Fabricated metal product manufacturing (12%)
- Chemical manufacturing (11%)
- Electrical equipment, appliance, and component manufacturing (11%).

The top five markets for study participants are:
- Manufacturing (54%)
- Retail (27%)
- Wholesale (26%)
- Defense industries (24%)
- Food services (24%).

Almost all participants had facilities in the United States (96%), and more than one-quarter had facilities in Europe (43%); Asia, not including China (32%); China (31%); Mexico (30%); and Canada (28%).

Roughly one-half of participants have made significant progress toward (39%) or fully achieved (12%) world-class manufacturing status; 7% have made no progress.

Customer satisfaction, productivity, and quality improvements are most likely to impact profitability at participant companies (Figure 8).

<table>
<thead>
<tr>
<th></th>
<th>Significant impact</th>
<th>Some impact</th>
<th>Limited impact</th>
<th>No impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer satisfaction</td>
<td>76%</td>
<td>21%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Productivity</td>
<td>75%</td>
<td>22%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Quality</td>
<td>72%</td>
<td>26%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Speed/on-time delivery</td>
<td>59%</td>
<td>35%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Machine reliability/uptime</td>
<td>55%</td>
<td>33%</td>
<td>9%</td>
<td>2%</td>
</tr>
<tr>
<td>Product/service innovation</td>
<td>54%</td>
<td>37%</td>
<td>8%</td>
<td>1%</td>
</tr>
<tr>
<td>Cost controls and reductions</td>
<td>53%</td>
<td>39%</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>Safety</td>
<td>41%</td>
<td>42%</td>
<td>15%</td>
<td>2%</td>
</tr>
<tr>
<td>Green/sustainability</td>
<td>16%</td>
<td>36%</td>
<td>38%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Figure 8. Type of improvement and impact on profitability
The MPI Group

The MPI Group (MPI) serves leaders with research, advice, and performance-targeted solutions that provide a competitive advantage in today’s fierce marketplace. MPI combines the disciplines of research, strategic advice, knowledge development, and hands-on leadership to create a difference — in performance, in profits, and in the people who make them possible.

In addition to the *MPI Internet of Things Study*, MPI has conducted the MPI Manufacturing Study for more than a decade — benchmarking research focused on manufacturing plant performances and best practices. MPI also conducts the Next Generation Manufacturing Study, an assessment of companywide capabilities to compete in the next decade, as well as myriad studies for clients on varied topics within numerous industries.

In early 2016 MPI will release a full report on the *MPI Internet of Things Study*. The in-depth report will examine all study findings in greater detail, including key cross-tabulations (e.g., comparisons of small-revenue companies vs. large revenue companies), as well as ways in which the IoT will impact business going forward.

MPI CEO John Brandt offers presentations on the IoT study data, via webinars and in-person events. To learn more about the *MPI Internet of Things Study Report*, schedule an IoT presentation, or to find out more about other research conducted by MPI, contact:

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