Edge Computing: Services for Manufacturing

RESEARCH BY:

Jonathan Lang
Research Manager, Worldwide IT/OT Convergence Strategies, IDC Manufacturing Insights, IDC Energy Insights
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Executive Summary

Manufacturers know that machine-to-machine communication and data exchange are nothing new, but the industrial Internet of Things (IIoT) and cloud-based analytics are enabling new methods of optimizing production and delivering services to customers through Industry 4.0 use cases and capabilities. These opportunities exist where data and connectivity extend beyond traditional boundaries to new audiences and decision-makers. Yet reduced latency, reliability, and data security become risks if this connection is not executed in an intelligent way.

In manufacturing, IDC asserts that a company cannot have a cloud strategy without an edge strategy. This critical exchange addresses the latency, reliability, and security requirements of industrial operations while opening the world of possibilities that remote connectivity offers. The new use cases that edge computing enables can increase Industry 4.0 maturity and support the resilient decision-making necessary to thrive in today’s markets.

Key Findings:

- Optimizing operational throughput is the top outcome to be driven by use cases such as predictive maintenance, quality inspection and assurance, and process optimization, which are enabled by edge-computing initiatives.

- Security, reliability, and latency are the critical requirements of any Industry 4.0 initiative or use case, and these requirements are directly addressed by edge solutions.

- Over 75% of edge solutions deployed by manufacturers are either fully managed or comanaged through a services model, enabling greater flexibility and confidence.
Edge Computing Is Key to Connecting Operational Data and Assets

Edge computing is a distributed computing paradigm that includes the deployment of infrastructure and applications outside of centralized datacenters and public clouds, closer to where data is acquired, analyzed, and acted on.

**Q.** Which of the following best represents your organization’s adoption of edge solutions?

- **In production in a single location**: 13%
- **Currently pilot/proof of concept**: 31%
- **In production in multiple locations**: 56%

Operational technology (OT) is hardware and software that detects or causes a change, through the direct monitoring and/or control of industrial equipment, assets, processes, and events.

Note: Managed by IDC’s Quantitative Research Group. Data weighted by GDP. Use caution when interpreting small sample sizes. % corresponds to number of respondents; total will not sum to 100%. n = 335 (manufacturing only), Source: Worldwide IT/OT Convergence Survey, 2020

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Edge Computing Is Key to Connecting Operational Data and Assets (continued)

Q. What percentage of the instrumented operational equipment is connected in the following ways?

- Connected via a wireless network: 47%
- Connected via a wired network: 33%
- Not connected to a network: 20%

Q. Thinking about all of your plants/delivery systems/mines/logistics, about what percentage of the operational equipment is instrumented (PLCs, DCSes, sensors, meters, etc.)?

- Less than 5%: 1%
- 5%–9%: 3%
- 10%–24%: 16%
- 25%–49%: 32%
- 50%–74%: 24%
- 75%–79%: 17%
- 80%–89%: 5%
- 90% or higher: 3%

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Manufacturing Operations Is a Brownfield Edge Setting in Need of IT and OT Integration

This integration advances Industry 4.0 use cases that impact assets and productivity:

- Predictive maintenance
- Quality inspection and assurance
- Production and process optimization

Q. Which use case is the highest priority to your industry?

- Productivity enhancements for existing facilities: 45%
- IoT expansion for existing equipment: 26%
- New facility construction (or expansion) with robotics: 17%
- Hyperscale cloud extensions to facility for edge: 13%

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n = 101, Base = all respondents. Source: IDC Edge Services ThoughtLeadership Survey, September 2020

$113,099 per hour

is the average cost of downtime in manufacturing, according to IDC’s 2020 IT/OT Convergence Survey.
Q. What are the main use cases your organization is considering in regard to intelligent solutions (edge) services?

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IoT applications</td>
<td>54%</td>
</tr>
<tr>
<td>Process automation</td>
<td>53%</td>
</tr>
<tr>
<td>Inventory management (warehouse/distribution)</td>
<td>53%</td>
</tr>
<tr>
<td>Predictive maintenance</td>
<td>50%</td>
</tr>
<tr>
<td>Operational awareness, flow controls</td>
<td>50%</td>
</tr>
<tr>
<td>Connected factory and robotics (manufacturing)</td>
<td>47%</td>
</tr>
<tr>
<td>Video analytics</td>
<td>41%</td>
</tr>
<tr>
<td>None of the above</td>
<td>1%</td>
</tr>
</tbody>
</table>

Intelligent solution (edge) services are targeted at asset-intensive or interaction-intensive industries to process data efficiently for key business workloads and very low latency requirements.

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Leaders Expect Edge to Offer Security and Lower Costs

Q. What is your organization’s primary motivation for deploying edge solutions?

- Security/data protection related to negative impact on operations/applications: 29%
- Cost of bandwidth and centralized infrastructure can be prohibitive: 27%
- Deterministic latency and distance limitations: 23%
- Compliance with sovereign entities and industry regulations: 11%
- Continuous operation if network access is interrupted: 11%

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n = 101, Base = all respondents, Source: IDC Edge Services Thought Leadership Survey, September 2020
# Security and Data Protection Drive the Deployment of Edge Solutions

**Q.** What benefits do you expect edge to add to your organization?

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve security/compliance</td>
<td>42%</td>
</tr>
<tr>
<td>Improve operational efficiency</td>
<td>42%</td>
</tr>
<tr>
<td>Improve application performance</td>
<td>39%</td>
</tr>
<tr>
<td>Improve customer experience</td>
<td>37%</td>
</tr>
<tr>
<td>Enable faster/better decisions</td>
<td>27%</td>
</tr>
<tr>
<td>Improve quality of products/services</td>
<td>27%</td>
</tr>
<tr>
<td>Ability to support remote, connected workers</td>
<td>26%</td>
</tr>
<tr>
<td>Increase productivity through automated processes</td>
<td>23%</td>
</tr>
<tr>
<td>Reduce infrastructure and/or operation costs and complexity</td>
<td>20%</td>
</tr>
<tr>
<td>Create new revenue streams</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Note:** Managed by IDC’s Quantitative Research Group. Data not weighted. Use caution when interpreting small sample sizes. % corresponds to number of respondents; multiple dichotomous table; total will not sum to 100%. n = 101, Base = all respondents. Source: IDC Edge Services Thought Leadership Survey, September 2020

Edge computing offers improved security, latency, and reliability which can provide organizations with operational resilience.
Growing Amounts of Data Lead to Varied Architecture Choices

Q. How do you expect operational data (TB/day) to grow over the next 12 months?

- No change or decrease: 4%
- 1–15%: 47%
- 16–30%: 38%
- Greater than 30%: 10%
- Don't know: 1%

Q. What is the typical retention time for this data at the edge?

- Less than 1 day: 2%
- 1 day to less than 1 week: 39%
- 1 week to less than 1 month: 42%
- More than 1 month: 18%

74% of operational data will be acquired, analyzed, and acted on within the factory, according to IDC data. This data also enables cloud-based use cases like remote monitoring and diagnostics.

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Growing Amounts of Data Lead to Varied Architecture Choices (continued)

Q. What key enabling technologies are relevant to your environment?

- Private cloud: 65%
- Public cloud: 58%
- Network and software defined connectivity: 54%
- Application hosting: 44%
- Content delivery network: 39%
- Virtualization services (edge hosted): 39%
- CDN Edge Compute (WAF, Botnet Manager, API Protection): 38%

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n = 101, Base = all respondents, Source: IDC Edge Services Thought Leadership Survey, September 2020
A Wide Variety of Manufacturing Data Exists at the Edge

Q. What type of data or information does your organization plan on keeping at the edge?

- **Operational data (e.g., business/IT operational data, integrated business/IT operational data)**
- **IoT collected data**
- **Customer information**
- **Business-critical information (e.g., pricing, inventory, etc.)**
- **Media such as streaming video**

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Real-Time Data Requires Real-Time Access

Q. What is the maximum latency required for your organization’s edge initiatives?

- Less than 5 milliseconds: 72%
- 5 to 10 milliseconds: 11%
- More than 10 milliseconds: 16%
- Not sure: 1%

Q. How often do you expect to access this data at the edge?

- Real-time access: 52%
- Frequent access (non-real time): 37%
- Occasional access: 8%
- Only as backup: 3%

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Cloud-Connected Data Requires Strong Security to Manage Access and Mitigate Threats

Q. What key enabling technologies are relevant to your environment?

<table>
<thead>
<tr>
<th>Technology</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unauthorized access to sensitive data</td>
<td>55%</td>
</tr>
<tr>
<td>Intrusion detection</td>
<td>47%</td>
</tr>
<tr>
<td>API protection</td>
<td>44%</td>
</tr>
<tr>
<td>Distributed denial-of-service (DDoS) attacks</td>
<td>43%</td>
</tr>
<tr>
<td>Domain name system (DNS) attacks</td>
<td>40%</td>
</tr>
<tr>
<td>Phishing</td>
<td>38%</td>
</tr>
<tr>
<td>None of the above</td>
<td>1%</td>
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Secure Edge Services Are Most Often Deployed with a Service Partner

Q. Who manages your organization’s edge solutions?

- Fully managed: 35%
- Self-managed: 24%
- Comanaged: 42%

Q. What key considerations are important to your organization regarding (edge) services?

- Security
- App delivery
- Storage
- Performance
- Privacy
- Cost
- Latency
- Global footprint

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Edge Services Can Reduce Costs and Complexity While Improving Confidence in Edge Solutions

**Q.** What percentage improvement in the following has your organization realized or expects to realize from storage (edge) services?

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower cost</td>
<td>23%</td>
</tr>
<tr>
<td>Opportunities for product/application improvement in performance, value, etc.</td>
<td>21%</td>
</tr>
<tr>
<td>Improved customer satisfaction</td>
<td>20%</td>
</tr>
<tr>
<td>Increased agility and reduced risk from unforeseen events</td>
<td>19%</td>
</tr>
<tr>
<td>Improved compliance</td>
<td>18%</td>
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**Q.** What percentage improvement in the following has your organization realized or expects to realize from security (edge) services?

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### Edge Services Can Reduce Costs and Complexity While Improving Confidence in Edge Solutions (continued)

**Q.** What percentage improvement in the following has your organization realized or expects to realize from app delivery (edge) services?

<table>
<thead>
<tr>
<th>Service</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased agility and reduced risk</td>
<td>22%</td>
</tr>
<tr>
<td>from unforeseen events</td>
<td></td>
</tr>
<tr>
<td>Improved compliance</td>
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<td></td>
</tr>
<tr>
<td>Lower cost</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Q.** What percentage improvement in the following has your organization realized or expects to realize from intelligent solutions (edge) services?

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Essential Guidance

Begin Industry 4.0 initiatives with an assessment of your asset inventory, including connectivity, security, and instrumentation.

Include operations and IT stakeholders to align on infrastructure requirements and to build a data governance and access model that will be adopted and maintained by operations.

Leverage edge computing to aggregate and broker operational data to cloud and on-site systems while maintaining the critical operational requirements of security, latency, and reliability.

Utilize partners in your technology ecosystem for expertise and capabilities that drive progress and fill gaps through managed services.
About the Analyst

Jonathan Lang
Research Manager, Worldwide IT/OT Convergence Strategies, IDC Manufacturing Insights, IDC Energy Insights

Jonathan Lang is Research Manager for IDC Manufacturing Insights responsible for the IT/OT Convergence Strategies practice. Mr. Lang’s research focuses on digital transformation strategies in environments where operations technologies are deployed including Manufacturing, Utilities, Oil & Gas and Healthcare Provider settings. As IT capabilities redefine and extend the core value drivers of operations technologies, Mr. Lang’s research examines strategies, roadmaps, and governance models to drive this convergence and manage the new data and processes it requires.

More about Jonathan Lang
Message from the Sponsor

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