Accenture Benchmarking Study 2014

Reshaping IT in Production Operations

High performance. Delivered.
At many industrial companies, the production operations area has gone through various improvement efforts—but there is still room to do better. According to a recent study by Accenture, a majority of production operations leaders believe that higher levels of performance need to be achieved in asset utilization, efficiency of production personnel, cost of quality, cost of inventory and utilities consumption.

For many companies, the key to improvement is a more effective approach to managing the information technology (IT) used to support production processes. Indeed, most of the interviewed operations managers in the Accenture study agreed that having effective IT tools is essential for high performance in production operations.

In reality, however, production operations are often unable to take full advantage of IT to manage and improve operations. The problem, in essence, is that there is typically a gap between the traditional corporate IT function and groups overseeing the frontline operational technology (OT) that supports production. But technology today plays a larger role in every aspect of business, and that includes production operations. IT systems and OT systems have become more and more connected and interdependent—they are converging. However, the organizational structures that oversee those areas have not kept pace, and IT and production operations often work quite independently.

Many industrial companies are now working to reorganize their approach to OT in order to reflect this new reality. But often, it is not clear what the right approach should be—who in fact should be responsible for and "own" OT?

To help answer that question, the Accenture benchmarking study assessed the approaches that companies are using to support IT in their production operations. The study looked at organizational models, roles and accountability—and explored what is working and what is not. The study’s findings provide insights that can help companies make the most of the trend toward IT-OT convergence, and use IT in production operations to help build high-performance businesses.
Why governance matters

Today, the IT that is used to support production operations is not where companies would like it to be. Many production sites still use paper-based processes for managing production and reporting, and the systems that are in place are often highly heterogeneous, creating a complex IT landscape. Moreover, companies often have not clearly defined who is responsible for production-site applications—such as corporate IT or local, site-based OT groups.

Both of the teams bring their own strengths to the table. OT groups are typically able to provide a critical production-oriented perspective to technology questions. For its part, corporate IT typically brings greater rigor to the management of technology.

In general, IT departments have relatively mature technology governance practices and better-defined IT processes than OT groups do, due largely to their focus on infrastructure and application standardization that aims to reduce complexity and cost. OT groups, on the other hand, usually spend little time describing their processes and procedures. In some cases, the individuals involved with OT are not even organized as a formal department or division. When an OT department does exist, it is typically placed under local operations or local maintenance in each production site, without any centralized management at the company level. This site-oriented structure can limit the OT group’s performance and its ability to think strategically. It is a large part of what makes it so difficult to standardize technology assets, applications and procedures, and why it is so difficult to connect IT with applications for production operations.

To understand how to go about doing so, the Accenture benchmarking survey looked at several questions. Who is accountable for IT in production operations? Which organizational models are companies using to manage OT? What results are companies seeing from their respective methods? And so on.

The study also looked at the use of commercial-off-the-shelf (COTS) solutions, which is an indication of the maturity level of a company’s IT services for production. When using COTS, companies benefit from the fact that most software suppliers build in industry-specific best practices and continually optimize and modernize their solution suites. COTS templates can be applied across the organization, driving harmonization and standardization of data and processes, and helping companies realize economies of scale. And production sites can more easily share best practices and pursue continuous improvement when they have these COTS platforms in place. The exception is the metals and mining industry—for which we believe no mature COTS solutions are available yet.
Key findings

There still is a great deal of room for improvement in production operations.

As mentioned earlier, the majority of the production operations leaders said that their operations needed to strengthen five key performance indicators—asset utilization, efficiency of production personnel, cost of quality, cost of inventory and reduced utilities consumption. The area identified with the most room for improvement was efficiency of production personnel, cost of quality and cost of inventory.

Production operations often rely on very basic tools for managing information.

Among the companies participating in the research, home-built Excel applications are the most commonly used tools for preparing production operations, collecting data on the production process, and reporting and tracking and tracing. Companies tend to use a variety of applications from a variety of suppliers to support all their operations and functions (see Table 1).

<table>
<thead>
<tr>
<th>Category</th>
<th>Applications in this category</th>
<th>Number of different suppliers in total</th>
<th>Most often encountered supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>MES</td>
<td>Production/operations order management, tracking and tracing, shift reports, batch reports, daily reports, overall equipment effectiveness reports, production/operations management dashboard, generation management and distribution management systems (for utilities industry), etc.</td>
<td>15</td>
<td>MS Excel, Access (9)</td>
</tr>
<tr>
<td>Data historian</td>
<td>Database for extensive amounts of data about production processes, mainly used by process engineers.</td>
<td>12</td>
<td>OSIsoft (11)</td>
</tr>
<tr>
<td>Batch system</td>
<td>System used on the shop floor that manages recipes and is integrated with the PLCs to control batch processes.</td>
<td>9</td>
<td>MS Excel, Access (4)</td>
</tr>
<tr>
<td>Detailed scheduling application</td>
<td>Scheduling system used in operations for short-term (such as hourly) scheduling, taking into account rush orders, disruptions and change overs.</td>
<td>15</td>
<td>MS Excel, Access (15)</td>
</tr>
<tr>
<td>Work flow application</td>
<td>System that helps operators and other production operations employees execute their tasks in the right sequence, following the right procedures. Workflow systems usually also connect tasks across different departments, such as the lab and production operations.</td>
<td>6</td>
<td>Werum (2)</td>
</tr>
<tr>
<td>LIMS</td>
<td>Laboratory Information Management System, system to support the processes and sharing of information in a laboratory environment.</td>
<td>11</td>
<td>Labware (5)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Tools for support of all types of maintenance, asset management and reliability-related operational tasks.</td>
<td>9</td>
<td>SAP PM (20)</td>
</tr>
<tr>
<td>WMS</td>
<td>Tools for support of all types of warehouse and silo management and inventory management-related tasks.</td>
<td>11</td>
<td>SAP WM (11)</td>
</tr>
<tr>
<td>EHS</td>
<td>Tools to support workflows and reporting in the domain of regulatory compliance and EHS.</td>
<td>7</td>
<td>SAP EHS (7)</td>
</tr>
</tbody>
</table>
Production operations and IT leaders have different views about production IT accountability.

When asked who should have final accountability for IT for production operations, almost 50 percent of the production operations leaders said the CIO, and just under 50 percent preferred the chief operations officer or chief supply chain officer. All but one of the CIOs said the CIO should be accountable, with the exception preferring site managers. Among production IT leaders (such as leaders of corporate competence centers), nearly 50 percent preferred the chief operations or supply chain officer, and one-third preferred the CIO.

Local OT teams lack IT best practices and cannot realize cross-site synergies.

Companies that rely on local automation and engineering teams to support the design, implementation and maintenance of production applications had a relatively low average level of maturity for IT services. They also had the lowest percentage of template-based COTS in place.

Site managers cannot be expected to have deep IT skills and cannot realize cross-site synergies.

Companies in which site managers are accountable for production operations IT had the lowest average level of maturity of IT services. The percentage of template-based COTS was also rather low in those companies.

Production operations leaders expect corporate programs for local OT to benefit production operations.

Most of these leaders said that they prefer a corporate approach to IT for production operations, as opposed to having every site select and implement its own solutions. However, one production leader cited concerns that a corporate approach could lead to a lack of responsiveness to local requirements.

The choice of organizational model and accountable roles often has little impact on user satisfaction.

No significant difference was found in the level of user satisfaction across these companies. Most interviewees said that their users are only slightly satisfied with the IT systems supporting production operations. However, at companies where a vice president of engineering is accountable for production operations applications and where support for both the design and run/maintain phases is provided by a corporate engineering and automation team, on average users are more satisfied with production operations applications.

Corporate-based OT teams seem to provide mature IT services and can realize cross-site synergies.

When comparing different responsible teams (such as local automation teams, local IT teams, corporate automation teams, corporate IT teams and dedicated manufacturing execution systems competence centers), companies where corporate engineering and automation teams provide the support for designing, implementing and maintaining IT applications for production operations had the highest average level of maturity of IT services. The percentage of template-based COTS was also the highest (37.5 percent of the applications in place are a template-based, commercial-off-the-shelf solution).

Having the vice president of engineering overseeing production-operations IT helps provide mature IT services and can help drive cross-site synergies.

When comparing results with a focus on different accountable roles (such as site managers, CIOs, COOs and VPs of engineering) it became clear that, in companies where the vice president of engineering is accountable IT for production operations, the highest average level of maturity of IT services was found. The percentage of template-based COTS was highest in those companies (63 percent of the applications in place are a template-based, commercial-off-the-shelf solution).

Corporate IT teams can often provide mature services for production-operations IT (OT), but they need to put further focus on stimulating cross-site synergies.

Companies where a corporate IT team supports the design, implementation and maintenance of IT applications for production operations have a relatively average level of maturity of IT services. The percentage of template-based COTS, however, is relatively low (just 15.5 percent of the applications in place).

CIOs that are accountable for IT in production operations may need to pay closer attention to this domain.

In such companies, the average level of maturity of IT services was rather mediocre, and only 17.5 percent of the applications in place are template-based, commercial-off-the-shelf solutions).
Having an internal dedicated center of excellence does not seem to have a significant positive impact on maturity of IT services for production operations.

Companies with a center of excellence providing design, implementation and maintenance for a specific application used across the sites ranked relatively low in IT maturity.

Their ability to deliver the expected value is harmed by the typical issues of internal centers—such as ability to renovate and upgrade required skills, an aging workforce, a rather small span of control—or, the challenges of establishing focused competence centers that normally do not lead to the required broad and intensive collaboration between all stakeholders (such as IT, automation, operational excellence teams, manufacturing boards, enterprise architects).

Locally initiated outsourcing for third-party software does not necessarily deliver the desired maturity of IT services.

In plants where site managers are accountable for plant IT, the maintenance of applications is often outsourced to small local systems integrators. In many cases, these local providers have a narrow focus and limited capabilities, and the engagements lack formal service-level agreements. Working with a number of individual local providers also makes it difficult to share best practices across different plants. At companies that rely on this localized approach, the average maturity level of IT services was 3.01 on a scale of 5—much lower than the highest score of 4.08. Only a few companies in the study take a more strategic, corporate-level approach to outsourcing.

Large companies more frequently realize cross-site synergies than do small- to medium-size companies.

The average maturity of IT services for production operations was a bit lower in small- to medium-size companies (2.57 on a scale of 5) than it was in large and very large companies (both 2.92). The average percentage of template-based COTS usage was significantly lower among the small- to medium-size companies (12 percent) than it was in large (18 percent) and very large (23.5 percent) companies.
Where do we go from here?

These findings show that in general, operations leaders recognize the value of sophisticated IT solutions for production operations. But such platforms are not yet being used on a large scale—which means that most industrial companies are not yet realizing the full potential benefits of IT in these areas.

The research indicates that more of a corporate IT-driven approach to OT is needed. But at the same time, there needs to be a balance. The right approach will allow companies to apply rigorous central IT practices and governance across sites, but be flexible enough to allow meaningful local input and control. Close collaboration between skilled IT people and OT and production professionals is needed for a cost-effective, fit-for-purpose and secure applications landscape for production operations.

Increased corporate governance is also needed to implement standardized solutions across sites—and especially, COTS. These COTS solutions are available for most industries, and many are appropriate for a template-based rollout to production sites. (The exception here is the steel, metals and mining industry.)

It is clear that many companies should consider revising their current organizational models and the assignment of accountability in production IT. For example, companies that currently rely on site managers for that role might want to shift that accountability to a corporate-level person. Of course, site managers will always have accountability for what happens at their sites. The key is to end the "do it yourself mode" to local IT that many site managers are currently forced to use—much to their dissatisfaction—because of a lack of support from the corporate level.

Companies that currently assign accountability for production operations IT to CIOs may either want to find ways to make production IT a more important part of the CIO team’s agenda, or consider shifting accountability to another role.

In general, companies should consider having the vice president of engineering and his or her corporate engineering and automation team to be a formal link between IT and production operations. Such teams typically have a good basic understanding of IT, and a fairly thorough understanding of production-operations processes, site-specific characteristics and priorities, and the local process control systems (see Figure 1).

The benchmarking study also identified some practices that do not seem to be especially effective, including the creation of an internal center of excellence and the use of local independent partners. However, results can be totally different when the approach between the center and external partners is defined with a more holistic orientation—setting the realization of synergies and value of collaboration as key objectives. For example, better results are typically seen in companies that define a larger scope for a team’s services, rather than focusing the team on one specific application. A governance structure needs to be established that facilitates intensive collaboration between all stakeholders, instead of a narrow focus on the technical aspects of only one type of application. Similarly, application maintenance outsourcing is often done locally on an ad hoc basis because companies lack the in-house ability to support a heterogeneous application landscape.

FIGURE 1. The vice president of an organization’s corporate engineering & automation team can act as a formal linking pin between IT and production operations.
However, if responsibility for this outsourcing is given to a corporate team, outsourcing no longer needs to be done on a site-by-site basis. As a result, the company is in a better position to negotiate and build a relationship with the outsourcer that focuses on delivering results.

In the end, companies should keep their eye on the goal of making more effective use of IT in production operations. Continuous improvement and operational excellence require a platform that is well managed and provides the required information to production-operations personnel. That type of platform is also key to the effective benchmarking of sites, and to sharing knowledge and good practices across sites. Accenture’s ongoing research into high-performance businesses has found that high performers focus on using IT to provide the right information to the right person at the right time—which ultimately is the goal of effective governance of IT in production operations.

Adopting the organization to the world of converging IT and OT will require significant change—and like any big change, it will not always be easy. Efforts will typically have to overcome cultural reluctance to share information; contend with competing initiatives for management attention, funds and resources; and defuse the all-too-common reluctance to change. All of this will require support from the organization’s leadership—and typically, even the board. But in the end, a closer relationship between IT, process control systems engineering and production operations is likely to pay off.
In total, 35 companies participated in this benchmark study (see Figure 2). The largest number was from the chemicals industries, including various subcategories (bulk, specialty, etc.). The second-largest group was the "products industry," which includes companies with batch and/or discrete and repetitive manufacturing processes, such as automotive, pharmaceuticals, medical devices, food & beverage, tobacco, etc. Six of the participating companies belonged to the steel, metals and mining industry. Three belonged to utilities (generation and distribution of electricity, gas, drinking water). The smallest group included energy companies (which includes the oil & gas industry and tank terminals).

The companies were also grouped by size as shown in Table 2. The following criteria were applied to these groups:

Of the interviewees, 29 out of 49 represented manufacturing IT leadership (including functions such as local automation manager, global MES director, MES competence center leader). Six were CIOs. Two were operational excellence leaders, either for a local plant or on an enterprise-wide level. Nine were production operations leaders, such as COOs, CSOs, and site managers. Three did not fall into any of these categories, and were classified as "other."

The one-hour interviews (either face-to-face or by phone) were based on a predefined structured questionnaire. More detailed information about the study is available upon request.

![Figure 2. Companies in study, by industry](image)

### TABLE 2. Criteria applied to grouping of companies into different sizes

<table>
<thead>
<tr>
<th>Grouping criteria</th>
<th>Small to medium</th>
<th>Large</th>
<th>Very large</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of employees</td>
<td>&lt;25,000</td>
<td>25,000 to 75,000</td>
<td>&gt;75,000</td>
</tr>
<tr>
<td>Number of manufacturing sites</td>
<td>&lt;25</td>
<td>25-75</td>
<td>&gt;75</td>
</tr>
<tr>
<td>Number of countries company operates in</td>
<td>&lt;10</td>
<td>10 to 75</td>
<td>&gt;75</td>
</tr>
<tr>
<td>Revenue in 2012</td>
<td>&lt;1 billion</td>
<td>1 to 10 billion</td>
<td>&gt; 10 billion</td>
</tr>
</tbody>
</table>

![Figure 3. Size of companies, per industry and overall](image)
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