CEO Perspective: The Internet of Things for Chemicals

Top Priorities to Build a Successful Strategy

Today’s chemical companies need intelligent systems to manage the Big Data that’s fueling their industry. Intelligent systems have the potential to transform chemical processing by improving the supply chain and optimizing manufacturing operations. They also provide the technology backbone that enables the capture of process data from industry devices, connectivity for data capture, and business intelligence tools to convert that data into impact.

The Internet of Things (IoT) is breaking down industry boundaries. Imagine anticipating maintenance needs for assets based on predictive analytics and enabling workers to run immediate maintenance on a critical asset using augmented reality supported by GPS and Google Glass. Suppose you could ensure product quality and integrity along the entire value chain, supported by sensors and active RFID tags. With increasingly sophisticated technology, you can simplify such cross-industry processes to help protect your brand, drive growth, and enhance performance.

By connecting assets, people, products, and services, the IoT streamlines information flow and enables real-time decisions. It heightens asset performance, mitigates supply chain risks, empowers people, and ensures product quality and integrity. Leading chemical companies are investing billions in the IoT and realizing returns like higher overall equipment effectiveness, reduced cost of quality and compliance, and greater return on innovation. They are transforming business.

How can you successfully navigate this transformation? Consider these top priorities to build an effective IoT strategy.

Predictive Maintenance

Today’s assets are more intelligent thanks to embedded software and analytics that can diagnose their health. Assets can send signals about their status and performance to predict possible malfunctions and maintenance needs. 3D asset visualization delivered in a spatial context (“augmented reality”) further enhances maintenance from a service perspective.

Precision Farming

Today’s farmers want to produce higher yields using fewer chemicals in a very precise way. Called “precision farming,” this approach relies on an ecosystem of farmers, agribusiness suppliers, equipment manufacturers, traders, and technology providers. These stakeholders need a secure, Big Data–enabled platform for accessing and sharing data to support precision farming.

Operational Intelligence

Chemical firms generate volumes of data during manufacturing. But they exploit only a small amount to improve decision making and add value. By blending all your data, analyzing it in real time, and federating results for intelligent decision making, you can improve operational, safety, and environmental performance.

Smart Products and Connected Logistics

Chemical firms need to track products in warehouses or in transit and ensure quality and integrity across the value chain. Using sensors and active RFID tags, you can identify the location, condition, and authenticity of products. Such devices create Big Data that you can now process in real time to proactively mitigate supply chain risks.

US$167 billion

IoT revenue opportunity for process manufacturing industries (including chemicals) by 2018

16.1%

Projected revenue increase for process manufacturing by 2018 based on compounded annual growth rate

2. Ibid.
Embrace Innovation

With advanced connectivity between smart assets, products, and devices, technologies such as the IoT and machine-to-machine (M2M) communication are enabling the chemical industry to optimize efficiency and deploy new business models such as precision farming. The adoption of these technologies is accelerating with recent advances in mobile, cloud, and Big Data solutions; the growing importance of social media; and the shrinking prices of hardware like sensors. Chemical firms that embrace such innovative technologies can gain first-mover advantage (see table).

### Chemical Industry Innovations for the Internet of Things

**Asset Maintenance**
- Location intelligence
- Pipeline and equipment monitoring
- Predictive maintenance
- Energy and emissions monitoring and control; release management

**Responsive Manufacturing**
- Cross-plant analytics
- Process optimization
- Production monitoring
- Predictive quality
- Short interval control
- Golden batch
- Real-time costing
- Sensor-driven dynamic replenishment
- Automated 3D printers

**Supply Chain Management**
- Logistics and quality monitoring
- Counterfeit detection and control
- Container management tracking
- Container security
- Loss prevention
- Dock shipment coordination
- Precision farming
- Chemical Factory Anti-Terrorism Standards (CFATS)

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Assuming the global cost base of manufacturing is $25 trillion today, 2%–4% cost savings from IoT, and 50% penetration of IoT, we get to $500 billion in potential cost savings. Assume the global cost base of manufacturing is $25 trillion today, 2%–4% cost savings from IoT, and 50% penetration of IoT, we get to $500 billion in potential cost savings.5

We conservatively estimate the potential savings to the freight transportation industry at $168 billion annually.4

Agricultural technologies could increase global crop yields as much as 67% and cut food prices nearly in half by 2050.5

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4. Ibid.
7. Ibid.
Think Big Data and Analytics

The growing number of connected assets and devices leads to huge data volumes. Formerly unused data from plants, supply chains, and logistics – as well as from social networks – adds to this massive IoT “data lake” to enrich asset and operations data. By correlating all this data, you can gain insight into market demand, trends, and preferences that can drive innovation. But how will you make sense of it all?

Chemical companies need a sound strategy for storing and securing large data volumes while enabling advanced analytics locally and enterprise-wide. With these capabilities, you can understand past actions and predict future trends. You can deliver the right products and inventory mix at the right time. Engage your growing audience of connected customers in real time. Cloud-based data warehouses and real-time analytics will be a must.

Think Sustainable Development

With “green” labels becoming increasingly more valued, begin your plans for new products and services by keeping sustainability and environmental impact in mind. Whether you operate in a business-to-consumer or business-to-business model, ensure your products and services not only are IoT-capable but also meet criteria for sustainability as well as cost, quality, and performance.

Worldwide IoT Revenue

According to IDC, estimates for IoT revenue by region in 2020 will be:9

<table>
<thead>
<tr>
<th>Region</th>
<th>IoT Revenue (Trillion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin America</td>
<td>$76.3</td>
</tr>
<tr>
<td>Middle East and Africa</td>
<td>$114.4</td>
</tr>
<tr>
<td>Central and Eastern Europe</td>
<td>$217.1</td>
</tr>
<tr>
<td>North America</td>
<td>$1.9</td>
</tr>
<tr>
<td>Western Europe</td>
<td>$2.1</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>$2.6</td>
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Extended Visibility

Salalah Methanol Company (SMC), an Oman-based production facility, created transparency, cross-functional visibility, and a unified enterprise view of information to achieve plant-wide operational excellence.10


Smart Products and Services

The Michelin Group uses sensors inside tires combined with analytics to coach truck fleet drivers on how to save fuel.

We are reliably connecting “things” today that just five years ago we would not have imagined possible, allowing us to serve our customers better and improve our ability to produce and deliver on time. The possibilities for the Internet of Things are like the mysteries yet to be discovered in our vast oceans. We’ve barely scratched the surface in understanding the potential.”

Dennis Ryan
Vice President and CIO
Momentive Specialty Chemicals Inc.
Address Privacy and Security

Data privacy and security need to be part of every discussion when planning an IoT strategy. As proven by Stuxnet, Flame, and other malware, control systems are targets for intruders wishing to do harm or interrupt production. Your security practices need to be infallible, and the IoT connections that deliver data need to be tamper-proof.

Beyond security, chemical companies need to clearly explain how they collect and use customer data. Privacy policies must prevent the unwanted sharing of customer information to third parties or in public forums.

Enable Your Infrastructure

The IoT brings together a vast range of technologies, including hardware, sensors, devices, apps, telematics, Big Data solutions, and connectivity to the cloud. Who you partner with to build your infrastructure will have a great impact on its potential for success. Assess how software vendors, device makers, and telematics platform providers can reshape your business processes and enable connected strategies. See them as strategic partners.

Harmonize It All

The real value of the IoT for chemicals is in connecting your infrastructure to your broader business process software. In-memory computing will become a necessity to successfully combine IoT data with transactional data in one shared database, in real time.

For example, running the IoT for chemicals on an in-memory computing platform can provide real-time insight into key performance indicators (KPIs) for plants and assets. This enables informed decisions on operations, maintenance, safety, and distribution. It also creates an environment where you can monitor, analyze, and automate in ways that improve efficiency, streamline key business processes, and support innovative business models such as precision farming.

SAP’s approach to the connected plant includes the SAP® Manufacturing Integration and Intelligence application, which provides operational integration to existing plant applications. It also lets you consolidate process and business data into the SAP HANA® platform for a holistic view of performance.

Rapid-deployment solutions from Rolta, an SAP partner, extend real-time insights into the performance of operations, assets, and capital, as well as environment, health, and safety.

Are you ready for the IoT in chemicals?
The IoT is not a distant concept for future consideration. The time to think about the IoT is now. Learn more at sap.com/iot or http://global1.sap.com/campaigns/digitalhub-internet-of-things/index.html.