The Internet of Things Supply Chain

Hyper-Granular Visibility and Revolutionary Use Cases Will Disrupt Old Business Models

The Internet of Things Brings Digital Disruption to Supply Chains – But Are You Ready?

The Internet of Things (IoT) offers a sweeping change to the way everyday objects and large-scale machines operate. As it gets cheaper to put powerful chips into all sorts of devices, the number of aware-and-connected machines is skyrocketing. These ‘smart machines’ generate tremendous amounts of data, which, when analyzed, can provide new business insights and enable the kind of intelligent automation that has forever been the holy grail of the industrial revolution. But while the sources and quantities of data will be greater than ever thanks to IoT, at the end of the day, business success in the coming decade will boil down to who has the best infrastructure to not only consume data but to use data for improved decision making and execution.
In 2006, there were about 2 billion connected devices in the world. Intel projects this number to reach as high as 200 billion by 2020\(^1\).

That includes more than just computers and mobile devices. All kinds of objects, from household washing machines to wind turbines to shipping containers, will become “smart.” Sensors will make them aware of real-time conditions, and connectivity will let them communicate instantly via the cloud.

By 2025, the total global worth of IoT technology could reach up to $6.2 trillion. What sectors will see the biggest IoT adoption? According to Intel, 40.2 percent of connected devices will be in the Business and Manufacturing sector, where real-time analytics of supply chains and equipment, along with robotic machinery, will be the prime use cases. Another 8.3 percent of devices will reside in the retail sector, where inventory tracking, smartphone purchasing, and anonymous analytics of consumer choices will offer great new business advantages.

The end result is that there will be tremendous explosion of data everywhere. For supply chains, that means things could get simultaneously more efficient and more complex.

On the one hand, IoT will turbocharge supply chains with hyper-granular visibility. Where previously supply chain managers could only see the status of goods after they passed through key checkpoints (equipped with data access), IoT will enable managers to continuously track goods, without needing to wait for their arrival at specific places with connectivity infrastructure. The flipside of this, however, is that there will be more complexity in data volume and scale. With more data available, the successful management of information becomes paramount. Done correctly, it will allow IoT to give birth to new demand and create new business models, fueling growth. Such paradigm changes will be Darwinian, however – businesses who can use data to win customers will survive. Those who can’t, won’t.

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The Internet of Things on the Retail Floor

The rollout of IoT is already beginning in retail. Macy’s recently deployed sensors throughout its flagship stores based on Apple’s iBeacon (Bluetooth low energy) technology. As customers walk around to different areas of stores, the iBeacons present relevant deals on their smartphones. By seeing what sorts of deals and products provoke customers to respond, Macy’s can make changes to its assortment. In this way, IoT technologies like iBeacons can directly capture customer demand, and as they roll out, they’ll impact inventory and omni-channel strategy, which have their foundations all the way up the supply chain. Companies will need to focus on agility, and the ability to adjust on a dime to changing demand, in order to serve an IoT-equipped retail world.

The Consumerization of Supply Chains

The “consumerization of enterprise” is now a large phenomenon. In the consumer world, mobile computing, social media, and e-commerce transformed the status of customers. These technologies put customers first, allowing them to have high standards and expectations for things like product selection, delivery times, order tracking, customization, and customer service. Those high standards, and the technologies that enabled them, are now coming to the enterprise world.

This means two things for supply chains. First, for retail supply chains, it forces a requirement: become flexible and capable enough to make good on the high customer expectations that now exist, or someone else will.

Second, in the manufacturing and logistics industries, supply chain managers need to realize that high expectations are coming to these areas too, coupled with a wave of changes to global markets. If a
company can’t prioritize the customer—who could reside anywhere in the world—while also staying profitable and nimble, it will spell catastrophe for long-established businesses in these traditional industries. IoT will play a major role in these consumerization developments. It is a technology enabler — allowing for the power of mobile computing to finally enter the enterprise supply chain space. But it will also demand that businesses be already equipped with the right data-driven infrastructure and mindset to make the most out of IoT.

The truth is that many companies today are lacking the fundamental data architecture to handle IoT. So while the benefits of an IoT-empowered supply chain might loom large, namely hyper-granular visibility and revolutionary business models, many businesses won’t be able to make use of them without laying the data groundwork first. To those businesses who are not organized around data, let the potential fruits of IoT become a call to action to modernize now, instead of later, when it will be too late to catch up.

Hyper-Granular Visibility

Supply chain visibility is a concept often talked about, but poorly understood. End-to-end supply chain visibility means being able to track all parts of the supply chain process, from sourcing, to procurement, to purchase orders, financing, production, transportation, distribution, and delivery as they’re happening.

Having end-to-end visibility means that a business has the ability to see information that is generated by different partners—such as factories, ocean carriers, or banks—in one place (an information hub), at all times. Which also means that those business partners are able to interact with and contribute to the information hub as well. End-to-end supply chain visibility currently exists, though many companies are not connected in such a way to make use of it — many of their important supply chain transactions still occur through a combination of poorly-trackable internal enterprise systems, faxes, emails, and phone calls.

IoT will supercharge the end-to-end visibility that’s currently available today. By placing smart, connected sensors on items such as pallets and even individual items within a shipping container, supply chain managers will be able to get an even more accurate, real-time view of supply chain processes. They’ll be less-reliant on updates that occur when goods pass through a certain checkpoint, or a supply chain partner updates their information. Instead, the devices themselves will provide regular status updates, throughout the supply chain. As one can imagine, this will generate an enormous amount of data, much more than the large amount that exists today. Every smart device in the supply chain, from intelligent factory equipment to GPS-equipped shipping containers, will give off streams of useful real-time data. Managing that data will, again, require a very competent data infrastructure and business mindset. But the upside is huge.

Hyper-granular visibility will allow for big data science to generate powerful analytics, which can predict and prescribe actions in anticipation of upcoming needs. For instance, up-to-the second ETAs for orders can automatically determine whether an important order will be late, and recommend expediting another shipment with enough advanced notice to ensure the high-value customer is none-the-wiser.

These sorts of visibility-driven actions and decisions are what makes a supply chain agile. And in the consumer-centric business age, agility is vital. IoT will take the end-to-end supply chain visibility that exists today to a higher level. But businesses will need to have, at the very minimum, today’s current level of visibility, and the data infrastructure behind it, to benefit.
Agile, data-driven supply chains have the potential to respond to volatile conditions and do things like:

- Dynamically reroute inventory
- Consolidate and create efficient shipments
- Accommodate painless and profitable returns
- Support servicing parts on-demand
- Manufacture quick runs of short-lifecycle products
- Configure and change orders even in the middle of production
- Aggregate data across regions to predict future demand accurately

IoT will make each one of those actions smoother and easier. But it will also act as a digital disruptor – upending business models through intelligence and automation.

Smart Machines, Smart Production

Picture a sudden order change coming into a factory. It arrives digitally, from the buyer via a cloud-based information platform, and gets approved by the production manager. The request for changes then gets sent out from the production manager, again digitally, straight to the factory’s production equipment, which are equipped with CPUs and sensors, and are networked together. Globally, these machines talk to each other through their data platform, assess one another’s capacity, and coordinate with machines in other geographies to begin the most efficient process to produce the order change. Big data analytics take into consideration the final destination of the goods, transportation costs, delivery times, and overall profitability. Consequently, the entire system optimizes operations, and begins altering production all on its own. Any further adjustments made on the fly are updated across the entire supply chain, so that stakeholders halfway across the world immediately know their changes are happening.

FIGURE 1: The IoT enables “Smart Factories” that will optimize operations dynamically, making sudden order changes manageable.
This sort of vision is what IoT brings to industry. Another powerful use case, and one that’s highly consequential for supply chains, is asset maintenance and repair.

Already, smart airplane engines by companies like GE and Rolls Royce analyze real-time flight data and are equipped to assess whether they will need a repair in advance of the scheduled maintenance date. Catching a potential failure early can cut costs tremendously and avoid expensive downtime. Expect large-scale equipment of all kinds to be IoT-enabled and capable of doing this. Smart wind turbines, for example, could examine their own performance conditions, determine the risk of a part failing, and compare the opportunity cost of performing preemptive maintenance now versus waiting, with risk of failure, until a scheduled maintenance time. A turbine could then decide to order maintenance preemptively to avoid, what it assesses, is an unacceptably high cost of failure.

This is where the supply chain’s role comes in. If assets are able to call for maintenance all on their own, it naturally follows that getting replacement parts to the asset also needs to be a seamless process. Spare parts supply chains will need to be able to fulfill the new demand created by IoT-equipped smart machines. The best way they can do this is to be connected. It’s only natural that a machine which schedules its own maintenance would also order its own parts. Supply chain managers will need to make sure their entire network is flexible enough to support the processes of servicing and replacing parts on-demand, at will, wherever in the world, instead of at predestined times and places. And again, this is how the information hub becomes the most important link between all these parts of the supply chain.

Production changes and asset maintenance are just the beginning of IoT’s revolutionary potential though. These forms of automation, and the big data decision-making that comes with them, will have an even more visionary effect: turning asset-producing companies into service companies. This will unleash innovative new revenue streams previously unimaginable in the pre-IoT age.

From Products to Data-Driven Services: IoT and Revolutionary Business Models

IoT will change the way businesses work. But, far more importantly, it will change what businesses are.

A company like General Electric (GE) used to only make stand-alone physical engineering equipment like MRI machines, airplane engines, and oil drills. It sold them, and sold support contracts for them. Now, GE has pushed its IoT initiative, the Industrial Internet, to sell outcomes-based services to its clients, guaranteeing that GE’s smart machines and big data analytics—delivered through its own cloud information platform—will provide specific, measurable efficiencies. GE has evolved from being more than just a physical asset company. It’s now a data company2.

Likewise, Domino’s reinvented itself in recent years via information technology, creating a sophisticated online and mobile ordering service that included features like a 3-D pizza builder, a Pizza Tracker, games, and pizza profiles for customers. The single biggest department at Domino’s headquarters is now its IT department3.
Companies need to realize that they are entering an era where the classic divisions between business roles are breaking down. A car company making sensor-equipped vehicles that learn drivers’ habits and upgrade features through software is no longer just in the car business, it’s in the digital transportation business.

According to the Harvard Business Review (HBR), data aggregation and analytics will create many such second-order effects beyond just improving processes; they will generate new options for revenue that cut across industries. By doing so, IoT will also cause inter-business relationships to change. Companies previously in different sectors might find themselves suddenly overlapping and competing with one another. Long-time competitors might need to cooperate to share and benefit from each other’s data to satisfy customer expectations. Businesses won’t compete. Ecosystems will.

The leaders that thrive in this new era of digital business will be the ones who understand that they need swift, responsive systems and data capabilities that can fuse with vast networks of external partners. Businesses won’t differentiate themselves by how well they use their internal ERP software. They’ll stand out by how well they can wield big data to ensure the survival of the larger ecosystem upon which they depend.

Start Preparing Now for the Internet of Things

The biggest obstacle to getting ready for IoT is the old paradigm of information sharing. Companies often implement systems with their own four walls of enterprise in mind. But with 80% of supply chain data residing with trading partners, companies need to start becoming part of multi-enterprise information hubs that can break down silos, enable end-to-end visibility, and lay the big data groundwork for handling IoT information.

These information hubs have an immediate effect being centrally-located, always available, massively scalable, and secure – which can improve operations immediately, even without IoT’s hyper-granular visibility. By fostering collaboration among supply chain partners and creating strong ecosystems, the information network approach can put businesses in a position where they can collectively take chances and explore new business opportunities. And when companies start to implement IoT projects, they can deploy them gradually, in meaningful ways that make the most out of the investment.

If companies are excited by the transformative potential of IoT, they need to understand that hardwired work streams, business silos, and hodgepodges of information won’t be compatible with IoT supply chain. Upgrading existing supply chains to be ecosystem-focused and data-driven is critical.

With up to 200 billion devices on the horizon, the time to act is now.