# How Industrial IOT is Disrupting Supply Chain?

A case study at UMSL

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**Introduction:**

As the competition in the open market grew day by day, the industries needed a better way to optimize their processes and existing systems were inadequate. Parallel to this, the Information Technology (IT) sector was advancing at a breakneck pace. With powerful hardware and software availability, disruptive ideas came to fruition.
Decisions made with instincts and gut feel were mostly less effective. So, many organizations around the globe started following the data centric and data driven approach. The organizations which followed the data centric approach started deploying data science and analytical teams to achieve success in businesses.
That's when the people with a goal to improve efficiency and results came together and designed machines and specialized sensors to collect data at every step of the process. This face of IOT is widely known as the Industrial Internet of Things or IIOT.

IIOT has made some serious impact in Manufacturing, Logistics, Agriculture, Mining, Oil and Utilities. To understand what IIOT is, how it is disrupting supply chain and why there is a lot written about the IIOT, we need to look at the technologies that are used in building it and look at how all these can fit together to solve a novel problem.

Typically, an IIOT system is built with a combination of:

1. Sensors – devices that sense the change in electrical signal from a physical device. Recently, these devices have become smaller, inexpensive and robust enough to detect minute changes.

2. Networks – A mechanism for communicating electronic signals. Recently, wireless technologies have evolved capable enough to deliver huge volumes of data.

3. Standards – Technical standards can help systems process the data and allow for interoperability of aggregated data sets.

4. Analytics and BI – Analytical tools that improve the ability to describe, predict and exploit relationships among phenomena.

5. M2M communications – Technologies and techniques that improve compliance with prescribed action.

## Analysis:

In 20th century, the third industrial revolution appeared with the emergence of computers and the beginnings of automation, when robots and machines began to replace human workers on the assembly lines.

And now, here we are in the fourth industrial revolution called “Industry 4.0” which is the next phase in the digitization of the manufacturing industry. The four important factors that drive Industry 4.0 are:

- Staggering rise in data volumes, computational power and connectivity.
- Evolution of advanced analytics and machine learning capabilities.
- Emergence of new technologies such as touch interfaces and augmented-reality systems that enable the interaction between humans and machines.
- Improvements in transferring digital instructions to the physical world, such as 3-d printing and advanced robotics.

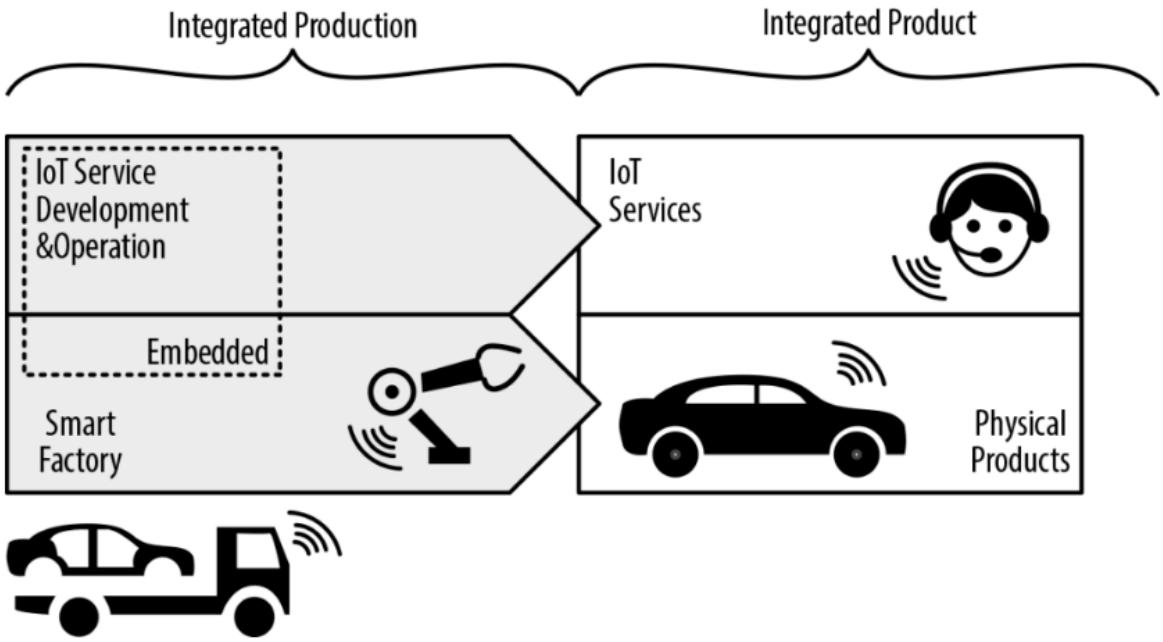
Industry 4.0 is rapidly shifting manufacturing from isolated, optimized cells of business processes, systems, and resources to fully integrated data and product flows across corporate borders.

Therefore, manufacturing companies have to build up capabilities in IOT service development and operations. Put differently, the achievement of “integrated production for integrated products”. This is what we call the disruption in Supply Chain Management.

The Internet of Things will ultimately become as fundamental as the Internet itself, with lots of opportunities and trials along the way as IOT sensors can provide far more accurate readings than humans can manage alone.

When I think of Supply Chain, I think of IIOT which gives us the ability to experience the transparency in businesses and much more.

Indeed, the IOT is set to revolutionize the supply chain with both operational efficiencies and revenue opportunities. In this revolutionary age, where markets are immensely improving day by day, the supply chain management is not just a way to keep track of our products alone, but also a way to gain insights on our competitors and build our own brands.



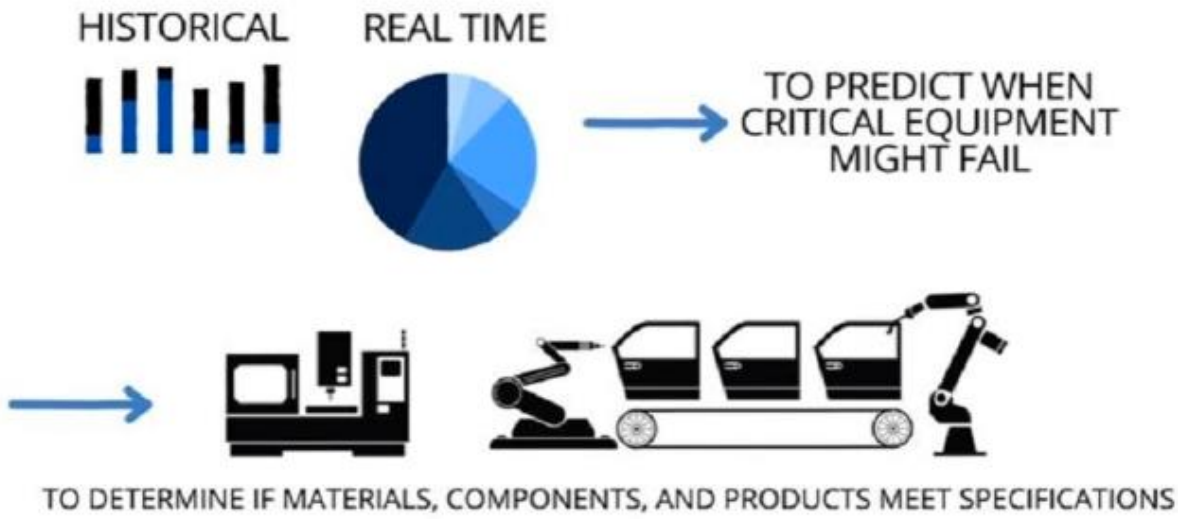

Accuracy in forecasts, understanding the demand patterns, tracking and tracing products, improving performance in transportation, analysing product returns, asset utilization, predictive maintenance and building smart cities are a few use cases where IIOT and supply chain management coincide in closing the knowledge gaps.

To understand the advancement and changes in the market, let's see a few practical use cases where the supply chain management is being reinvented with Industrial IOT.

1. **Utilizing sensors in manufacturing sectors to gather asset health data:**

The information gathered from a variety of sensors is analysed to perform predictive analytics for condition based and preventive maintenance and predicting potential asset downtime.

In manufacturing industry where machine maintenance is one of the biggest challenges, with calendar based routine maintenance activities leading to expensive machine downtime, failure in meeting demands and so on, the IT and OT integrates as IIOT to provide predictive insights which helps in monitoring, assimilating and analysing the information gathered from valuable assets to draw inferences such as predicting the possible downtime of the monitored assets, which in turn sets an opportunity to fix it and avoid failure. This is how supply chain management streamlines the manufacturing process, because they get to be well organized and would never miss deadlines.




## 2. Fleet Management

Trucking and transport is a $700 billion industry. Just like cities are using data to get to emergencies quicker or clear up traffic issues, manufacturers are using data to get better products to their customers, faster .Start-ups and corporations have started disrupting the industry with autonomous vehicles and IOT technologies. With the right IOT enabled fleet management tools the trucking industry can save fuel (by optimizing route), Avoid Accidents and improve operational insights through ML and AI.

For example, intelligent pairing of platooning trucks (based on location and route) with Vehicle to Vehicle communication can let trucks have coordinated braking and acceleration thus saving fuel (by reducing air drag) and improving safety. Continuous monitoring and tracking can improve operational efficiency by casting a light on inefficient route/behaviour or even time and weather.

## 3. Asset Tracking

The goal of asset tracking is to easily locate and monitor key assets. By tracking assets, industries can optimize logistics, maintain inventory levels, detect inefficiencies or even theft.

Industries like Maritime shipping rely heavily on tracking assets. Specific real-time data like temperature of individual cargo can help shipping industry save a ton of money.

Discrete manufacturing industries with distributed assets can leverage IOT to track, monitor and control assets. For example, An IOT enabled windmill farm can sense the change in wind speed, direction and temperature and align individual mills in certain directions and configurations for efficient power generation.

The data obtained through asset tracking is also important because it allows companies to tweak their own production schedules, as well as recognize sub-par vendor relationships that may be costing them money.

## 4. Save food and prevent scarcity:

Vegetables, fruits, grains, meats, dairy and other agricultural products are especially susceptible to delays, temperature variations and other environmental factors as they travel from farms through processing and distribution centers to supermarkets, restaurants and other destinations. By utilizing sensors to create digital endpoints across each supply chain element can produce data about product inventories, shipment locations, ambient temperatures, retail purchase rates and dozens of other variables. By analysing that data, organizations can automatically restock inventories, predict product arrival times and potential delays, warn about spoilage or other quality control issues, and react instantly to changes in demand.
The IOT enabled solutions are also making way to the “farm-to-fork” supply chain.

## 5. Other use cases:

a. **Disaster Management**: Data-driven decisions for local governments to track anomalies prior to natural disasters using location based sensors.
b. **Block-chain in IOT**: Block-chain is based on 5 main principles like Distributed database, transparency, Peer to Peer transmission, Irreversibility of records and computational logic. By implementing block-chain principles in IOT, Industries can

improve workflows, increase safety and visibility, Trustable History/Records and Improve asset lifecycle

c. **Optimizing and streamlining healthcare supply chain:** In the healthcare sector, using IOT to collect and analyse the data collected from connected objects can be used to improve processes and care. The benefits directly accrue to the bottom line, and most importantly, result in an enhanced quality of care and can bring down costs.

d. **Oil and Gas:** A leading provider of machine controllers and sensors, is using IOT to transform its processes for moving oil and other hydrocarbons from remote extraction sites through refineries and ultimately to gas station pumps by feeding all kinds of data from IOT devices across the supply chain into cloud to achieve various benefits.

## Conclusion.

There is a huge list of benefits and a new industrial revolution with IIOT being paired to supply chain management. The process of driving operational efficiencies through automation, connectivity and analytics is easily achieved when IT and OT are integrated with each other.
IIOT is here to grow as advanced supply chain analytics is critically important in any manufacturing sector. The industry experts say "those companies that reject industry 4.0 technology will probably be at distinct competitive disadvantage ten years down the line."

The IIOT offers immense potential to organizations in improving operations efficiency, worker safety, reduce costs, and transform the revenue model. It may be in its infancy, but many organizations have already begun to reap the returns of their investments. Managers can choose to experiment at a small scale or wait for a while, but they certainly cannot afford to ignore IIOT. It is most likely the next business revolution after the Internet. The only negative part of this is the security issues. Many experts are working towards achieving success in handling security issues will probably be fixed very soon and then there is not stop for IIOT.

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