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TAKING A LOOK INTO SUPPLY CHAIN'S CRYSTAL BALL

New Technologies That Will Fundamentally Change the Industry
PART 1

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Introduction

Supply chain and logistics are fields that are making rapid advancements. Established companies and startups, alike, must capitalize on the opportunities these new technologies offer. As a result, eft wanted to shed some light on the developments across the different functions of our industry.

This report, divided into three separate sections, features technologies being implemented by early adopters, technology in development, and even technologies that are mostly theoretical. We also highlight specific companies working on the cutting-edge and individual success stories within particular industries. With this knowledge, we hope our readership will not only be prepared to take full advantage of the changes coming but will be those leading the innovative charge.

Section overview

The first section of this series will be focused on technologies that are 'on the cusp'. By this we mean, innovations that are being heavily tested, deployed into actual operations, and are expected to make impacts within the next five years. Though this list is far from comprehensive, the main focus of the "**Technologies on the Cusp**" section will be self-driving vehicles, warehouse innovation, and drones. To provide the full picture, we will describe the basis of the technology, describe the potential benefits arising from it, and highlight companies making the technology a reality.

The second section, "**Emerging Technologies**", will cover innovations that some may have heard of, but whose supply chain application and potential are widely unknown. The two main highlights of this section are Hyperloop and the Internet of Things. The Hyperloop is an ultra-fast, low friction transportation method that is able to transport goods and people at up to 760 mph / 1200 km/h. The Internet of Things we're talking about here isn't your grand dad's RFID inventory method; it is full-scale end-to-end visibility with machine learning and automated problem solving to boot. For Hyperloop, we will explain the basis of the technology as well as the benefits of the technology, especially in how it relates to the supply chain. Meanwhile, for the Internet of Things, we will show where we are today, what steps we have to take to reach its full potential, and what that potential is.

Tangential, to "Emerging Technologies", the "**Supply Chain's Laboratory**" section will briefly highlight different technologies that promise great advancement for the supply chain but are considered long-term plays that have are technologically infeasible currently or have not had that much interest from the supply chain community. In this, we will cover the biggest benefits and barriers to additive manufacturing, droids, and a 'loop' underground network and also a brief analysis on what could be done to make them mainstream.

Contents

Technologies on the Cusp

This section on "Technologies on the Cusp" is part one of our three-part series. This week, we're covering innovations that you can expect to make a significant impact within the next five years.

Self-driving vehicles, warehouse innovation, and drones have created a lot of buzz, quite literally for some – we're talking to you drones. In the quickly evolving world of logistics and supply chain operations, these technologies promise to dramatically change the way businesses operate and interact with customers. Here are a few macro trends to look out for as self-driving vehicles, warehouse innovations, and drones become mainstream.

A general overview of how the industry could change:

Capacity, lack of drivers, and labor shortage problems will be minimized. The problems will fundamentally change.

80% of parcels will be carried by autonomous vehicles
Source: McKinsey 2016

52% of transportation and storage tasks can be automated
Source: PwC 2018

Human involvement will focus on high-skilled tasks.
- Job growth will occur in functions like: forecasting, programming, customer retention, cyber security, and in providing a better customer experience
- New processes and careers will be discovered, further increasing job growth and the efficacy of the supply chain
- In trucking, docking and other complex tasks will still be needed, especially initially as technology and regulation are progressing

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With less human error and better tracking abilities, predictability will increase to the advantage of both shippers and consumers.

Expect larger short-term investment, but higher long-term profits.
- Autonomous vehicles, robotics, etc. will be cheaper to operate – require bigger upfront investment
- Less labor will be required to operate, but the high-skilled workers required to operate new technologies will be more expensive

HR, with comparatively fewer employees and lower overall turnover, can shift from an emphasis on recruitment to a focus on development and retention of key employees.

Unknown challenges will arise, as we have never experienced a supply chain with this level of automation.
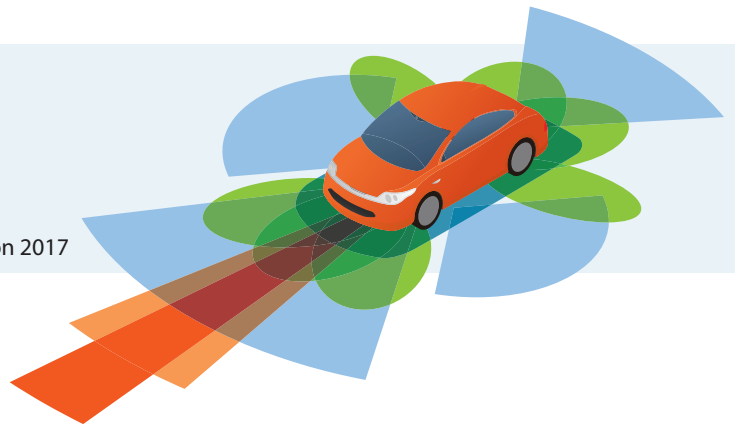
Self-Driving Vehicles

With many industry leaders promising fully autonomous vehicles on the road by 2020 or before, the disruption, or perhaps advancement, of the supply chain is imminent. Beyond the obvious reduction in costs, let's take a look at what autonomous vehicles mean for the industry.

TODAY'S PROBLEM

50,000
driver shortage in 2017
Source: American Trucking Association 2017

Potential Improvements:

The People

Nights and holidays will be less of a restriction on supply chains.

Despite recent accidents, self-driving vehicles will increase safety.
- Worldwide, 1.25 million people die per year in road accidents – Only 3 have died in total from self-driving vehicles (with over 1 billion miles driven)
  Source: WHO 2014 and Medium 2018

Drivers' lives could be vastly improved with the creation of "trucker hotspots" where drivers congregate to make last leg of journey and complete difficult tasks such as docking.
- This would result in more time home and better working conditions for drivers

Increased ride sharing, public transportation, and inter-vehicle communication could make congestion even less of an issue when transporting goods.

Convoys

Autonomous semi-trucks will be able to form convoys, increasing efficiency and decreasing the environmental impact of the logistics industry.
- One driver could be responsible for one convoy (3+ vehicles – driver in lead), cutting the amount of labor needed and raising wages for drivers

Tesla Semis, if estimates hold, would be more cost competitive than rail transport at just $0.85 per mile and will pay for themselves in just 1.5 years.
Source: USA Today 2017 and DHL 2018

Overall, convoys, non-commercial platooning, and a reduction in congestion could mean 273% greater capacity on roadways and up to $121 billion recovered in lost fuel and productivity, yearly.
Source: Lécué, et. al. and Tientrakool, et. al. 2016

But there are still questions…

Who is responsible for the, albeit less common, accidents?
- Car company, software company, driver, pedestrian, insurance

Who/what will the software of vehicles prioritize?
- Pedestrians, driver, structures, multiple people

Policy decisions will be made to allow and regulate autonomous vehicles. What will they be and how will they affect the progress of the industry?

How will roadways change?
- Truck-only lanes, autonomous vehicle optimized highways, smaller roads (due to less margin of error/closer proximity vehicles can maintain)

Because of better fuel efficiency, will fuel taxes increase? Will this include electric vehicles?

With fewer drivers needed, how do we avoid widespread unemployment?

And who are the Players?

Warehouse Innovation

For warehouse technologies, the future is already here.
Warehouse technology, unlike many other new developments, is already in use in several locations across the world. Let's take a look at the benefits, challenges, and some of today's success stories.

Think what you can do for your warehouse?
I don't think so, JFK, think what your warehouse can do for you.

Automated warehouses are able to work around the clock. Very little, if any down time.

Drones and robotic inventory tracking is quicker, reduces error, and is safer for staff.

Robotics can actually decrease overhead costs.
■ Most technologies don't need lights, air conditioning, etc. to function

Turnover is a non-issue for the technology and will increase standard of work for employees working alongside.

- Employees will have safer and more engaging technology-assisted work

Reaching the Moon wasn't an easy, straight-forward process. Implementing these technologies won't be either.

Finding the right balance of people and automation for different applications will be trial and error. There isn't a one-size-fits-all approach – expect growing pains.

There are many different technologies and approaches to automating a warehouse. Finding the right solution is largely theoretical.

Hiring people with the skills to program, fix, and improve the technology in your warehouse will mean an increase in cost and possibly a shortage of qualified individuals, especially short term.

Again, unemployment. Most people are concerned that warehouse automation will take jobs.

Something to think about

Rethink how you calculate RoI on an investment like this. Traditionally warehousing and inventory have been looked at as a cost center, and rightfully so, but with that, improvement has typically focused on minimizing costs. Not only do we need to improve the technological advancement of our warehouse, but we need to update our thought process also. When considering RoI on implementing technology, don't only look at the investment as cost and recovery of cost, but think of how this creates value for your customers, how you improve the productivity of your employees, what impact does it have on your culture and public image, will embracing technology give an advantage over competitors, and so on. Explicit costs and benefits are just one part of the equation. Finding a way to quantify the non-obvious factors is perhaps even more important.
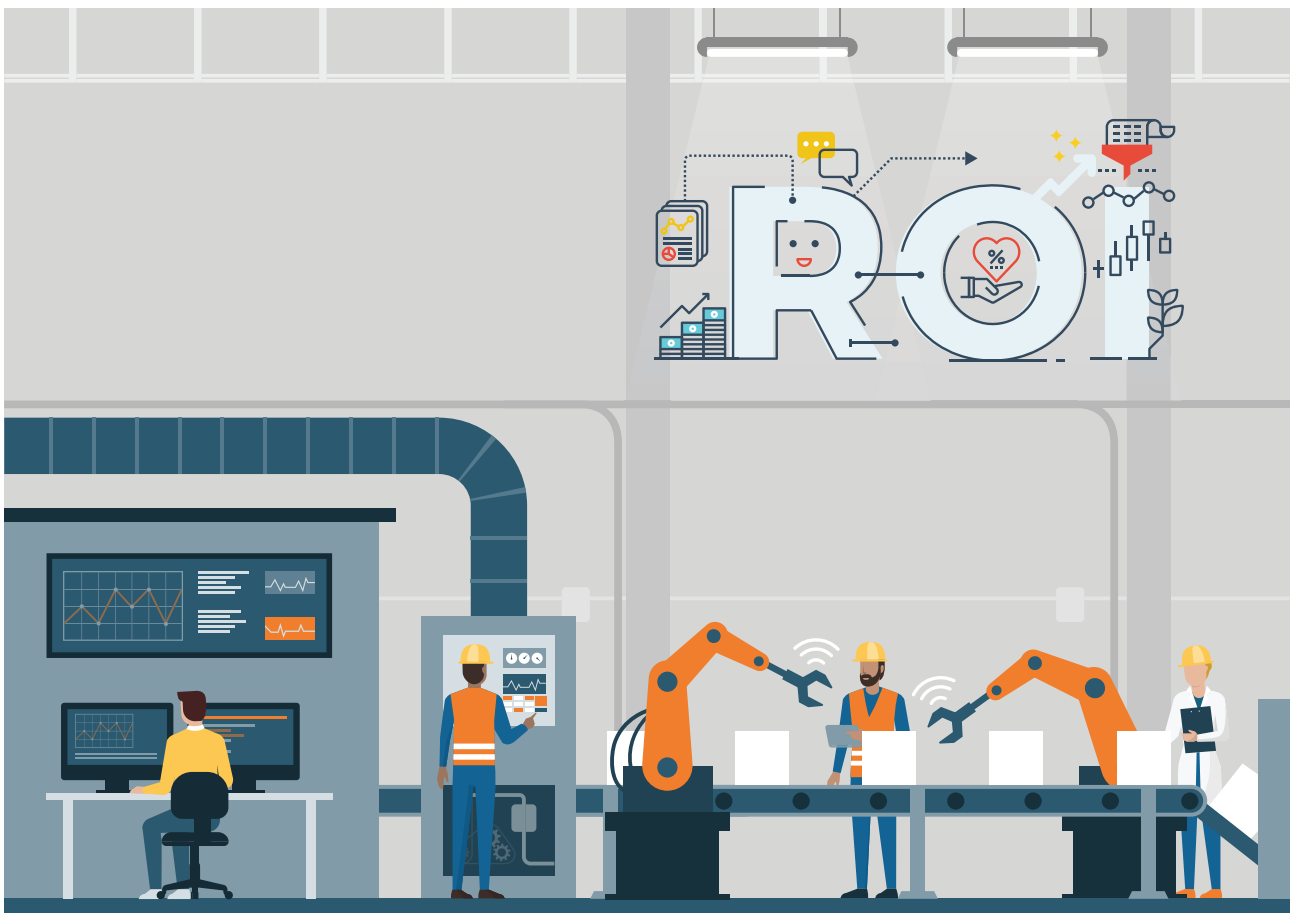
Success Stories

Ocado

Ocado is using an innovative approach to fulfill online orders for groceries. In its new facility, it employs a team of hanging robots and containers within feet of the ceiling. This method allows Ocado to move over 1.7 million items a day across its four fulfillment centers. Because of this, Ocado maintains margins of 12% compared with the industry average of less than 6%.

Source: Forbes 2017

FLEXE

A U.S. startup labeled the AirBnB of warehousing, FLEXE certainly has earned the title. By facilitating peer-to-peer warehouse sharing, companies operating outside of peak season may rent their excess capacity while giving smaller companies a vast network without the industry standard 5-year contract. This is very much a win-win. Smaller companies are able to fulfill orders in as little as one day and grow their footprint in real-time, while warehouse owners avoid seasonal hiring and cover overhead costs. FLEXE currently has over 900 partner warehouses. To give that context, Amazon has 140 (full size) fulfillment centers in the US.
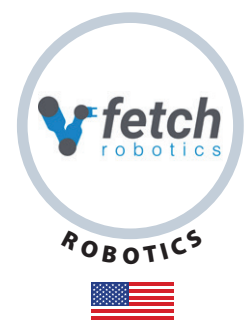
Source: Business Insider 2017

Exotec Solutions

Another startup in the warehousing business, Exotec Solutions recently released its Skypod shelf-climbing robot. This unique ability allows the technology to work 3-dimensionally and reportedly doubles similar competitors' output. Romain Moulin, CEO, prioritizes deployment speed and flexible capacity rather than heavy, fixed infrastructure. This is certainly the case, as Skypods are charged and capacity can be added all without interrupting existing operations.

Others to Watch

Alibaba.com — QUIKTRON — ROBOTICS (China flag)

DHL — UBiMAX — AUGMENTED REALITY (Germany flag)

amazon — ROBOTICS (US flag)

ZEBRA — SPEECH PICKING (US flag)

fetch robotics — ROBOTICS (US flag)

Drones (Unmanned Aerial Vehicles)

No longer a toy or the stuff of science fiction, drones have a chance to revolutionize the most expensive part of the supply chain: last-mile delivery. Drone-makers look to decrease cost, time, and environmental impact, but are being challenged by regulations and oversight adapting to this new branch of aeronautics. The time may have come when the park or Back to the Future won't be the only time we see this budding technology. Next stop: your doorstep.

50% or more of the of the total cost of the logistics journey is from last-mile delivery.
McKinsey & Co.

Best Uses:

Due to their flexibility and lack of required infrastructure, drones are the optimal vehicle to deliver parcels to the end consumer.
86% of Amazon packages weigh <5 lbs
Source: Business Insider 2016

Smaller vehicles mean reduced fuel costs.
Fuel costs could be as low as $0.88 per delivery.
Source: ARK Invest 2016

Drones can, on average, fly about 10-15 miles, well within the distance of most Walmarts.
70% of Americans live within 5 miles of Walmart, 90% within 15 miles
Source: The Motley Fool 2017

The United States being an extreme example of distance needing to be covered, drones could work even better in smaller countries.

According to McKinsey, drones are particularly attractive in rural areas (less wires/obstructions).

■ However, as the case is for all aeronautics, weather is an issue.

Companies today have had success deploying drones in warehouses and performing maintenance work, increasing inventory visibility, safety, and speed in daily operations.

The Playbook:

How drones deliver packages

The Fisherman:
Drone releases cord that sets package on ground

PROJECT WING

GOOGLE - FISHERMAN

FLIRTEY

FISHERMAN

Sticking the Landing:
Drone sets package directly on ground

AMAZON AIR

STICKING THE LANDING

DHL

STICKING THE LANDING

The Wingman:
Trucks act as distribution center from which drones take packages

MATTERNET-MERCEDEZ

THE WINGMAN

WORKHORSE

ut works a WORKHORSE

THE WINGMAN