

How Technology is Reshaping the Modern Supply Chain



C3 Solutions

WHITE
PAPER

By

Gregory Braun

Senior Vice-President, Sales & Marketing

C3 Solutions

In Brief

It's no secret that tech innovations have become key to the evolution of business processes. Whether born of necessity, to fill a niche need, or developed as a blue-sky invention that business adopts, new technologies power much of the growth and development we see in supply chain operations.

But early adoption of new technologies, until very recently, was the preserve of the large, well-capitalized corporation. Tech investments used to be major projects, time-consuming and expensive, requiring the assets and human resources capabilities of big players that needed to leverage big investments in order to compete.

Think about the early adoption of mobile scanners by the large last-mile couriers—in 1985 FedEx developed tracking and equipped its drivers with handheld scanners, enabling real time package tracking. P&G introduced continuous replenishment in 1987, thanks to mainframe software from IBM.

ERP software was introduced in the 1990s, as the preserve of big enterprise, motivated by the recognition that the data in various parts of a business could be linked together to help deliver better bottom line results, but also out of fear of the Y2K crisis.

However, although these all began as the preserve of the massive, many of these and other supply chain technologies have since evolved into more scalable and affordable options for businesses across the spectrum—from the truly small to the massive enterprise. As they mature, the cost of entry has declined, making many technologies accessible to all businesses. It is said that, thanks to these developments, supply chains are on the cusp of a digital revolution. But as outlined by Georgia Tech, which is a leader in supply chain education notes: "Since the 1980s, computer technology has advanced at such a phenomenal rate that it is currently far ahead of the ability of the supply and logistics field to adequately utilize the new technologies." [1]

So, as the pace of adoption continues to accelerate, there is still plenty of opportunity for technologies to be adapted to supply chain operations. At the moment, there are several that are quickly gaining traction.

This paper is going to explore the current influence of mobile technology, Software as a Service (SaaS), big data, and web APIs. These four have come a long way recently and continue to evolve rapidly. We're going to take a look at where they are now and where they might be headed.

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Mobility

From the first use of mobile scanners on delivery trucks back in the 1980s, the potential for mobile devices has long been recognized as a boon for supply chain operations.

Numerous factors contribute to this utility. First, the need for communications between widely dispersed and moving members of the supply chain—drivers, dispatch and destination, for example—meant adopting mobility was an obvious advantage. Suddenly, disparate parts of the supply chain network could communicate instantly, and not just by voice—wireless data transmission was a huge advancement. But it has been the advent of personal handhelds—smartphone and tablets—that has really increased the viability of mobile tech options for supply chain operations.

As the devices proliferate to the point of ubiquity and become ever-more sophisticated, the barriers to entry continue to fall. Prices are dropping and because nearly everyone has one, businesses can take advantage of “bring your own device” (BYOD) options for some applications, further decreasing the cost, and even shifting it from capital to operating budgets. And, as we noted in our Whitepaper, [“The Internet of Things and the Modern Supply Chain”](#), the average smartphone is a truly powerful tool. An Apple iPhone 5 has 2.7 times the processing capacity of the 1985 Cray-2 supercomputer, the gold standard of the time.

With this kind of power at users’ fingertips, it’s no wonder that new avenues for mobile technology continue to open.

According to The 2016 MHI Annual Industry Report, [2] 36 percent of respondents said these technologies had the potential to either provide competitive advantage or disrupt supply chains.

While current adoption rate of mobile technologies in supply chains is 26 percent, it is expected to surge to 75 percent over the next six to 10 years.

Increasing competition, the need for speed in the e-commerce environment, the growing drive to use available data to better analyze trends and operations efficiency are also contributing to the demand for mobile solutions that provide more than just immediate communications.

The combined data that is gained from the application, device and user contribute to more informed and faster decision making.

There are a few considerations, however that organizations need to consider before jumping into a mobile strategy. Managing security, especially with employees’ own devices, can be a challenge. There are also potential dangers in a piecemeal approach to apps that, far from bringing data into one big useful pool for analysis, can end up creating data silos. Caution also needs to be exercised in selecting apps that are tailored to supply chain by experienced providers.

Some of the most popular and successful application areas for mobile technologies in logistics at present, according to recent research, are navigation and routing using GPS, dispatch management and dock scheduling, parcel tracking, proof of delivery, telematics and customer service. Growing areas include fleet management and yard management. [3]

Looking at [yard management](#) provides an example of how using mobile technology can pay off. By using an application on a device that most drivers have already, a mobile YMS can reduce costs, speed up operations and simplify processes.

Payoffs for mobile adoption can be measured in improved productivity, reduced operating costs, improved customer loyalty, faster decision-making, better collaboration between staff and departments and an enhanced bottom line. [4]

While mobile applications have not yet become the mainstream for supply chain, they are rapidly gaining traction. The benefits they convey in terms of immediacy and building collaborative networks within supply chains cannot be discounted.

According to some analysts, mobility is “morphing into the backbone of IT infrastructure” for many in the supply chain, [5] and will only continue to grow in popularity.

SaaS

Software-as-a-service or SaaS (also known as cloud-based software), like mobile technology, has been around for a while. But like mobile supply chain apps, cloud computing is still immature and has yet to truly develop its potential.

SaaS offers numerous benefits for companies occupying the sweet spot where it makes sense. (To find out where that sweet spot is, read our blog: "[SaaS vs Licensed Software: Factors to Consider in your Cost Analysis](#)".) It affords a lower cost of acquisition, with monthly fees instead of capital costs. SaaS offerings are kept up to date by the provider, and are also secured by the provider.

SaaS is gaining in acceptance because it is also native to the increasingly digital nature of supply chain. In conjunction with the connectivity of the Internet of Things, cloud-based apps help to bring the data together for analysis.

Cloud technology is also permitting greater integration of different platforms through the use of standardized protocols. This contributes as well to reduced IT costs, as you can refocus personnel to other areas when you outsource to a SaaS provider. The cost savings in this area have been quantified: In a recent study it was shown that:

"costs for IT resources were 16 percent in a SaaS model, while for licensed software 41 percent of the cost was allocated to in-house IT resources". [6]

SaaS apps are easily scaled to your business needs, and create opportunities for collaboration across your business and with clients and suppliers. Cloud-based systems also work across geographical and international boundaries, effectively shortening supply chains by bringing far-flung parties digitally closer together. Collaboration is a highly valued feature of SaaS, according to a recent SCM World study. In fact, 94 percent of respondents believe that more collaboration equates to problems being solved more quickly. [7]

Possibly the greatest benefit of SaaS applications is that it will allow smaller companies to gain access to types of software that were previously beyond their reach for reasons of cost.

SaaS erodes the leverage that larger enterprises once had with their big IT departments and provides cushion to cope with peaks and valleys in demand. With SaaS all companies have the potential to get software that was previously only available to the large.

In *The 2016 MHI Annual Industry Report*, over 70 percent of the respondents said SaaS is having some impact on operations. Forty-five percent claim to be using the cloud already, while another 22 percent expect they will adopt SaaS within the next couple of years. Overall, adoption rates of cloud computing are anticipated to achieve 86 percent in the next six to 10 years. [8]

While adoption of SaaS solutions is not yet widespread in the supply chain, it is being touted as an almost inevitable solution. Oracle's CEO recently said he thinks that by 2025 fully 80 percent of all applications will be cloud-based. [9]



Big Data

Big data is not new. What's different now is the velocity, the volume and the availability of analytical tools to use it.

The Internet of Things is widely identified as one of the main sources of the supply chain data that's now available for analysis. But even before it was highlighted, there was plenty of information available, coming in from sources such as ERP systems, and more recently the data coming in from GPS devices being used for last mile deliveries, and other applications.

Big data includes discrete bits of information about items, locations, movements, usage and demand. Being able to extract actionable analysis from that requires extremely advanced algorithms and computing power—these are the new parts of the equation. New technologies are able to interpret data from disparate systems— ERP, pricing and competitive intelligence systems, for example—bring it together and turn a spotlight on previously dark corners of business operations.

When these techniques are deployed consistently, organizations stand to benefit. A recent study by Accenture noted:

“companies that embed analytics in their operations have faster and more effective reaction time to supply chain issues than those that use big data analytics on an ad-hoc basis (47 percent versus 18 percent).” ^[10]

At the moment, properly analyzed big data can be used to optimize distribution, logistics, and production networks. Demand forecasting is another important area the data can illuminate, helping to create more accurate predictions, and uncovering demand patterns that previously would have been unknown. Furthermore, information collected from products in use can be used to improve uptime, anticipate when maintenance is required and even improve customer service. [11]

Risk mitigation and chain of custody are also enhanced by data analytics, potentially streamlining processes around product tracing and recalls, which are increasingly important for both food and pharma supply chains. All of these benefits contribute to creating more efficient supply chain networks, with lower inventories, faster turns, better throughputs and ultimately superior bottom line results. Good demand forecasting can cut 20 to 30 percent from inventories and ultimately deliver a couple percentage points in profit. [12]

Utilizing big data analytics in operations can improve reaction time to supply chain issues (41 percent) and can lead to a 4.25-times improvement in order-to-cycle delivery times, according to Accenture. [13]

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“Although the adoption rate in supply chains stands at just 22 percent, according to the report, it is expected to grow to 80 percent over the next six to 10 years.”

Similarly, 64 percent of supply chain executives surveyed in an SCM World study consider big data analytics a disruptive and important technology, that will “set the foundation for long-term change management in their organizations.” [14]

The key for managers in this is to not be deterred by the impression that big data requires a big corporation to use it. MHI proffers this advice: “Options could range from simple spreadsheets to complex visualization layers. A key is to start with something small enough to be achievable, yet big enough to matter – and then iterate and improve from there.” [15]



Web APIs

APIs (Application Programming Interfaces) enable communications between different apps. Together with the connections between them they've been described as "the plumbing of the Internet of Things", as well as the EDI of the 21st century. ^[16]

What does this mean for supply chain? Essentially, they speed up and streamline communications. They also are the enablers for all the other tech innovations we've mentioned in this paper.

APIs are used in SaaS applications; sensor-interpreting software uses them; contextually based mobile apps rely on them; and the data that goes into the big-data crunching systems gets there through APIs. Estimates say that about 24 percent of web apps and 15 percent of mobile apps are taking advantage of APIs.

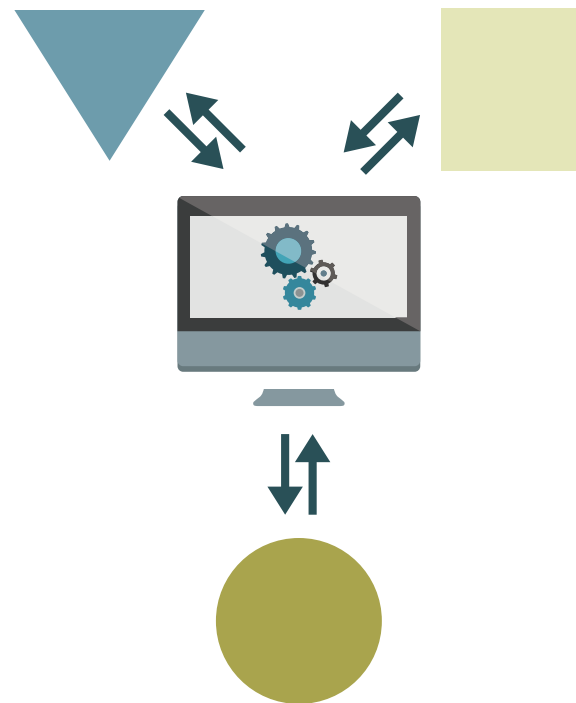
And by the end of 2018, these numbers are expected to climb to 80 percent. ^[17]

A current example of how APIs can help is seen in a recent crackdown by retail giant Target on its suppliers. In an attempt to curb stockouts, the company reduced the delivery window for shipments to distribution centres from two to 12 days down to one day. They also announced plans to increase penalties for deliveries that didn't arrive in the scheduled window.

Target's suppliers now have a communications problem if they are still using EDI to transact business with the retailer. EDI bundles information and sends it in packets at timed intervals. The information is captured and forwarded without confirmation. This can result in delays of between 30 minutes and four hours. ^[18]

This means that companies using EDI can be four hours out of date in responding to orders, and when there is a one-day window for delivery, that's just not acceptable. APIs and webservice can solve the problem with instantaneous communication.

As APIs come to the fore as a tool enabling the revolution in supply chain technology, it will be important to ensure your organization is onboard. They "unlock data, increase agility, encourage innovation and speed time-to-value", making them a crucial piece of the coming IT toolkit for successful supply chain management. ^[19]



The Future

Where is all this going to take us? While we see increasing adoption predicted for all the technologies explored here, that information on its own shows only a tiny sliver of the looming iceberg that technological change currently represents.

While we don't want to invoke apocalyptic scenarios, there is a danger that those who are not on the lookout will run afoul of that tech juggernaut in a Titanic manner.

Strategic and tactical employment of these new technologies can result in significant supply chain optimization. Increased visibility, better cost control, better integration within and across businesses, improved planning of demand and networks, better tracking and regulatory compliance — these are just some of the many advantages that can accrue through the adoption of some or all these innovations.

And there's more to come. Supply chain 2.0, disruptive technology, the always-on supply chain—these are themes that are occupying the top supply chain analysts these days.

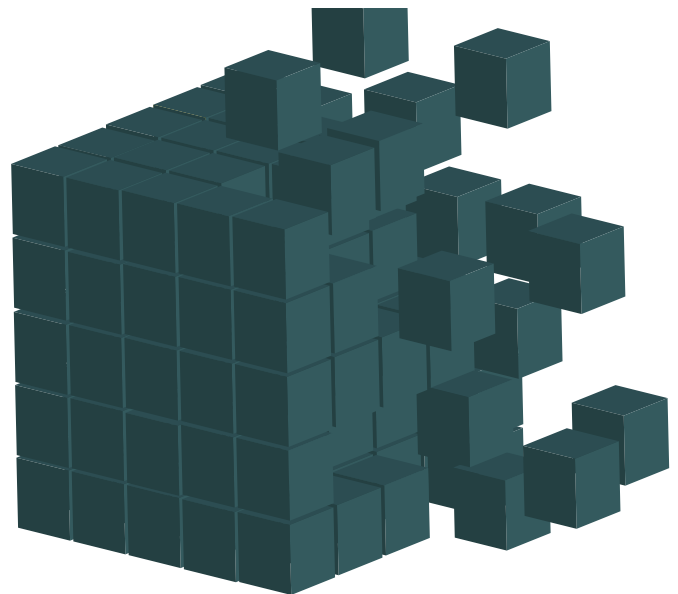
What will it mean for the supply chain manager trying to stay on top of trends?

Keep looking for the technology that will offer competitive advantage in your sector. That may not always mean the most recent, or the most expensive; it will depend on the task that needs to be accomplished. That much hasn't changed.

But what has changed—and will continue to change—is the environment in which you operate.

A few years ago we laughed at drones, wearable tech in the warehouse was a goofy fad, and autonomous vehicles were sci-fi. Now autonomous truck platoons have been proved in Europe with a recently successful cross-continental trip, wearables are being used successfully in DC operations and drones are delivering packages.

Next up is artificial intelligence. Hopefully it will be smart enough to help us avoid hitting the new technology iceberg lurking on the near horizon.





About C3 Solutions

C3 Solutions is an information technology company specialized in yard management (YMS) and dock scheduling (DSS) systems. Since its founding in 2000, C3 has gained the confidence of clients around the world and across many industries including retail, grocery, distribution, manufacturing and parcel post. Headquartered in Montreal (QC), Canada and privately owned, C3 is dedicated to developing, implementing and supporting the most complete yard management and appointment scheduling products on the market today.

Contact

+1 (514) 315 - 3139

email: sales@c3solutions.com



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