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NEXT MOVE

BY C3

Emerging Digital Technologies For the Retail Supply Chain

Strategic Advantage or Big Question Mark?

C3 Solutions



SOLVING FOR RETAIL

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Everybody wants a strategic advantage in today's retail supply chain. The intensity of competition, the speed with which orders arrive and must be fulfilled, and the constant pressure to innovate are motivating the development of [new technologies](#).

Digitization is one of the biggest umbrella concepts being touted at the moment. If you do any supply chain reading you'll know that digital technologies are the proposed answer to every challenge. There is a new solution for every problem.

And it's no surprise that this is where the best minds are taking innovation. We live in the digital age, and after all, it is digital commerce – e-commerce, [omnichannel retail](#) – that's driving the charge.

So, if the future is digital we thought it was time to look at some of the cutting-edge innovations that are on the market or close to fruition to help you understand the landscape and where we may be in the next few years.

We chose three technologies to discuss:

- ★ 5G
- ★ Digital Twins
- ★ Blockchain

All three are rapidly evolving and all three have demonstrable benefits for supply chain operations. These tools may not be right for your organization

yet, but understanding what they are and their level of development will be a piece of the strategic puzzle that will help you make the right moves in the retail chess game.

Our piece of that puzzle is the interface between the distribution centre and the outside world. A best of breed automated dock scheduling system from C3 Solutions ensures that you are in control of the inventory coming and going from your facility. That's a foundation piece in the retail supply chain – without it you are operating in the dark.

As these new technologies add a layer of complexity, what we do helps to simplify, streamline and enhance your operation.

Our objective with this paper is to help you make decisions that will drive your organization forward.

Read on for an overview of 5G communications, digital twins and blockchain and how they may – or may not – become a useful part of your supply chain technology inventory.

5G is Coming

5G is the fifth generation of the international cellular communication standard and it is expected to propel the advance of numerous technologies such as [AI](#), [robotics](#), [Internet of Things \(IoT\)](#) and virtual reality. If you've been reading our C3 retail whitepaper series, you'll know that each of these technologies is playing a significant role in supply chain modernization.

5G is expected to deliver much faster data speeds – roughly 20 times faster than today's 4G optimum – and also reduce the delay time, known as latency, as a device receives and responds to a message.¹ Another benefit is network slicing, which divides the signal among numerous clients, whether they are systems or devices.²

Blazing Speed

The 5G promise is huge, according to the 2019 State of Logistics report:



It will be so fast that you can download 20 videos in the time it takes for one today; it will be so efficient with network energy that your sensors' batteries will last 10 years instead of one; it will connect up to one million devices per square kilometer with 100 times more capacity than today..."³

Cellular providers are beginning the 5G rollout and a recent survey from Gartner says businesses are eager to adopt it.⁴ The survey found that activating Internet of Things applications is the most

common objective, with the end goal of increasing operational effectiveness.

However, while some service providers already offer limited 5G capabilities, the technology will not be widely available until the 2025 timeframe. Gartner is predicting that only 45 percent of global communications providers will be offering the technology by then.⁵

That timeframe may give retail operations managers plenty of time to assess how 5G might improve their business; but it's not too soon to start investigating. One analyst suggests that if you are only beginning to consider 5G now, you need to get moving quickly or be left behind the adoption curve.⁶

So, what are the applications that will have an impact on future retail operations? As noted above, IoT will be a big one. With its ability to split the signal for millions of devices, 5G will make IoT possible on a much larger scale. Many more items will be able to be monitored in a smaller area, making the IoT warehouse feasible on a scale that large retailers with millions of SKUs, for example, will be able to leverage.

The IoT-enabled distribution centre is already being brought online.⁷ And with commercially available 5G technology not yet ready for widespread dispersion, many large enterprises are planning, or building their own networks to get ahead of the trend.⁸

Not only in the DC but throughout the supply chain, a 5G-enabled IoT will open the door for much greater visibility into inventory, delivering a truly seamless and real-time image of where product is and how fast it's moving.

Retail supply chains will also benefit from the application of 5G in autonomous vehicles. Both over-the-road trucks and last-mile drones will be able to achieve new heights of sophistication using 5G's ultra-fast communications speeds. Although pilot projects for both types of driverless vehicles are proceeding, with success after success, experts agree that 5G will provide a boost that will speed up commercial viability.

The faster speed of the 5G network will give autonomous vehicles the capability to make decisions much faster than they have to date. This will enable them with the kind of “reflexes” that humans have⁹, and make them even sharper – and ultimately safer – than human operators.

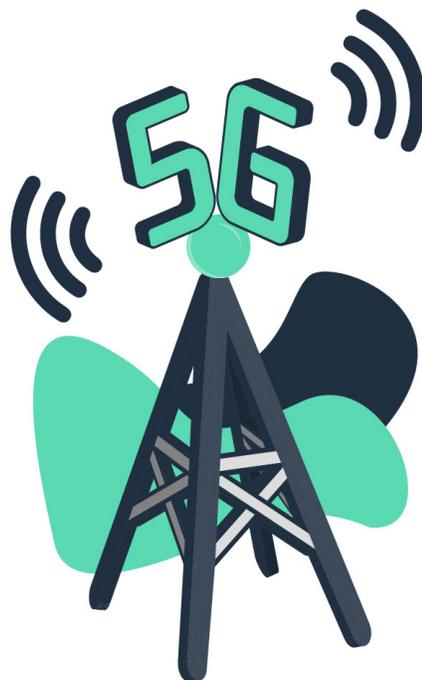
These benefits will also apply to the development of robotics technologies inside the DC. The 2019 CSCMP State of Logistics Report asserts that 5G will be a game changer for DC operations. It sees the wireless capabilities of 5G as enabling greater flexibility in the use of robotics, as well as increasing the speed at which [DC automation](#) can operate.

Among some of the bleeding-edge technologies the report highlights are real-time supply chain orchestration, video that captures items being shipped in real- and full-time, pinpoint temperature control, and more.¹⁰ If they come to fruition, each of these has the potential to create significant efficiencies and cost savings in the retail supply chain.

Not So Fast

While 5G is a very exciting technology that promises huge gains in automation for logistics operations, there are still some challenges to be worked out. First, the final standard will not be published until March 2020, so there are details still being worked out. Second, in many cities, the network will need an infrastructure upgrade, which will require a major investment and will take some time.¹¹ Third, some analysts are calling 5G hype, and assert that the service promised may not be exactly what users end up getting.¹²

So, as with any brand new technology, a wait-and-see approach may prove to be a good risk-management strategy. On the other hand, if 5G turns out to be as advertised, fortune may favour the aggressive early adopter, providing you can get the service!



Digital Twins

Digital twins are coming. A digital twin is a digital copy of a thing, process or being. Digital twins rely on sophisticated algorithms and artificial intelligence to parse information coming from sensors placed in and around the real object, along with historical data. They monitor and recreate the real-world item or process in real-time, creating a visual representation of what's going on. Engineers can then change parameters in the simulation to see how the real thing will react, but without having to put it at risk.

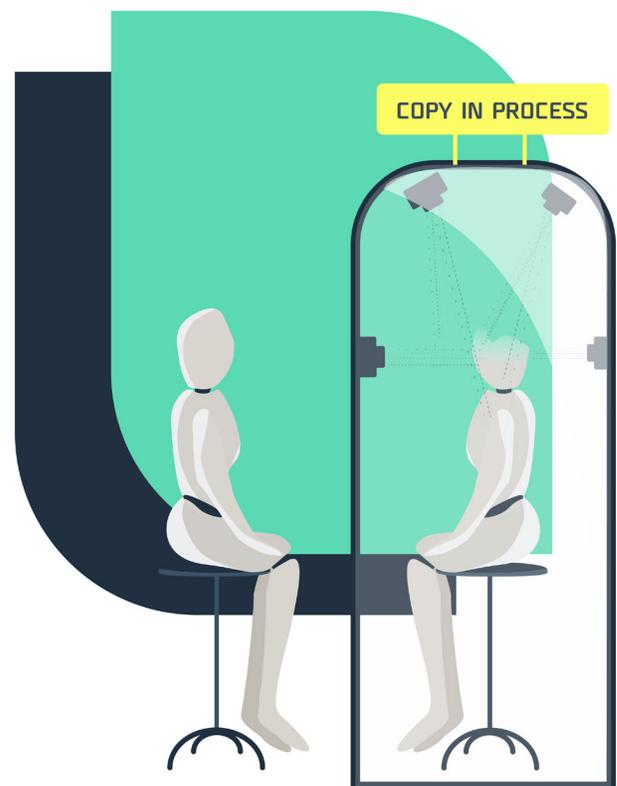
While the term was coined in 2002¹³, in fact, this concept has been around for a lot longer than that; with NASA famously using a ground-based model of the Apollo 11 capsule to figure out how to resolve critical issues in space back in 1970.¹⁴ In 2002, the McLaren Formula 1 team was using a digital twin simulation to predict performance, but it was around 2015 that the idea really started to become feasible with the advent of Internet of Things technology.¹⁵ Major manufacturers like GE have been using them since then to derive significant gains in manufacturing and maintenance.

In the supply chain, twins are relatively new kids on the block. Only in the past couple of years have digital twin solutions for logistics operations been made commercially available.

A digital twin is the logical, modern extension of the engineering prototype. Where engineers once modeled in clay, then moved to mechanical models and eventually to computer aided design, now they can create a digital copy of a real-world item or system or process and manipulate it to see how it reacts under different circumstances.

Magical Twin Powers

In general terms digital twins offer numerous benefits, including improved reliability, reduced risk, lower maintenance costs, more efficient production and faster return on investment.¹⁶ In an industrial example, using digital twins GE was able to improve a customer's reliability from 93 to 99.49 percent in less than two years, and cut reactive maintenance by 40 percent in just one year. A digital twin also saved a customer US\$360 thousand by predicting a power outage.¹⁷



In logistics, analysts see tremendous potential for digital twins to drive efficiencies. Keeping tabs on distribution packaging, for example, could yield insight into how to make more **sustainable packaging** as well as helping track the millions of reusable containers in the transport system. **Likewise, a digital twin of an entire shipment may give transportation planners the capacity to plan loads more efficiently and may turn out to be an incredibly effective tool for AI-enabled load matching services.**

The trucks themselves offer a huge opportunity to streamline communications. Because they are now effectively rolling computers, they are sending data to various systems like maintenance, driver logs and fleet management but they send it multiple times in various formats. If each truck had a digital twin, which contained all the data, sent via a single channel, these other systems could access the twin and get the information they need.



The traditional approach wastes effort and resources because the data is overlapping and redundant.

Additionally, it's very complex and expensive to establish a new channel for every new application that needs to access the data.”¹⁸

said W. Roy Schulte, Distinguished Vice President Analyst at Gartner.

In the complex and fast-moving environment of a retail distribution centre, for example, a digital twin would enable operations managers to adjust for different scenarios without having to take the risk in real time. A new putaway process, for example, could be tested. Or new automated picking equipment could be specified and tried

out to see how it would integrate with existing processes and equipment. **The whole change can be tweaked and perfected, before the change is implemented in the real system.**

All this is not fantasy or hype. Dematic has recently released a product that lets users explore a distribution centre environment before it is built to look at factors such as labour productivity, inventory movement and the effectiveness of material handling.¹⁹ The twin reduces risk by letting the DC's systems run in virtual reality before you commit to expensive capital outlays, making sure that it does what is expected and needed. According to Dematic, their system can be as specific as letting you know what happens if a barcode doesn't scan properly.

In theory, an entire supply chain could be modeled this way, enabling adjustments from raw materials procurement right through to delivery to the final customer. In fact, the entire city-state of Singapore has been modeled into a digital twin by engineering firm Dassault Systèmes. It's being used to make decisions about infrastructure and how to manage possible emergencies like major fires or floods. The model is connected to traffic systems, climate data and transport vehicles.²⁰

Sounds a lot like a supply chain, doesn't it?

Geographic information systems connected with autonomous vehicles will be able to deliver enormous amounts of data that can potentially fuel end-to-end supply chain twins. Add products to be tracked and you are pretty close to the elements that would be needed to replicate – and manage – an entire supply chain ecosystem from end to end.

Applications specific to retail operations are also coming. In addition to tracking inventory throughout the supply chain, twins technology is being used to model actual retail stores with the objective of guiding shoppers right to items on the shelf, as well as using the **data on individual customers** to create models that may be able to predict shopping behaviour. ²¹

Double Trouble?

Digital twins are very compelling. They offer many new opportunities thanks to the creation of digital sensors, the data they collect and the development of artificial intelligence to analyze and act on it all.

However, just because there are examples already in action and new models being developed as we speak, does not mean that digital twin technology will suddenly become the norm for assessing and streamlining operations, in spite of predictions. Back in 2018, Challenge Advisory predicted that by 2020 up to 60 percent of manufacturers would be monitoring product performance and quality with digital twins.²² A 2019 survey by Gartner put the brakes on a bit, suggesting the adoption rate would be more like 62 percent of the only 13 percent of organizations already using IoT technologies.²³

A few hurdles will need to be cleared before we see the birth of a digital twin for every application. First is the challenge of integration. Most digital twin applications within the enterprise require the twins to achieve some level of integration with each other. According to Gartner, this remains a significant technical hurdle.



The ability to integrate digital twins with each other will be a differentiating factor in the future, as physical assets and equipment evolve.” ²⁴

Further, for the grand, overarching, end-to-end supply chain model to come alive, numerous jurisdictional, regulatory and cooperative hurdles will need to be overcome. Just as we now struggle sometimes to communicate effectively between supply chain partners, this fragmentation of the logistics industry will also militate against effective twinning.

Data will need to be shared amongst numerous partners, with resulting concerns about security and proprietary and competitive information. It will take a lot of work for standards to be developed that all can agree on. And further down the road there will need to be agreement on how the massive amounts of data collected will be managed and owned.²⁵

Blockchain

Blockchain is also known as distributed ledger technology. **It is a system whereby every transaction, every move of an item in the supply chain is tracked via a digital ledger.** All the parties can see every entry in the ledger and changes cannot be made without signoff from all involved. Ownership of the data is decentralized; it is available to all, but the chain of custody is crystal clear.

Originally conceived as a means to secure cryptocurrency transactions (Bitcoin and the like), in the past couple years **it gained a lot of traction in the leafy greens supply chain** as a means to combat food-borne illnesses like salmonella by being able to ensure the provenance of food items is known. Walmart led the charge to implement blockchain, requiring greens suppliers to sign onto an IBM-designed platform.

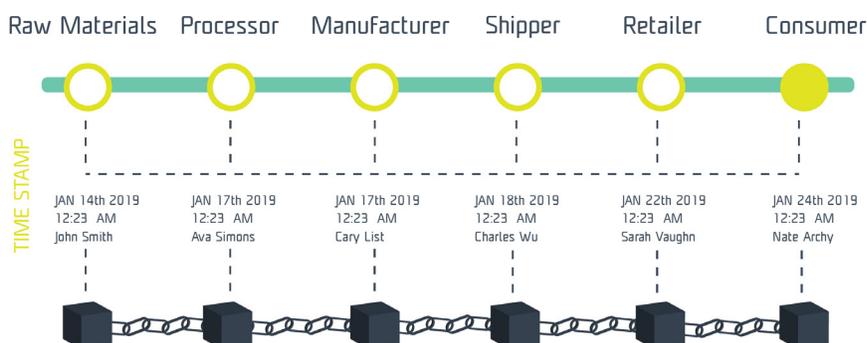
This initiative is not alone: TradeLens, Global Shipping Business Network (GSBN), Blockchain in Transportation Alliance (BiTA), Digital Container Shipping Association (DCSA) and other associations are testing the waters for blockchain in the shipping industry. In agriculture, the world's four largest companies have banded together in a project to digitize the grain trade.²⁶

Block Party

Blockchain promises great strides in overcoming supply chain inefficiencies. IBM estimates that global trade could see a 15 percent boost if blockchain were widely implemented.²⁷

Because it is fully transparent it should be able to show where items come from. For example, tracking provenance was key in the adoption of blockchain in the leafy greens initiative. It should show what's next in the trip, thereby making hand-offs and border crossings simpler and faster, and it can provide real-time tracking. **Eliminating paperwork is one of blockchain's chief promises**²⁸, an objective that many in supply chain have been working towards for years.

For retail, it's suggested that aside from the track and trace benefits outlined above, it also has potential on the customer-facing side to improve trust and authenticity for brands and products.²⁹ Blockchain-authenticated goods, like fair-trade foods, or child-labour-free clothing, allow retailers to prove that they are on the side of good corporate citizenship, rather than just making the claim. Likewise, blockchain offers retailers and brand owners the ability to reduce the penetration of counterfeit parts and final products into the retail chain.³⁰



Putting the Block on Blockchain

However, recent surveys suggest that while blockchain is on executives' radar, it's not at the top of their must-implement lists. In one study only five percent ranked the technology as a game changer,³¹ while in another, it ranked lowest among 11 emerging technologies in use today and only eighth in supply chain execs' estimation of what technologies would be adopted in five years.³²

The problem seems to be that the return on investment for blockchain initiatives is opaque. While companies considering a blockchain project cite cost savings, traceability and transparency as the top benefits, 92 percent of organizations that were already involved in implementation said that their inability to measure ROI was the main challenge.³³

Blockchain faces two main hurdles. First is a lack of awareness and second is the problem of sharing proprietary and competitive data with supply chain partners.

In a recent call for blockchain research to support initiatives in the U.S. food and beverage industry, Information Services Group (ISG) director Alex Manders identified the problem:



Based on my observations, the top challenges facing the food and beverage industry are incomplete awareness and understanding of blockchain technology vendors, solutions and business-to-business collaboration models; a lack of established industry and governance frameworks, and markets influenced by supply chain participants with a disproportionate pool of resources.”³⁴

Indeed, the question of collaboration among supply chain partners is the most frequently cited barrier to blockchain adoption. For blockchain to become a truly useful tool, it requires the cooperation of every party in the chain. And that's a big hurdle for many companies.

Not only would they have to modify their digital systems to join a common platform, they also have to figure out how to scrub the data that is shared so that company secrets are not revealed, and at the same time ensure that data meets the needs of the ledger's recordkeeping. Lots of work is being done at the intergovernmental level right now to educate corporate players about the benefits of blockchain³⁵, but the fact that its success will depend on the intervention of governments, global trade organizations and the like, is a sign that the technology's widespread adoption may be years away.

The End Game

One thing is clear in the world of emerging technologies and the retail supply chain. There is no single miracle move that will save the game. 5G is coming, but when? Digital twins offer the possibility of real gains, but come at a cost of tremendous complexity. Blockchain can tell us everything about where an item comes from, but do we want to trade our own data to get that information?

What we do know is the pressures that are making us examine these new technologies are not changing. **The retail supply chain is getting faster every day, and competition is intensifying. In this environment, how do you choose the right solution to meet the challenge?**

Let's take it right back to the distribution centre. All the solutions we've described in this paper are very high-level. They have far-reaching objectives that, if they work, have the potential to impact the entire supply chain.

But there's one place where you can gain an advantage, given that you choose the **right technology: and that's at your dock doors**. Trucks come, trucks go. They will do that whether your DC is running on 5G or not. They will do it if you are blockchain enabled and they'll still arrive and depart if someone is monitoring them as a digital twin.

The dock door, as simple as it is, can be a great source of efficiency. **Take a look at your scheduling system. Could it be improved? Chances are the answer is yes.** That's where C3 comes in. Using our cloud-based dock scheduling could give your retail DC the boost you are looking for in new technology, without the cost, implementation headaches and months of research. [[Click here to see a video >](#)]

Simply allowing drivers to make an appointment allows you to allocate labour and equipment, ensure there is no wait time, and eliminate repetitive, and error-prone manual processes. Even more, imagine if your appointment process could be automated by configuring your business rules into our system and allowing carriers / suppliers to take care of the booking via an online portal. With this one effective, simple addition to your technology repertoire you can increase efficiency in the DC, keep up with retail orders and look like a hero.

So, instead of staying up at night trying to figure out how blockchain will help you, or when 5G will be available, why not investigate, right now, the strategic advantage of scheduling?

Ready to Plan Your Next Move?

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NEXT MOVE

Globally recognized as the masters of Dock Scheduling and Yard Management Software technologies; we've perfected the art of helping industry leaders move strategically through quickly changing landscapes so that operations continue to move smoothly.

At C3, we've dedicated ourselves to helping you plan your next move!

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White Papers

A constantly evolving Supply Chain means that your operations need to evolve as well.
We've put together five white papers that discuss the latest tools and trends to help you not only stay in the game, but how to strategically win it.

- Artificial Intelligence**
Making machine learning analytics work for your retail operation.
- Retail Distribution Centres Automation**
Using technology to stay in - and win - the game.
- Emerging Digital Technologies for the Retail Supply Chain**
Strategic advantage or big question mark?
- Warehouse System Softwares**
The brains behind your retail operation.
- The Internet of Things: How IoT is Reshaping Retail**
The deal is in the data.

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