



# The Smart Supply Chain: *A Digital Revolution*

By Craig Crawford

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**N**ot since the 1970s introduction of the barcode—the universal language of retail—has the apparel industry undergone such a radical transformation.

In the past 12 months, an important development—the upgrade of the world’s barcode standard to give every product a web address in a standardized format—has shifted this language to digital, giving every physical product a universal digital identity on the web. A digital revolution, or “the smart supply chain,” is here.

“The traditional view of the supply chain has been basically a siloed situation. An organization could only control information about part of the lifecycle of the product—visibility to your own enterprise, or your own distribution center,” explains Niall Murphy, founder and CEO of Evrythng.

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The upgrade of the world's barcode standard now gives every product a web address in standardized format.





Swatchbook's capture App and augmented reality (AR) allows a smartphone user to photograph any image and apply that to a 3D object in real time.

Evrythng is an Internet of Things (IoT) Software as a Service (SAAS) platform for consumer products. Brands work with Evrythng to apply data science intelligence on an item-by-item basis through uniquely-controlled QR codes, providing visibility into supply chains, driving new digital applications, and engaging with customers.

"In the digital world, that assumption has changed. Every product is traceable across its entire lifecycle, providing accessibility across multiple aspects of the supply chain," Murphy explains. "All information can travel and pass with the product, and multiple organizations can contribute—supplier, manufacturer, distribution center, point of sale, and consumer."

"The tag is the language of interconnection across the value chain—the connective tissue organizing all data around each product," Murphy says.

According to Murphy, US\$458 billion a year is lost due to overruns and counterfeit items, but now that it is possible to have each product identified as it's produced, there is a stronger infrastructure of integrity control.

"We tend to think of supply chain challenges in a linear way—'I'm solving a manufacturing problem' or 'I'm solving a counterfeit problem,'" Murphy says. "Now we can apply decision making from the data around that product—is it where it should be?—to

determine if it's a counterfeit or from overruns. Overruns in apparel brands is a complex process and there is usually a 1-5% variance in manufacturing. 'Is a 2% overrun a problem in this factory but not in that factory?' A machine learning algorithm can learn overrun data—where it's made, what order it is related to, and identify if there is an integrity problem. Evrythng is doing that today, alerting when there is a problem in a defined situation as opposed to a general rule that says only flag 5% overruns," he explains.

"It's not just ROI on brand integrity, but on the full lifecycle of our consumer relationship. The ability to track product beyond the point of sale is a fundamental leap for any retailer or brand. The industry is now focused on shortening its cycle from concept-to-consumer as well as protecting product integrity, but it can go beyond that to the final end-of-life of the product, solving some of the circular economy challenges," says Murphy.

If you know what recycled materials you have nearby, you can use this information to influence the development of a line, he says. Recycling means manually sorting items by the component materials. With digital tracking of the item, verification of materials contained within the product determine how and where to recycle it. When a tag is scanned at the recycling center, recycled inventory is automatically registered at location.



Swatchbook's digital materials library displays fabrics with their properties in a one-to-one ratio intended to reduce the dependency on physical samples.

Instead of growing more cotton and shipping it to factories, factories can make use of local recycled raw materials. New manufacturing facilities can be created where the materials are located—enabling closer-to-consumer production with fewer logistics and a smaller carbon footprint.

Apple and Google have updated their operating systems so that their smartphone cameras can read this new standard code. “That’s huge, as it means consumers don’t need special devices,” Murphy says. “In fact, this is turning the world’s smartphones into data capture devices, and creates an open system of data capture,” Murphy explains.

We can therefore start to apply learning technology (artificial intelligence and machine learning) across data from distributors, a brand’s stores, third-party retailers, and the supply chain to gain more insights, he says. More insights mean a smarter supply chain and the evolution of new business models.

## RFID: 35 Years Old and Still Going

“RFID (Radio Frequency Identification) will continue to play a critical role as it triggers activities in a controlled environment,” Murphy says. RFID can be connected to the scanned data from the QR tag. “We shouldn’t be thinking that digitally-identified products are different from that which started with

RFID. They work together to give the full lifecycle,” he adds.

“Progress with RFID might not have been as swift as people expected it to be. However, RFID adoption today is going beyond what most people are aware of,” says Francisco Melo, vice-president and general manager of Global RFID for Avery Dennison. Avery Dennison is a global materials science and manufacturing company specializing in the design and manufacture of a wide variety of labelling and functional materials including RFID.

“Tier 1 retailers and brands are roughly one-third of the total apparel and footwear space, and in 2019 RFID is becoming mainstream for a third of the Tier 1. We are beyond the early adopters,” explains Melo.

In addition to combating counterfeit products, RFID is now in use to improve supply chain logistics, in-store shopping, track marketing samples, organize retail events, control inventory, and automate replenishment.

Earlier this year, at New York’s National Retail Federation (NRF) show, the “store as distribution center” was a recurring theme as omnichannel and omnistock initiatives are turning stores into fulfillment centers for online purchases.

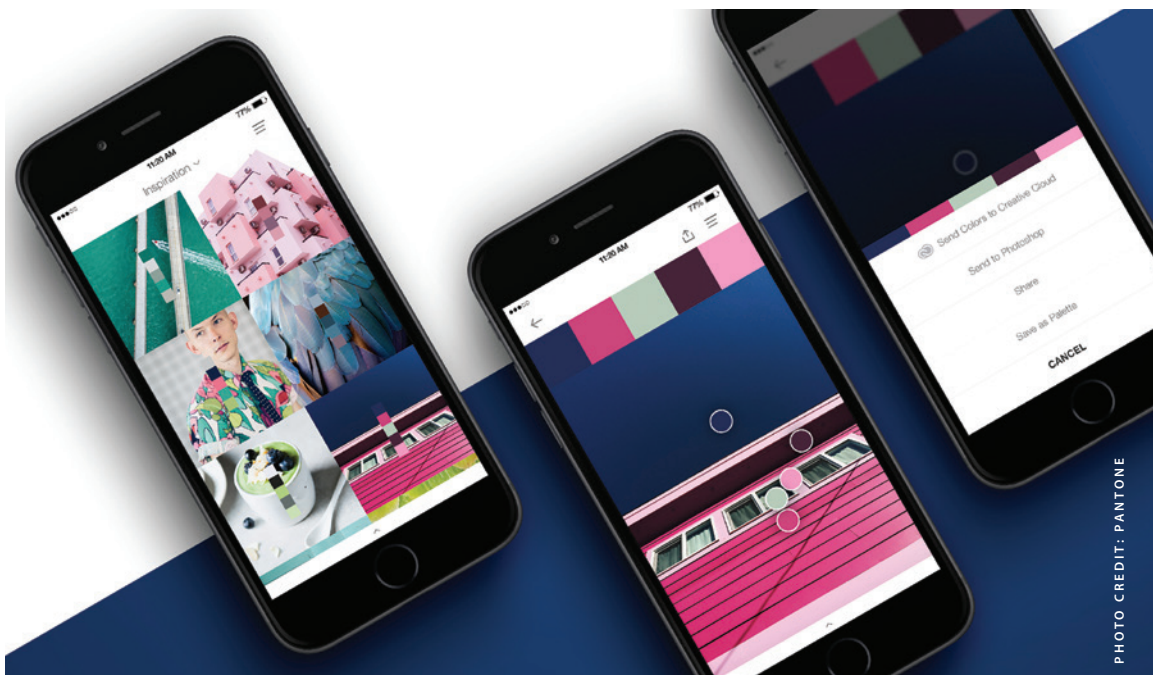
“A primary driver for RFID is this optimization of inventory,” Melo says. “Retailers can reduce stock levels as much as 10% and still have the same sales if they accurately know what stock they have and where they have it. Less capital invested in stock means fewer markdowns. This is a sound business reason for RFID that happens to have sustainability advantages because you don’t over-produce.”

At the Los Angeles Product Innovation Apparel conference in February 2019, Avery Dennison created the digital labels for a digital end-to-end smart supply chain workflow done in partnership with Swatchbook (a cloud platform built for the exploration, visualization, and sharing of materials), and Foot Soldiers, (an independent Footwear Design Consultancy whose clients include Puma, Alexander McQueen, and Birkenstock.)

## From Zero to Hero

“With our technology and just your smartphone, you can take a picture of any pattern you like and immediately put that on a 3D asset,” explains Swatchbook founder and CEO Yazan Malkosh.





Pantone's digital color tools.

"Any brand can now go from inspiration to AR (Augmented Reality) Product to 3D simulation to marketing to manufacturing. That's the fundamental game changer," he says. "The idea here is dealing with the design of a product both virtually and physically. Down to the label."

"Our connectible architecture allows any 2D, 3D, PD, PLM, or DAM system to bi-directionally integrate and exchange data with Swatchbook," he explains. Swatchbook's Capture App and Augmented Reality infers size information for the scale of the raw material on the product. To find an existing raw material similar to an inspiration, the visual search engine assesses tens of thousands of raw materials loaded into their library from more than 20 global suppliers.

In addition to 3D simulation properties, the technology holds manufacturing data like lead time, cuttable width, price, and content. This means data around the manufacturing process flows through the digital eco-system to drive the supply chain.

## But What About Color?

"Despite the increasing demand for accurate digital color data in 3D Design and eCommerce, the majority of designers are still working like they did 30 years ago," says Pantone's Director of Business Development (EMEA) Carola Seybold. Pantone

provides a universal language of color that enables color-critical decisions through every stage of the workflow for brands and manufacturers.

"They don't understand digital processes. They take a physical color swatch that may not be an engineered standard, check it in a window, and then tell the dyer they want it 'fresher' or 'brighter,'" says Seybold. "The education level in the market is almost zero. We are bringing clients along by creating awareness and an understanding of the workflow of digital color."

John Newton, head of Color Technology at Coloro agrees. "Color education levels vary greatly across retailers," he says. Coloro is a color system that decodes color as the human eye sees it, offering 3500 colors in polyester standards providing data for each of these under six different illuminates.

"Digital screen data is a much smaller space than what's achievable in the physical space. Many designers love working on screens. But they also need to see real color," Newton explains. "So, we start with the physical standards, and their reflectance data, and then we also provide the digital color space footprint to match what comes in digitally to a physical output."

"Conceptual design begins with inspiration, and today's tools and technology include

colorimeters and smart phone apps that allow for digital capture and translation of color inspiration to the phone or desktop,” Seybold adds.

“Display and CAD design stage can include digital standards embedded within design software, alongside physical color reference guides, textile swatches, or paper chips,” Seybold says. “Assuming monitors are calibrated regularly for optimum color, and all stakeholders agree to a common color language, then accurate digital communication is feasible across teams globally,” she says.

## Speed Is the New Currency

### Product Development On-Demand

Using digital product development and crowdsourcing, sourcing agent Li and Fung has been working with apparel company Betabrand to develop a high-speed consumer development process that brings ideas to life in a matter of weeks using virtual design.

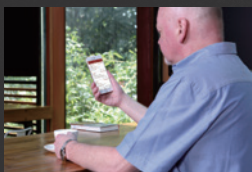
Consumers co-develop shoes and handbags from a digitized library of components and 3D renderings. Once the demand for the products hits a certain target, Li and Fung then physically produce the products. Demand dictates supply—only products consumers want and have paid for are manufactured. The product development cycle is reduced by months, creating newness with on-trend products and reducing waste by producing ‘right the first time’ products.

Three years ago, Li and Fung embarked on a digital journey to create “The Supply Chain of the Future.” The goal is to fully digitalize each step of the supply chain to seamlessly capture data end-to-end, realizing data-driven insights. Accelerating the supply chain through their Digital Center of Excellence—3D design, sampling, and fitting—is their first step. Digital has achieved a 70% reduction in sample time for them.

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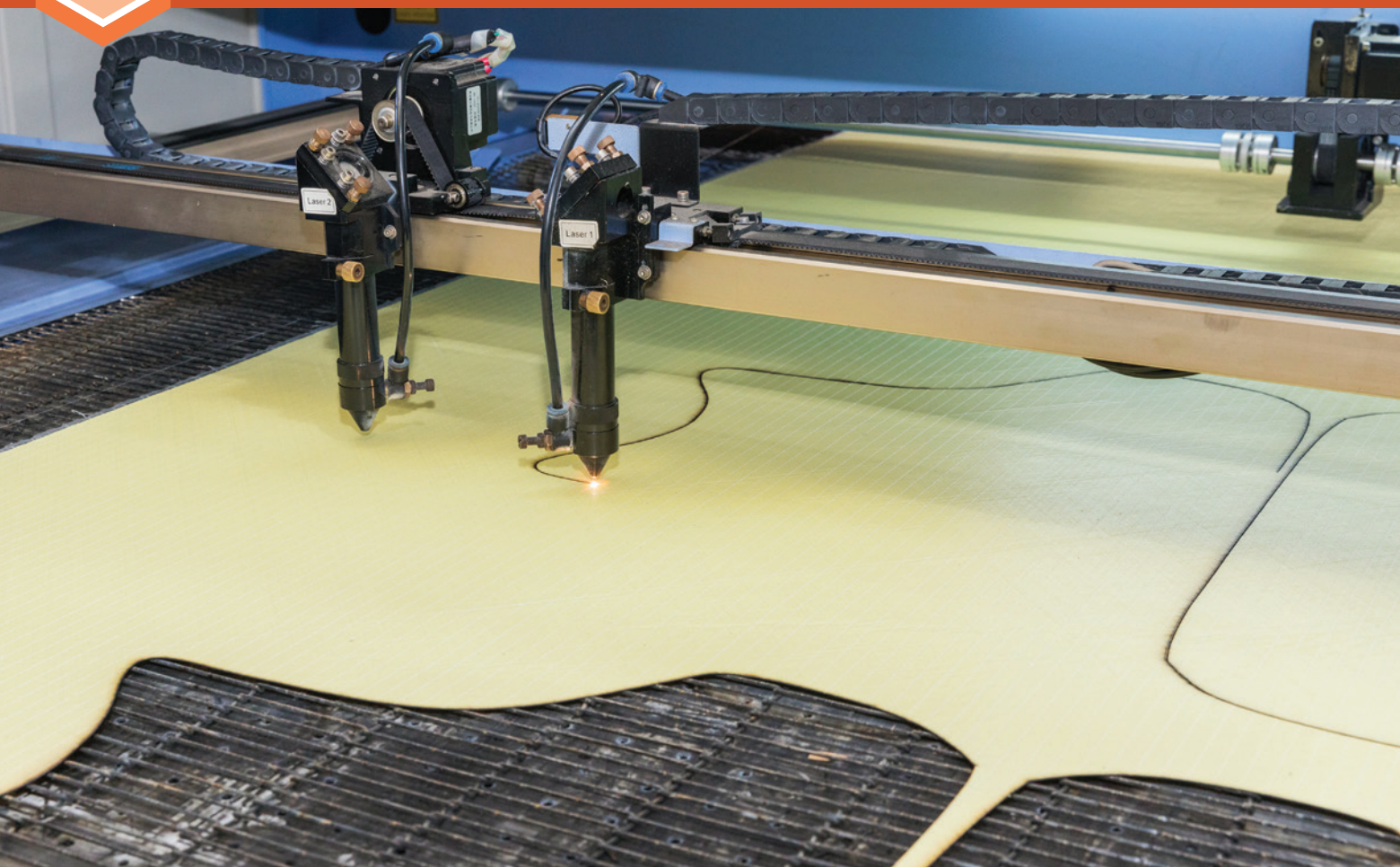
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Automation, such as laser cutting machinery, helps to speed up the manufacturing process.

“It’s no longer enough to optimize your supply chain for cost alone. Our aim is to increase speed like never before, helping our customers reduce lead times and increase speed-to-market to meet growing consumer expectations,” explains Spencer Fung, group CEO for Li and Fung. “We believe companies who can move fast and react to changes in the environment quickly will win.”

## Manufacturing On-Demand

“If you want a digital supply chain, you need a digital manufacturing capability,” says Palaniswamy Ragan, chair and CEO of Softwear Automation, creators of the digital T-shirt Sewbot Workline—a fully autonomous manufacturing processes that requires a single operator. It can produce one complete T-shirt every 22 seconds, twice as fast as manual sewing.

“We are not a robotics company, we are a sewbotics company and that’s very different,” Ragan explains. “Robots are traditionally used for manufacturing

hard goods, and they don’t work for soft goods like fabric. We have solved the problem of dealing with fabric. This technology will enable made-to-measure and on-demand manufacturing in local supply chains all over the world.”

“Once an order is placed, you make the product. That means no excess product, less shipping when made locally, better water use, better energy use, all contributing to a sustainable circular economy,” says Pete Santora, chief commercial officer for Softwear Automation. “This eliminates labor-related issues and solves the excess inventory problem.”

Last year, Li and Fung partnered with Softwear Automation, and used their Sewbot Workline to manufacture T-shirts on demand, with potential to expand to other product categories in the future. “Through this collaboration, we want to partner with an initial set of manufacturers to create our first fully-digital apparel supply chain, and use those



learnings to scale the technology and create customized solutions for our supplier network around the world,” Fung explains. “The benefits will not only reach our suppliers, but all our stakeholders along the supply chain.”

### Color On-Demand

Twine Solutions is a technology startup that has developed a proprietary digital on-demand thread dyeing system DST (Digital Selective Treatment). The system continuously dyes a single raw off-the-shelf white thread to any requested length and color that’s ready to use within seconds, promising to eliminate conventional bulk dyeing of thread. The system links to their digital dye-to-match color application.

In December of last year, Twine Solutions announced a strategic investment and partnership with Coats Plc., a global industrial thread manufacturer. Plans for enterprise deployment of the system are underway.

### Fashion Driven by Demand

“To enable fashion driven by demand is not easy. So much can be achieved by improving the supply chain—not just reducing waste. If you start with a reactive efficient supply chain, there are a lot of cool ways brands can behave,” explains Hal Watts, CEO and co-founder of Unmade.

Unmade is a platform that gives brands the ability to offer customizable products and manufacture the results. eCommerce orders are sent directly to the factory, made, and delivered straight to the consumer through technology that seamlessly integrates individual and short run orders into existing production. This means individual orders can be manufactured at the same cost and speed as mass-produced items.

“The suppliers are often just driven to make it faster and cheaper. It’s super challenging to speed up the supply chain. There are a lot of barriers to it: sampling, backlog, minimums, and lead times. I don’t think that speeding it up makes the relationship between the brand and the factory very healthy,” Watts says. “Fundamentally, our Unmade software is a layer that builds trust between the brand and the supplier.”

“As an engineer I thought, ‘If I can design and get a robot built in two weeks, why do I have to wait six months for a T-shirt?’” he says. Unmade offers

“curated customization” for knitwear and printed apparel for brands including Rapha, Moniker, Christopher Raeburn, and Opening Ceremony.

“We don’t enable custom fit. There are barriers that we admit we cannot fix because fit is subjective,” Watts explains. “What is a brand comfortable to allow to be changed by consumers or by the regional buyers and still match the season, match the collection, maintain brand integrity, and brand heritage?” he asks.

“We allow a brand to say, ‘I want this type of thing to be possible.’ Designers design parameters that match the brand’s aesthetic. For example, ‘I’m comfortable with half of the garment being one color and the other half another, but not a 50/50 split on everything, maybe only certain size ranges.’ Or ‘If a customer picks this green they can’t pick this color.’ We then create algorithms based on these rules,” Watts says.

“We also know what changes can be safely made to the product because our system also analyses what can be changed without harming the integrity of product,” Watts notes. As part of the set-up process, Unmade manufactures a sample on every factory machine and then inputs variables from that into their algorithms. “We modify manufacturing data for print machines from the data obtained from each sample. We know what the machines differences are, and then our algorithms are specific to that printer.”

For knits, Unmade analyzes samples for structural behavior on every machine—their physics engine does 10 million calculations per garment per machine. “We generate all cut and print files for full product. What the factory gets is producible, manufacturable, and customized as guided by the brand,” Watts says.

“For a traditional factory, booking up to capacity is important. We book capacity using Unmade software; we don’t know what we are making next week but we know we want the capacity,” he says.

“In the future, people won’t be buying garments,” Watts says. “Instead we will be renting manufacturing time.”



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