THE LIFECYCLE OF FASHION TECHNOLOGY

INFORMATION, PROCESSES & DATA

NEIL HICKS
WITH CHARLENE O'HANLON

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A catalog record for this book is available from the Library of Congress.

eBook ISBN 978-1-64516-747-1

Typeset in Gotham
Printed in the United States of America

10 9 8 7 6 5 4 3 2 1
First Edition

DEDICATION

This book is dedicated to my Mom and Dad, the best people I have ever known. The most fortunate day of my life was when you came into it. I love you and miss you both every day. Sometimes, it's hard to tell which way the wind blows without you.

To my family, you put up with a lot from me. I know I'm not easy, but you always keep supporting me and that's pretty amazing. I love you all very much.

To my friends who are truly my extended family—you are the best.

In the lotto of life with those that I have been so fortunate to have around me, I am a winner.

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About this Book

The title of this book is somewhat deceiving. When I speak about 'Fashion Technology,' I am not so much focused on the names and types of technical systems used, although I do touch on them. My focus is more on the information and its creation and movement throughout a garment's life, from inspiration to disposal. The information is mostly in the form of data, but also in images and, increasingly, video. The systems' names and flavors come and go over time, with their capabilities and functions ebbing and flowing. They generally lag behind the demands of the moment but are becoming more complex. This complexity isn't necessarily a good thing. As we have learned from Apple, simple can be something to aspire to, by making the user experience easier. Many systems have failed not because they didn't work, but because users couldn't figure them out.

In today's world, there is more information than ever—data rules the day. However, users want simplicity: Get in, do their thing and get on with what's next. In this book about fashion technology, I believe it is more important to help you, the reader, to understand the information and data, as it passes from one function in the company, usually executed by a person, to another, when it

lays dormant; and when it is resurrected, added to and then occasionally archived or destroyed.

Every step in the process of producing apparel is now done through, or enhanced by, technology. This book was created with the intent of helping those in the fashion industry, from designers to buyers, manufacturers to retailers, understand technology's ever-growing role in fashion, as well as students and people new to—or interested in—the way technologies intersect with and impact the fashion industry.

To aid in that understanding, this book focuses on the life cycle of technology in the fashion industry: What technologies are used, what role each technology plays at each phase, technology's impact on the process at large and who most benefits from each technology. Having the knowledge of how technology is used, can help professionals in all areas understand how the technologies are interconnected, with each having an impact on the other.

This book also hopes to foment discussion among various groups in a company, as each gains a better understanding of how technology helps them carry out their day-to-day tasks. This includes groups directly involved in the creation of apparel, as well as those involved in back-office or other functions, such as human resources, marketing and sales.

At its core, this book is intended to demonstrate

the influence of technology in transforming processes, business models and even ways of thinking. Fashion is evocative and emotional in nature. Technology is less visceral but powerful nonetheless. Combined, the two are formidable.

Introduction

Of the many things that have had an impact on our society, technology is arguably the most significant. Nothing else in modern history has reshaped our lives in so many ways. Technology has changed the way we interact, exchange ideas and conduct business. It has created new ways of building things and new ways of thinking about problems.

Technology has played a pivotal role in transforming every industry, from agriculture, mining and zoology to fashion—A to Z. From ideation to creation and beyond, technology's influence is rampant. Sketchbooks and colored pencils have been replaced by tablets and styluses. Computer-aided cutting machines, designed to reduce fabric waste, have supplanted workers using manual fabric shears. Automatic sewing machines assemble and sew together garments in a fraction of the time it takes with manual machines.

Technology as an Innovator

There are some people who may point to the sewing machine as the most important technological advancement in fashion. Before its introduction in the 19th century, all garments were hand-sewn. This was an arduous, time-consuming task that could take weeks or even months to complete,

depending on the complexity of the design. Sewing machines reduced much of the manual labor involved, completing about 900 stitches per minute. This meant that garments could be created in less time and with less work. It was time and effort that could go into creating more, and sometimes more elaborate, garments in the same amount of time.

In creating the ability for garments to be produced quickly with less effort, the sewing machine ushered in the era of industrialization in fashion. Mass manufacturing drove down apparel costs, which gave birth to ready-to-wear clothing companies. Among the first was owned by George Opdyke, who later became mayor of New York. In 1831, his company began manufacturing ready-made clothing in New York, which he stocked and sold from a store in New Orleans.

The rise of ready-to-wear clothing, which also included shoes and accessories, sparked a new era in fashion. However, it also began the decline of age-old professions, including cobblers, seamstresses and the bespoke suit-maker and tailor. These professionals still exist, but their numbers are much lower than they were in the 19th and even 20th centuries.

As technology commercialized the creation of apparel, it also changed consumers' general attitudes toward fashion. The availability of garments meant that different classes of people could dress

in a similar fashion, which blurred the lines between the upper echelon of society and the common man or woman. It was no longer easy to distinguish a person's social status, by their clothing. As a result, the upper class turned to haute couture, which focuses on creating high-quality, individual, high-priced apparel by well-known designers. This, in turn, gave rise to the concept of "fast fashion"—apparel that is created quickly after designer shows, to take advantage of current fashion trends but is not made to last for more than a few seasons.

Technology as a Business Driver

Technology now drives the advancement of fashion on a number of levels. Beyond the actual creation process, technology also plays a critical part in the business of fashion. Procurement of materials, inventory management, sales of garments, transportation of finished goods and back-office functions, such as invoicing and even forecasting of trends and demand—are all made simpler through various technologies. Companies rely on technology to be more efficient, understand and react to the market better and even drive the market in a particular direction.

Generic technologies, or those used by other industries besides fashion, are as important to apparel companies, as those specific to fashion. These technologies include such things as inventory control systems, customer relationship management (CRM)

applications and big data analytics platforms. They are all integral to the business of designing, manufacturing and selling fashion, even if they aren't directly involved in the creation of designs. Companies cannot run efficiently or effectively, without technology, and as such, it is important to understand how each fits into the process.

For every phase in the process, there is a technology that plays an important role. Technologies that assist in collaboration or create a connection with potential customers and to vendors and suppliers, are becoming increasingly important for many companies. Specifically, the use of data analytics and social media to help spot trends and understand consumer preferences is gaining influence and is greatly impacting how companies do business.

For example, knowing that customers are favoring capes over coats, based on data from various sources, can help apparel manufacturers to determine demand for particular styles and help buyers order the proper inventory to meet the demand. A wealth of data can be culled from social media metrics, which measure everything from customer sentiment to how many likes an article or video post receives. That data can be further mined to determine a customer's preference for particular colors and fabrics, as well as demand in different geographic regions, better ensuring that the right apparel reaches the right audience.

Social media also can be used in marketing to build a following and to help companies connect with their target market on a more personal level than print ads or commercials. Social media enables a level of communication that traditional advertising doesn't allow, which can help build brand loyalty among customers.

In tandem, technology is democratizing the way customer sentiment is even derived. In today's techno-centric society, one fashion blogger with thousands of followers on social media can have as much impact—if not more—on the market, reaching readers more quickly than a print magazine covering a fashion show in its next issue.

Companies embracing the power of technology in their workflows, are reaping more benefits than those that aren't. Certain technologies require a thorough understanding of their power, however. For example, the concept of "clienteling," in which sales associates establish long-term relationships with key customers, based on data about their preferences, behaviors and purchases, has long been used in retail. This information was traditionally kept privately by the associates. However, many applications seek to digitize clienteling, by putting the information in a central repository that any associate in any location can access to better assist customers. However, certain customers, especially those who are more affluent, eschew the idea of

having their personal information available to more than one associate. For certain retailers, their clients' need for privacy, heavily outweighs the benefits that clienteling apps could bring.

Technology can be incredibly powerful in transforming the customer experience, but it must be used wisely. Companies should determine which technologies will best help them meet their needs and further their business, without negative impact.

As much as technology has impacted the evolution of fashion from individually created pieces and handcrafted collections to machines creating ready-to-wear garments with mass appeal, the focus is now shifting to technology enabling "personalized" fashion. Custom-made apparel, traditionally reserved for wealthy and discriminating clients, has become a trend among pop-up and boutique retailers looking to set themselves apart from their competitors. Customers simply provide their measurements, or scan themselves with new personal measurement applications, and place their order for anything from blue jeans to dress shoes. These items are made just for them and delivered in a matter of weeks, at a cost equal to or slightly above what they'd find off the shelf, thereby bringing back the democratization of haute couture.

Technology as … Fashion?

The past few years have seen technology integrated further into fashion. It has now reached the point where the technology itself is now considered fashion in today's market. Watches, necklaces and other accoutrements containing sensors, known as wearable technology, are now mainstream. Smart fabrics that can measure heart rates or adjust their warmth or coolness, based on the wearer's body temperature, are starting to join the fray, and a new type of conductive yarn aims to embed touch and gesture sensitivity into garments to truly make them interactive.

Wearable technology is being hailed as a disruptor to multiple industries, including fashion, health care and even IT, since they produce massive amounts of data that must traverse networks not built to handle such capacity.

They also are changing what we perceive as fashion. Can an undershirt that automatically wicks away moisture when it perceives sweat, for example, be considered fashionable?

3D printing also is gaining ground in fashion, enabling designers and small-batch manufacturers to create apparel on their own. Garments can be 3D-printed utilizing all types of materials, from swimsuits to cocktail dresses. In fact, initiatives are underway by major athletic shoe companies to mass produce 3D-printed sneakers, paving the

way for a future in which customization and individualization will be the standard, rather than the exception in manufacturing.

In addition to changing our perceptions about fashion, technology is emerging as a differentiator. It is a way to once again distinguish the upper class from the middle and lower classes.

Apple, in designing its Apple Watch, hired professionals in the fashion, watchmaking and luxury goods industries to create an extraordinary piece of technology that also pushes the edge of fashion. For other companies, a smartwatch is simply just another wearable device. For Apple, however, the Apple Watch is a trend-setting statement piece that can command a hefty price—the most expensive version costs as much as $17,000, according to the company, and features an 18-karat gold case and modern buckle.

Obviously, few can afford to spend that much on an Apple Watch. However, less expensive models are available and readily consumed by those who can spend a few hundred versus thousands of dollars.

Technology as an activity – Approach: All-in-One or Best-of-Breed?

Systems generally come in two flavors: all-in-one, which focus on a broad spectrum of processes related to managing business functions, for example:

accounting and order management through human resources, and best-of-breed, which focus on one or a few select areas or processes to provide a richer, more valuable user experience, for example: employee recruiting. In deciding which type of system to use, companies have the choice of a system that touches multiple points of business at a high level or multiple single-use systems that go deeper in their functionality.

Most organizations use some form of Enterprise Resource Planning, or ERP, system that is more broad than deep, valuing integrated business functionality over user experience and siloed specialty functions. Generally, an all-in-one offering will be more cost-efficient, since it can manage multiple functional applications in one platform. This negates the need to purchase additional systems and eliminates issues related to integrating separate systems.

Because they focus on targeted functionality and a high user experience, best-of-breed systems tend to be less cost-effective overall. This is because companies must grapple with the integration of multiple systems and ensure that relevant information, such as master data tables, is available.

In addition to price, organizations must also consider the environment in which the ERP system will run. Most integrated ERP systems are now cloud-based systems. This means they don't run in a company's on-premises data environment and

are accessed via the web—also known as software as a service (SaaS). Best-of-breed technologies can either run on-premises or in the cloud. However, when integrating best-of-breed systems, organizations must have a particular level of expertise in working with cloud technologies and have a strong understanding of data security, as well as user security to create an integrated solution effectively.

The level of relationship management provided by an ERP system also should be a consideration in choosing the right solution. Companies in the fashion industry work with multiple vendors—from trim suppliers to wholesale customers to shipping companies and more. Therefore, they need an ERP system that is capable of working with the multiple types of information that these vendors provide. Because cloud-based solutions are accessed via a web-based interface, vendors can input information to the ERP system directly. This helps to reduce the time and effort involved in record-keeping and ensures that the information is the most up-to-date available.

Cloud-based ERP systems, however, are more difficult to customize, because companies have no control over the technical landscape the solution lives on, which can make integrating various apps into the ERP system or customizing it challenging.

TECHNOLOGY'S IMPACT ON FASHION
PROFESSIONAL SPOTLIGHT

An interview with
TANYA GOLESIC, Industry Executive
linkedin.com/in/tanyagolesic/

Tanya Golesic has worn many hats in the fashion sector, having spent time in both wholesale and retail, working in sales and planning and filling executive roles at a number of global luxury design and fashion apparel companies. Over the course of her career, Golesic has witnessed the way technology impacts all facets of the fashion industry, both positive and negative.

In this Q and A, Golesic discusses her perspective on the fashion industry and technology's impact.

Spending your career in the industry, you know the effect of understanding the consumer in the retail space. Do you think that technology has helped that area in general? Do you think that that technology has shaped the way that the area functions?

I think for any brand that's been successful, it absolutely has. I think people who haven't adopted technology have found themselves in a different place, and I think technology is a must. When we talk about planning or you talk about analysis or any type of tool that shows you—and that's all

client data, so if you're talking about CRM or inventory by store and looking at what's selling, what's not selling—that's how you tell who your client is and what they want and what they don't want from you, based on full price versus markdown.

I think that technology in the stores, having handheld devices and being able to service that client, I think it's more of a seamless client experience when you do have technology. I think there's a lot of opportunity, but from a planning your business or analyzing your business standpoint, you can't survive unless you have it.

What are your thoughts on the change that's happened in the fashion industry and then where it's moving to?

I think that the client is 100 times smarter than they ever were, and they're 100 times smarter because of technology. People are price comparing much more and they have a global inventory to pull from, in terms of what's offered versus 20 years ago. Technology makes the world a much smaller place and makes it a much more accessible place.

I think that we had the luxury, even 10 years ago, of people going to shopping malls, of people going to stores and enjoying that kind of experience, but no one has time anymore, and technology, I think, has also taken over the time for people. So, people have a much smaller window, so they need to be

much more efficient, and technology allows them to be efficient.

And I think until people start realizing that stores need to be an amazing experience, maybe with product you can't find online and that's unique and you actually have to walk into that store, we're going to continue to suffer with less foot traffic in the stores. The way to get people in the stores is to offer them that experience in store that they can't have online.

What challenges has technology presented to the brands that may or may not use it, but it's in the world around them? There are companies that still aren't online.

Yes, which is crazy. It's almost suicidal in that your brand has to be so strong that someone must always go to the store to buy it. And I don't know who that is today, necessarily. I think technology is nothing but an asset—it's an amazing thing. But technology can also be super slow or super annoying—technology has all this data, but unless you know how to use it properly, it's going to be a drag on the customer. In my case, it was having five different profiles with one retailer, each with a different address, so one purchase ended up taking 25 minutes because the salesperson had to delete my profiles.

I think the training to understand the technology and how to use it the right way is probably

one of the biggest challenges, or how to disseminate the information that you get as a result of the technology.

Do companies do well with the investments they make in technology? Do they see the value?

There are a few factors, I think. The No. 1 factor is the size of the company, because if you're too small, some of these things (A) don't make sense, (B) are too much of an investment, and (C) can be paralyzing in terms of stopping the business. I don't know exactly what the size of the company is that, say, would need SAP, that would need EDI, but I do know that people have to have patience in order to adopt these systems. There needs to be a lot of planning, and I think once you get through the paralyzing piece of it, you then see the payoff. There's always a reward, I think.

A mom and pop that's so small that they're just trying to grow and stay ahead of making production, I think that's a totally different problem. I don't think that's even a world that they're in yet. But I think that once companies become more strategic and whether they have backers or are looking at creating efficiencies, you must have these systems in order to survive as you scale.

Do you think as the younger generation comes in to the industry that it will drive more successful adoption of technology?

I think systems will improve because as younger people come in to work for these companies, they will find the solutions we think are great today could be dinosaurs in another 10 years because everything's moving so quickly.

What are some of the big drivers in the fashion industry today?

I think real brands and having a real story and telling that story is the No. 1 driver. We've grown up in a culture of a lot of fake brands, and I think that's part of the reason some of the stores are starting to leave the world—I don't know what some of these store brands mean to a younger generation.

I think a lot of brands are going to disappear because I think people are going to start to see that they're not real brands, and I think the ones that are going to succeed or will continue to grow will be brands that can offer you something that makes your life easier, better and more enjoyable. I think people are really weighing what's important in life, and their priorities are different.

The younger generation will spend $2,000 traveling the minute they have $2,000 but they won't spend $100 on some items for themselves.

They'd rather just say, "I don't need that and I'll wait." Which from an industry perspective, makes what you're competing with different.

I think that kids now have been educated in such a way that (A) they want a real story, and (B) they want something that links back to something they believe in, whether it's a charity or something else. They want something that makes their lives easier. They want to be a part of something.

What do you think young people who are coming into the industry now need from a skill set perspective?

I think this is a really difficult business because (A) it changes just as fast as technology does, because every season there's a new collection that you're trying to sell, (B) what the trend is of the season, and (C) because it's creative people mixed with financial analytical people, it's this weird, very difficult engagement. So, I think people coming into this industry have to be ready for a roller coaster, and the roller coaster changes week by week, month by month.

And people need to be ready to roll their sleeves up and do whatever it takes. And what I mean by that is that one day you may be asked to help cut out patterns for something or the next day you may be asked to help run an expense

report to figure out something. It's ever-changing and it's not a pigeonhole world where you only do one thing every day. If you want to do one thing every day, this is not the industry for you.

TECHNOLOGY SPOTLIGHT:
The age-old question: Buy versus Build

Like many business types, fashion apparel has several unique attributes that are not common in other industries. While it may closely resemble the business 'vertical' of retail and consumer products, people in the industry will tell you that it is unique. To service these unique attributes, systems designed for other industries, like manufacturing, were used and modified for many years in order to support our unique processes and functions. This continues today. Building your own system was the alternative. You could map out the way you wanted it and hire some programmers. All of sudden, you were making shirts and you were in the software business.

To meet the industry needs, smaller software companies, sometimes starting with the people who got hired to build the one offs described above, built programs very specific to a set of functions and business processes in the industry. An example would be product development software, initially built to collect and organize technical details surrounding a garment: collar size, sleeve length, number of buttons, etc. You will see a number of these solutions highlighted in this book, which many in the industry call 'Point Solutions'.

With the introduction of web technologies in the mid to late 1990's, companies began to offer their 'Point Solutions' via a common centralized host, accessed over the internet, to fashion and apparel brands. These companies were called 'ASPs' or 'Application Service Providers.' This term was not popular and died a quick death. However, if you think it sounds like 'The Cloud', you are correct. ASPs were the precursor to Cloud software. They had remote servers that provided distributed users with operational functionality. This was how software was done in the mainframe days, so what's old is new again. 'The Cloud' sounds much better, so bravo to the marketing department.

As the industry grew and technology investment increased, larger software companies identified the industry as a huge potential market. They began tailoring their platforms to meet the specific needs of the business. Variants of large-scale ERP systems became available, supporting key industry concepts, like 'seasonality'.

As these other tailored systems grew in usefulness and Point Solutions proliferated, companies had many more options to meet their specific requirements. As a result, 'buy vs. build' exercises, evaluating the cost of building versus the constraints of buying, became common. With Y2K, software developers were making a killing adding two characters to every system in site, to avoid

world destruction and general mayhem, while everyone else danced to Prince's 'Party like its 1999'. The good developers then went to Amazon, Google, and other potential unicorns. This made securing good software development talent challenging. 'Build' lost its luster, and value, in the industry.

With the age of The Cloud and advanced integration techniques, 'Buy' turned into 'Rent.' It resulted in software solutions specific to a set of your needs, that can be integrated with your other systems and are available on a monthly/quarterly/annual subscription basis. While this can sometimes cause the finance and information security people agita (not from New York? Google it), business people who just want good functionality to handle their specific business scenarios love it. Smart providers have also resolved the finance and data security issues.

Buy vs. Build: DoorSharp by PANDESCO

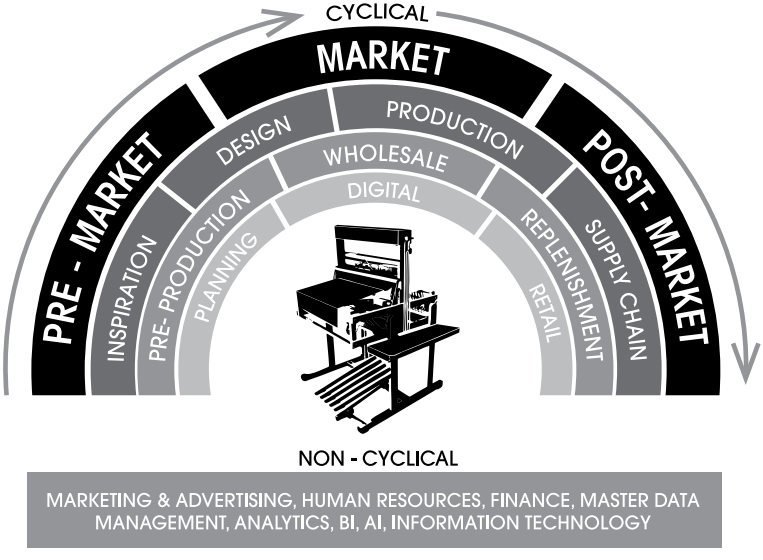
DoorSharp is a cloud-based channel management system that blends industry best practice key performance indicators (KPI's), big data insights and daily operational interactions for a best in breed solution for apparel brands. It helps them to measure, monitor and interact with all of their sales and distribution channels. It is available in the corporate offices, out on the road using mobile technologies for the operations teams and in the

stores on mobile or point of service devices. It provides advanced insights and actionable communications across groups for efficient operations.

DoorSharp has you covered. Do you want to know what your hottest product is? How did your West Coast ecommerce distribution center do last week, compared to last year? What happened at Store 51 that led to the spike in sales in that region? Where should we open our next store and what is the optimal size? Did Macy's sell that product category well last spring? It also does much more.

DoorSharp is the quintessential buy/rent vs. build point solution. There are tools and technologies in the market that could be put together to give a company the functionality in DoorSharp. However, it would cost millions of dollars and take years to complete. It would also cost thousands of dollars and extensive resources to maintain. Why? In this current, secure cloud computing environment, there is no need to make these huge investments. Lower points of commercial entry make this type of enterprise class system accessible to larger companies faster and is now available to smaller companies with tighter resources.

Cyclical and Non-Cyclical Activities



The Fashion Lifecycle - Cyclical and Non-Cyclical Activities

In this book on Fashion technology and business processes, we have decided to look at the lifecycle of activities in two ways: 1.) Cyclical and 2.) Non-Cyclical. The cyclical activities are those that happen over and over related to a fashion "season" or "line." This happens several times a year and represents the company's upcoming offerings. Non-cyclical activities are not directly related to a season or line. Technology in the cyclical fashion

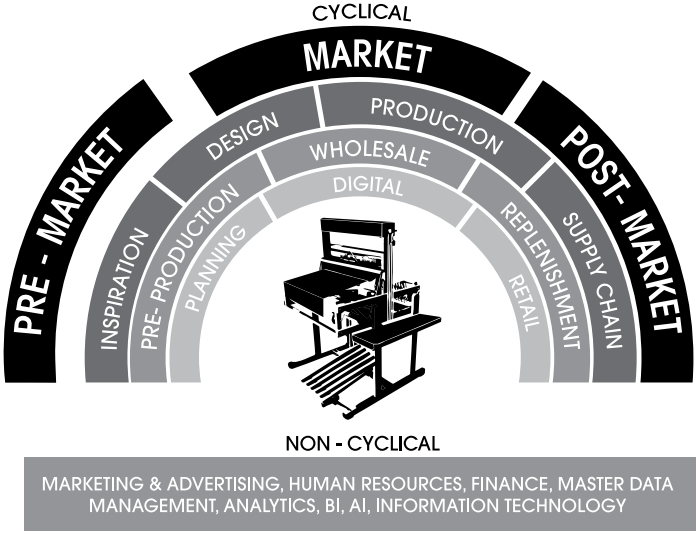
space revolves around three phases: pre-market, market and post-market. Many technologies are designed to address the unique circumstances that occur during each phase. Certain technologies, however, such as enterprise resource planning (ERP) systems, are broadly capable and can span multiple phases to address numerous steps in the process. These activities are not linear, one does not always start when the other finishes, they can overlap and blend, making the lines blurry between functions and the definitions of where an activity sits from a labeling and organizational perspective open to interpretation. Where one company may have a certain activity in a particular group, another may not.

The first section of the book is focused on the three phases of cyclical activities. Later, we will look at non-cyclical activities. As the pace of product release accelerates and brands move towards 'Drops' of a limited supply of styles being available at a time, the concept of 'season' has become a topic of conversation related to long-term relevance. It is an interesting debate, which we won't take up here. For this work, a 'drop,' 'season,' 'release' or 'line' is considered the same and are cyclical in nature.

Cyclical Activities

Cyclical activities have been broken into three phases: 1) Pre-Market, 2) Market and 3) Post-Market

Phase 1: Pre-Market



The Fashion Lifecycle: Pre-Market processes

The first phase in fashion is the pre-market phase. It is the planning phase and the time when designers are their most creative. It is during this time when collections are drawn, setting the tone for the next season/release and hopefully impacting the course of fashion for everyone. For luxury fashion houses, every detail of a design, from color palette to fabric, is selected with an eye toward being a trend-setter

and capturing the buyer's interest.

Pre-market is also when lines are determined, sometimes taking their cues straight from the runway. Seasonal lines, from winter coats to swimsuits, are designed during this phase—but while designers go for haute appeal, commercial organizations, who are not design-driven or "merchants-driven," build lines with an eye more toward mass merchandising. Their designs can be less creative, with styles and colors chosen more for their marketability in large retail stores.

To understand the type of technology used in this phase—and all phases—of fashion design, it's important to know the business models and how each operates. Data is the thread that connects all roles in fashion, but the technology used differs from role to role. What may be appropriate for the intricacies of designing a collection, may not be appropriate for a wholesale environment, where time is money. Likewise, the technologies used to determine mass-quantities of apparel pieces will be sorely out of place in a haute or boutique environment.

The information that a company chooses to collect and utilize, is driven by the model it operates under. Designers, for instance, typically drive the market in terms of styles and don't focus on large quantities of their designs. Therefore, they are not forced to purchase large amounts of fabric and accessories upfront. Their model typically is to purchase supplies, after their designs have been sold.

Companies that follow the market are not as involved in creation. Instead, they focus more on commercialization and sales. The commercialization process for all channels—wholesale, retail and direct to consumer—is different for design-driven companies than merchandise-driven organizations.

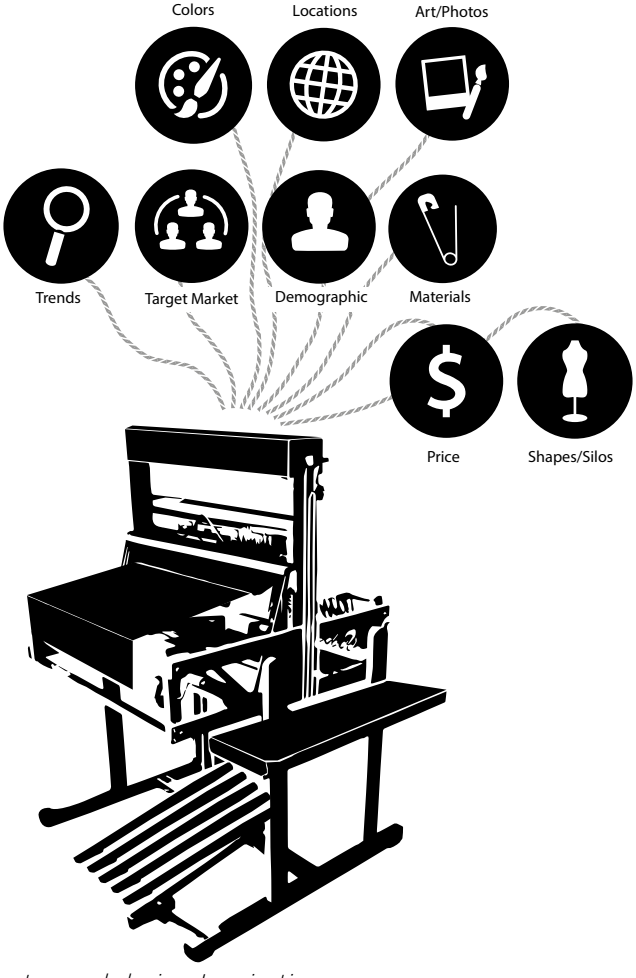
Merchandise-driven companies typically produce or purchase mass quantities of apparel that are sold to retailers or consumers, based on projections. Their business model is to plan the number of units at the prescribed locations, acquire their pieces and then sell their product at the desired locations. The data that a merchandise-driven company needs during the pre-market phase is vastly different from—and vastly greater than—what a design-driven company generally wants.

The types of apparel that are included in a line, such as their cut, color and fabric; size ranges and quantities in each size and style, are some of the considerations of a merchandise-driven company in the pre-market phase. Geographic location, past sales trends, expected delivery dates, production costs and logistics are some other things considered to be important during this phase.

Unlike design-driven businesses, which direct the market styles and trends, mass market commercial businesses begin by devising a plan of what it believes it should be selling, and then either specifies designs or sources the product to fill that product category, or a combination of them all.

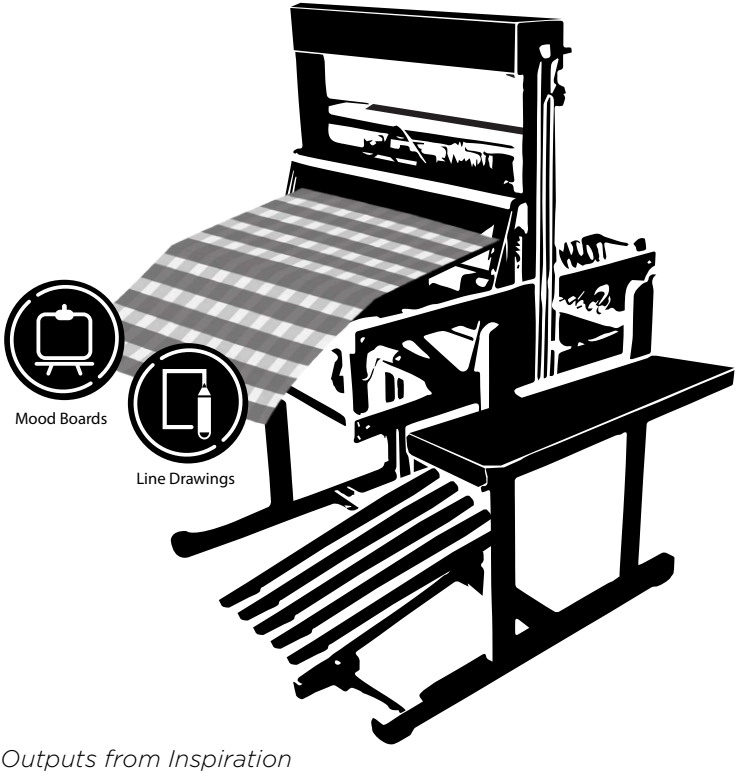
Pre-Market for Design-Driven Companies

The pre-market phase for the designer is all about creativity. Getting inspired, putting ideas to paper and bringing them to life through sketches, is the main goal for designers in this first phase of the fashion design lifecycle.



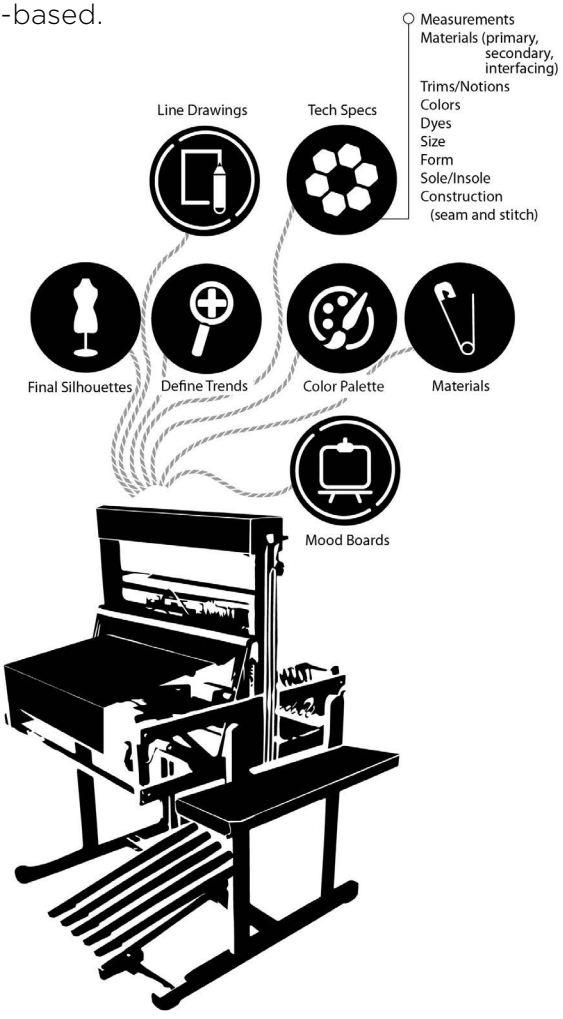
Inputs used during Inspiration

This is considered a very pure set of activities by designers. While there are technologies that facilitate the process, they are secondary in nature to the natural activities themselves. You should notice that the outputs from one phase are generally inputs to the next phase. Sometimes, outputs drop off and aren't picked up and used, until later in the lifecycle, making proper storage or digital availability important for retrieval and use during that future set of activities.



Outputs from Inspiration

The process of sketching designs is still a manual process, primarily involving sketchpads and colored pencils. Some design houses have adopted digital technologies, such as tablets and styluses along with creative software, to create and save in digital form, what once was paper- and pencil-based.

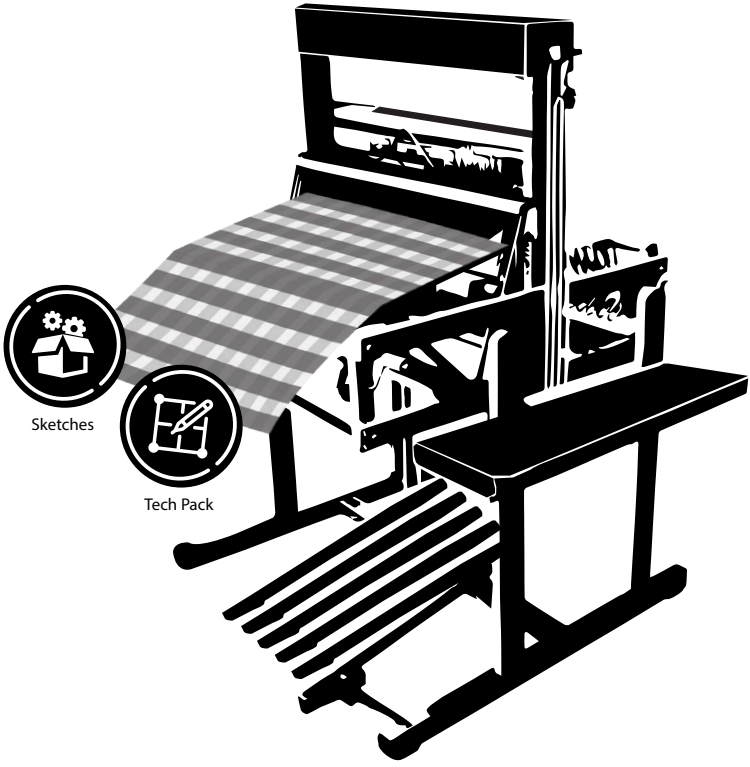


Inputs used during Design to create the 'Season' or 'Line'

Where technology truly comes into play, is during the handoff of designs from the designer to production. However, the conversion to digital is usually during pre-production and done by design assistants, who provide basic details about the design. Not all the details and specifications are added, until the design gets to pre-production. This could include the choice of zipper manufacturer, the fabric source or buckle metal content. All of these elements have an impact on the cost to produce the garment and the lead time for production. The production team then determines the average price to create the design and makes any necessary adjustments to meet the target margin and/or a target MSRP. Adjustments may also be made, because of the availability of material in a production region. The changes are then sent to the design team, which signs off on the changes (sometimes reluctantly) or modifies the design in another manner to meet a commercial target.

Once the design has been signed off by the design team, the design assistants input information to a computer-aided design program to give the designs dimensionality and ensure the right proportions for sizes and target markets' population. Other necessary information, such as type of fabric or fabrics, weight of threads, stitch types, fastener styles and embellishments, is also captured. The CAD drawings and garment details

together make up a tech pack, which is used by production to create the finished piece.



Outputs from Design towards creating the 'Season' or 'Line'

TECHNOLOGY AND THE DESIGN PROCESS
PROFESSIONAL SPOTLIGHT

An interview with

NOAH WAXMAN, Entrepreneur, Footwear Designer

linkedin.com/in/noah-waxman/

Noah Waxman has always held a passion for shoes and shoemaking, yet his foray into fashion was not a direct line. He was working abroad in the media broadcasting space, when he met a shoemaker who taught him the craft. Waxman spent 10 years in Amsterdam working full-time and making shoes in his spare time, before making the decision to return to New York and start his own collection.

Today, Waxman has a thriving upscale footwear and accessories business, selling online, wholesale, and retail in his New York City store. In his six-plus years running his own company, Waxman has seen technology become an integral part of the business, from design to inventory to customer acquisition and retention. For example, like many other designers, he regularly features his latest designs on Instagram, which can help his company measure customer sentiment and drive more business.

In this Q and A, Waxman discusses how technology impacts design and other parts of the fashion process.

As your business has evolved, do you ever see a time when you won't be using the wholesale model and it will be either e-commerce or retail?

I can see that. I feel like in the last five years so much has changed about this business. And, all of the kind of rules and ways in which brands like mine want to grow to become successful has really shifted, and I don't think it's finished shifting. I'm in that in-between place, where I've built up something under one model and, to grow and continue, I have to be open to the fact that things are shifting and that may have implications for my business in the future.

How has the design process evolved over the last couple years?

What I see now with a lot of brands that are very techy, is that it's all about the analytics—which seems to be the case with a lot of things in the world today, not just fashion.

Analytics obviously helps in terms of forecasting and in terms of understanding what people want and understanding what the market wants, as well as how to develop products that are more apt to sell through. But I think it does come at a cost to creativity and design sensibility. And, I see with a lot of new brands that are very techy and all direct-to-consumer that things get distilled down to very basic types.

Technology can be a real help in terms of the back-end and everything from managing inventory to logistics to things like payment software how that's been revolutionized. And, just distribution—people can shop in many different ways and many different moments.

I use technology and I'm grateful for all the things it can do, and all the ways it can simplify what we need to do even as a small brand. We even use computer stuff for design work and things like that—it's not super high tech, but I feel like that's part of the world now. So, in my own work, I try to balance it with other ways of imagining and coming up with ideas and being creative because I don't want to leave everything to just the analytics and the technology to do that. It wouldn't make me happy.

Do you consider data to be a driver for your business?

I definitely do. I've always listened to customer feedback, even when I met customers in person. If somebody had a comment or suggestion or feedback on a shoe, I would put it in the tank as I'm thinking about making new designs or updating old designs. So, I've always been open to that. The ways that I've used data in a more techy way have been more on the sales and marketing side.

Do you think data-driven technologies are going to be big drivers for fashion moving forward?

I think tech has already had a huge impact on fashion and I think it will continue to do so. But, I do think that other things that are also impacted by tech in different ways also will have an influence on fashion. If you look at how people live and work today, even that has an influence on fashion. When I started five, six years ago, I was selling a lot more leather-soled shoes and dressier stuff. Nowadays, that's been completely overtaken by rubber-soled shoes and casual shoes and sneakers.

What advice do you have with regards to technology for anyone entering the fashion sector today?

The one rule of technology that we should know by this point in time, is that we don't always realize the full force and the full effect, until long after we've all signed on for it. I would just encourage other people coming into the field to think about what their brand is, what their brand positioning is, what the core values of their brand are, and then make decisions. Because it's so easy nowadays to use technology for almost everything. And, just make sure that there's some congruence between how you want yourself to be presented and what you stand for and what you're doing.

TECHNOLOGY SPOTLIGHT:
Adobe Creative Cloud

The technology used during the design process has a decidedly creative bent, to enable designers to work without constraining their creativity. The Adobe Creative Cloud applications—namely Adobe Illustrator and Adobe Photoshop—are the most widely used applications by designers, as they are designed specifically for those in the creative arts.

Adobe Illustrator is a vector graphics editor that designers can use to manipulate their design sketches or even create sketches within the program. The application features tools for drawing, typing, painting, reshaping, slicing and cutting and moving and zooming—everything a designer would need to visualize a design with different colors, trims and patterns and paired with various other garments and accessories in a collection. Pen and pencil tools enable the user to add features or make changes on the fly.

Adobe Photoshop is a raster image editor used mainly by photographers to edit photos to adjust lighting, correct color or to add or remove elements of the photo, such as changing the background. Third-party "plugins"—available add-ons

to the program—extend Photoshop's capabilities, such as adding special effects (changing the model's skin to look like lizard skin, for example) or 3-D effects. Like Illustrator, Photoshop has a number of tools that a user would need to manipulate the image, including drawing, painting, measuring and navigation, typing and retouching.

As noted, both Illustrator and Photoshop are part of the Adobe Creative Cloud, which includes a whole host of applications designed for the creative visual arts, from creating and editing to viewing and managing files. As the name suggests, Creative Cloud is available as a cloud-based subscription service, with four tiers available that offer a variety of applications, depending on the tier, from single applications to multiple or all applications. Because it is cloud-based, users must have an internet connection to use Creative Cloud; on-premises versions are not available.

Pre-Market for Merchandise-Driven Companies

The technology used by designers during this phase is very limited, although a few high-end companies have systems that capture inspirational items, prototypes and samples that lead to the final production units, as well as tagging and tracking

the final runway garment and its relationship to the inspiration. Much of this is done as much to facilitate future design, as it is to preserve the heritage and memorialize the work of the designer or the design house/brand. The designs and functions of these systems are similar in nature to museum curation systems.

In the commercial apparel space, the story is much different. The amount of inventory determined, as well as the type of inventory and the logistics associated with creating the inventory, necessitates the use of various technologies by merchandise-driven companies.

The process for these companies begins with determining which items will comprise their seasonal collections or line. This requires them to look at current trends in the industry, as well as historical sales information. Fabrics, colors, pant and sleeve lengths, fastener types, collar styles and more are all influenced, based on this data.

Some data, such as historical sales data, is internally generated. Others, such as consumer reaction to runway styles and fashion trends, can be culled using big data tools and data analytics systems. Information can be collected from virtually any source—social media posts and comments, blogs and online fashion coverage, current retailer inventories and sales trends—all with the goal of providing merchants with intelligence they can use

to procure designs that will hit the mark, in terms of consumer adoption.

In the commercial apparel space, merchandisers are often the main points of contact and the front line in the decision-making process. This involves everything from choosing the styles and colors, to how many of each size to produce. In addition to the insight that big data analytics provides, merchandisers rely on their experience in the industry for much of their decision-making. Many of them use their personal take on the market, along with information they gather from interactions with others about what consumers are buying, in deciding/recommending what to include and what not to include in the collection or line. In the future, companies may employ artificial intelligence to try to re-create some of the merchandisers' experience—a notion that could have major implications on the job title and associated duties.

Pre-Production Merchandising

Once designers and merchandisers have defined the collection or line, they then determine what merchandise will make up the collection or line. This is based on information, such as historical sales trends. For example, merchandisers may include fewer handbags for their cruise collection, since handbags don't sell as well then, as they do in other seasonal collections. They may also order a

greater number of turtleneck sweaters in red, recognizing that red will be the "in" color during the winter season. It's part of their job to know which categories sell better during each season, even in different geographies.

The merchandiser is the ultimate initial numbers person, deciding what needs to be created, from the types of apparel in the collection or line to the color assortment and size range of each piece. Much of their job revolves around determining the mix and the ratio, to ensure that the right amount of inventory is created to fulfill orders and replenish, as necessary.

In determining the right amount of apparel to produce, merchandisers must also understand how much each piece costs to produce. Once a target financial goal has been determined by the finance department or the executive offices, merchandisers create a high-level target plan that outlines how they expect the collection or line will perform in each channel—wholesale, retail, online, etc.—and other factors that might affect the price, such as shipping costs, returns, markdowns and off-price liquidation. Once all factors are included, and they have set the markup price and margin, merchandisers can then determine how many pieces need to be produced to reach the financial goal. Whatever tool they are using, the merchant can do what-if scenarios, such as the impact that

dropping one item from the collection might have on production and financial targets.

This isn't a one-time process. Merchandisers continually revise and adjust the numbers, as changes to the collections or line occur. In many ways, the financial tasks performed by merchandisers during the pre-market phase can determine the ultimate success of the collection, line or an entire season.

The merchandiser also works with other departments, besides Finance, throughout the pre-market phase. After determining the assortment of apparel to match financial targets, merchandisers work with the Production Department to schedule the creation of the apparel to ensure that availability targets and margins are met. This includes any logistics information, such as the number of production runs needed to fulfill orders and with the help of their logistics partners, packing and shipping information for pre-orders.

Merchandisers also work with the Sales Department, to ensure that the right product is being sold through proper sales channels and in the correct amounts, whether in retail stores, online or through wholesale distributors. Geography also plays a role in this step, since not every apparel type is appropriate in every region. Based on previous sales data and drawing from their experience, merchandisers know that turtleneck sweaters sell best in regions

with multiple ski resorts, for example, and dark shirts tend to not sell well in the Southwest. They might also know that evening gowns sell better in brick-and-mortar stores than over the internet. Armed with that information, merchandisers can work with Sales to ensure that each channel has the appropriate allocation.

Forecasting is an important part of merchandisers' jobs in both design and merchandise driven companies and overlaps with Sales' commercial planning responsibility in most organizations, when collections and lines are developed and produced, based on their directives. In the retail space, forecasting becomes even more critical, since merchandisers consider the apparel and accessories that will grace store shelves and racks, essentially setting the ambiance that customers will experience when they walk through the door. They need to ensure that the merchandise they select is appropriate and attractive to their store's target customer—short shorts won't sell in a store targeted to professional women, just as suits won't sell well in a store targeted to teenage girls.

In retail environments, sales forecasting is based on more granular information. Some of the information is historical—what has sold well in the past, the areas in which certain products have sold and how many of certain products have sold, for example. Other factors considered in forecasting

and planning include:

- **Geography:** What will sell in certain geographies? What won't sell well?
- **Category:** Styles that are trending, will sell faster and in greater numbers than regular stock items.
- **Price point:** Will items be priced in line with what target customers are used to paying or what competitive products are priced at?
- **Economic factors:** How will the economy impact sales, and what areas will be impacted most?

These and other factors are individual data sets, from which merchandisers can extract trends and forecast their product allocation. Using big data analytics, merchandisers and planners can take these data points and combine them with other external data to better project demand.

Regardless of the information used, retail merchandisers and planners must build their forecasts at generally high levels and by seasons. Certain retailers that have sales data for each location (also known as door-level) can make more precise forecasts and more accurately order inventory, which can result in higher levels of items sold at full price and reduce the amount of stock left over at the end of the season.

It's clear that forecasting is a major part of the pre-market phase, since it sets the pace for the rest

of the phases in the life cycle. Whether merchandisers work for commercial design houses, wholesalers or retail stores, all rely on forecasting to ensure that apparel is stylish and on-trend, inventory is plentiful and prices are appropriate.

Without the insight that big data analytics can provide, merchandisers must rely on their intuition, experience and historical sales information. All are useful in forecasting, but they don't provide the algorithm-based, repeatable actionable intelligence that comes from big data analytics.

Regardless of whether they are design-driven or merchandise-driven, most companies perform pre-production activities to gain inspiration, determine what types of garments they want to create, sketch designs and create mood boards to arrive at a broad idea of a line. The pre-production process isn't refined—it's often vague and includes ideas and comments from the designer and the design team.

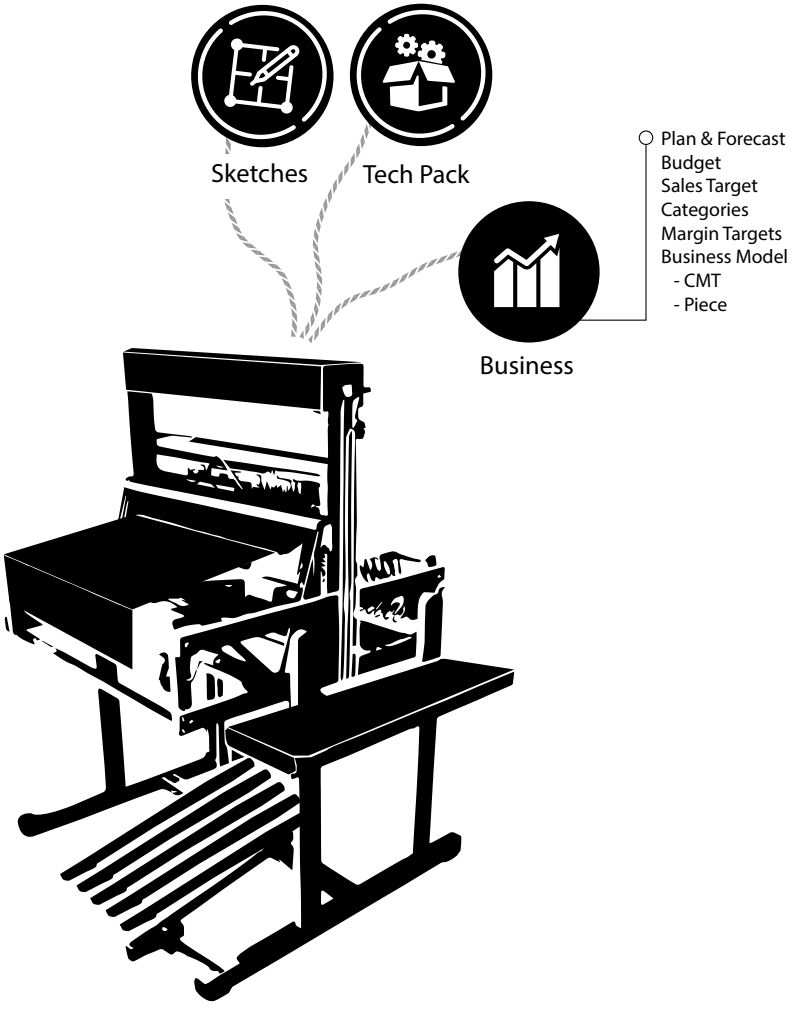
From there, designers, merchandisers and production work together to determine whether a line can sell. Does it meet what the market is looking for? Could the items be created and sold at the right price point? Can the ideas be turned into reality? If the answers are yes, the decision then must be made how the items will be created—either cut-make-trim, which essentially means buying material and assembling the individual units, or piece goods, which essentially means buying the unit as

a whole from a manufacturer—to meet the price point that reflects brand and make the necessary margins to be successful. In that process, they must determine how much the items are going to cost and whether they will meet the needs of the brand and the customer, as well as quality benchmarks.

Pre-Production Costing and Sourcing

Those involved in pre-production, then look at the cost and source of each the item and its elements, including the material specified, the desired type of stitching, the lining, trim, collars—everything that goes into creating the garment and where the garment will be made—and understand how those elements will impact the cost. If the company is doing cut, make and trim, it must know the cost of each element and the labor involved in making the item. However, even if it is ordering piece goods, it still must have a general idea of what labor costs are, potentially by region, to ensure that it meets margin goals and know what elements to reduce, or factory locations to change, if the margin goals aren't met. Should the design include a pearl button, or should it be scaled back and include a high-end plastic? A thorough costing must be done at the garment level, and potentially at the element level, that shows the company how much it can make the garment for and how much it can sell the garment for. This must occur for every item in the

line, to ensure that there is balance at the target price point—low, mid and high.



Inputs to the Pre-Production process

TECHNOLOGY SPOTLIGHT:
Production Technology

Product lifecycle management (PLM) software is generally designed to be used during all phases of production, from concept and design through manufacturing collaboration. PLM is a platform that integrates the data, processes and business systems to provide visibility and better management of an item throughout its entire pre-production life cycle.

In fashion, one of the more popular PLM systems is Centric PLM, which was designed specifically for the fashion and consumer spaces. It links all members of a product team, including design, merchandising, planning, product development, product testers, sourcing, procurement, production and retail teams, offering an end-to-end view of the product's life cycle and providing complete transparency through all development stages. This level of transparency can streamline the production process, reducing errors and rework and improving collaboration.

Centric PLM is a cloud-based solution that is accessible via a web interface. Therefore, users can access it from anywhere they have an internet connection and on most devices, like iOS and Android. It stores data from each project, enabling teams to

reference past projects for insight to make more intelligent decisions regarding current and future projects. Users can analyze information, such as per item projected costs, markup, supplier performance, delivery calendars and other metrics that can impact a project.

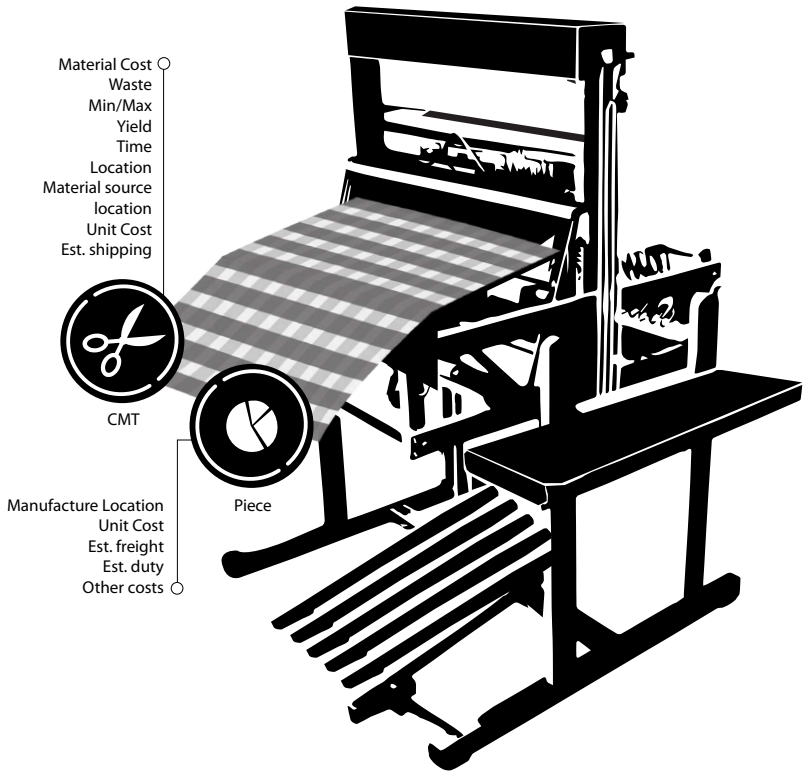
Centric PLM integrates with other business systems, including enterprise resource planning and digital asset management systems to leverage its data throughout an organization. The platform is customizable, so companies can choose the functionality that works best for them. According to Centric, available modules and functions include:

- Merchandise planning
- Product specification
- Materials management
- Product sourcing
- Cost scenario
- Collection management
- Calendar management
- Quality management
- Final inspection

The pre-production teams should also take into consideration whether the company has made a

similar item before. If so, and this version is simply a modification for the new season, then the information about the item exists. If the company has set up its systems data well, then the item's estimated and real costs will be available for reference, as well as a breakdown of unit, freight, duty (customs) and other costs to create a variance from an estimated cost and the actual cost.

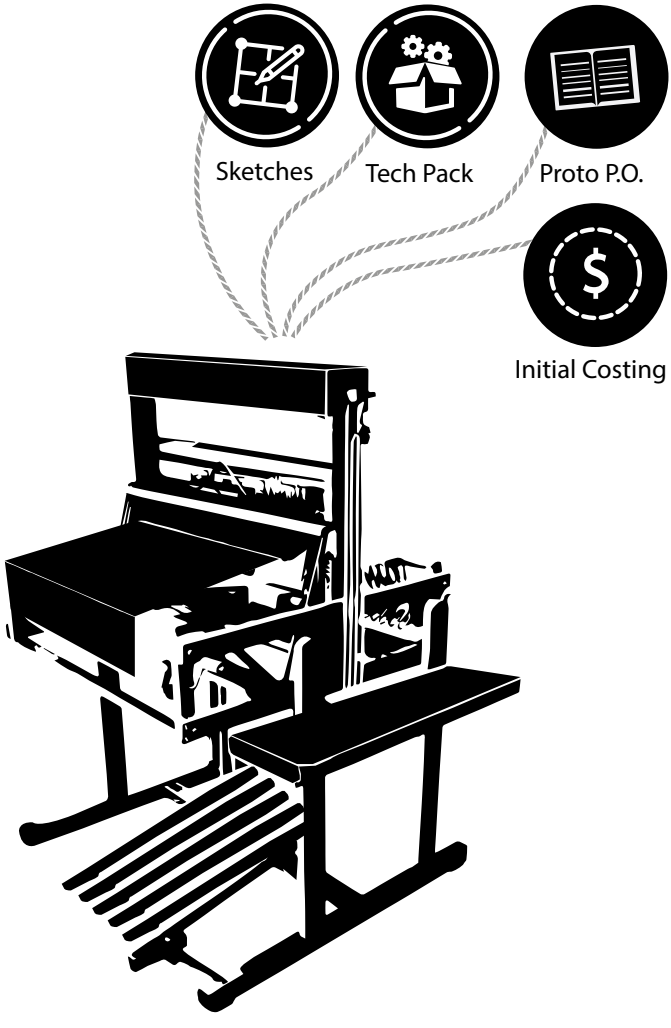
If the historical data is available and set up correctly, companies will also have a better understanding of what the next model will look like and most likely won't need to create a prototype. However, they may decide to create a prototype for quality purposes, such as testing the dye to see if it bleeds or whether the color is true, for example. If the first choice of dye isn't of good quality or appropriate for the item, the design team may specify another, more expensive dye, which would impact the production cost.



Outputs from Pre-Production process

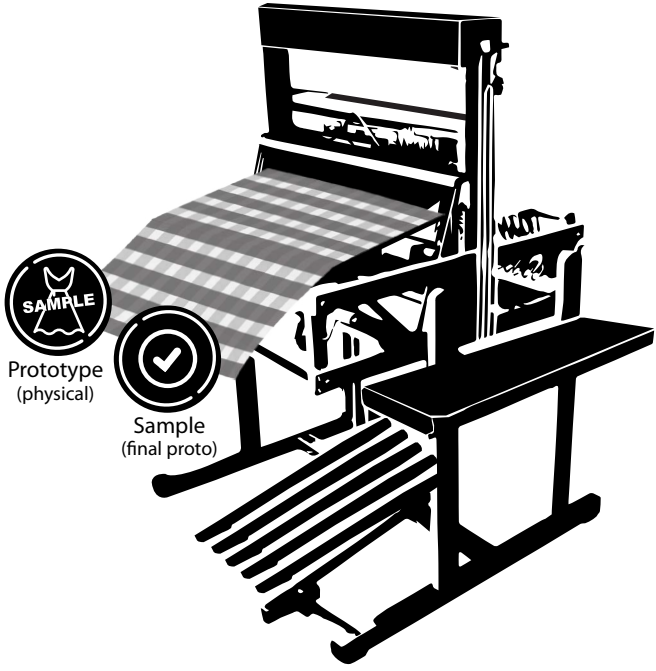
Prototype and Sample Management

Prototyping and costing are not always linear processes. When one changes, so can the other, so the teams must work hand in hand, as the design comes to life.



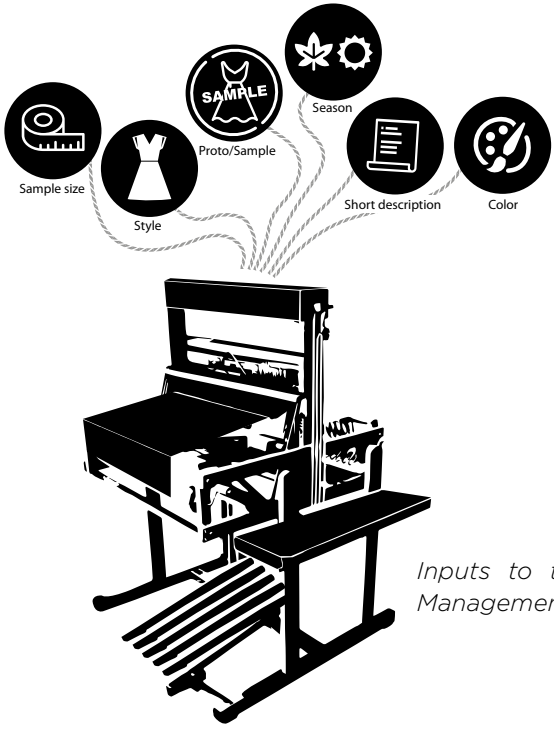
Inputs to the Prototype and Sample processes

An item may go through multiple prototypes, before a design or production team is satisfied. At this time, the final prototype may become a sample, which is then further modified for quality and cost, as the design team gets a look and feel for the actual product. Costing will change with each modification, so the team must ensure that the item still fits in the proper price range. The production team performs the costing and works with designers and merchants to get the pricing right. The sample eventually looks almost exactly like the production item. In this scenario, the product has gone through several prototype and sample iterations. In reality, however, it is generally not that complex and is usually handled in one or two iterations.



Outputs from Prototype and Sample processes

Once a company gets to a sample, knows what the costing will be (standard) and decides to move forward on the item, it may order a few more samples to be used for marketing and advertising. The company will sometimes ask the manufacturer to ship a few items from the "top of stack" to the home office for use as production samples. In the wholesale market, the sample may be photographed for the line sheets or as a display piece in the showroom. Once the company has enough orders and goes forward with production, 365-degree pictures of the samples may then be taken for the website and samples may be sent to the media for exposure or lent to celebrities and social media stars for their influence.



Inputs to the Sample Management process

No matter what happens to the sample, it should be tracked. The company needs to understand where a sample is and what it is being used for. For example, most advertising is created using samples, so a company should collect information regarding where the sample is being shown in ads, when it was worn in public by a celebrity or other influencer and what magazine it appeared in. Since most samples don't yet have a SKU, it can be difficult to relate the performance of a sample without this type of data. Once the items receive a SKU, the company should connect those data points to the SKU, thus creating a historical profile of the sample.

Outputs from the Sample Management process

SAMPLE MANAGEMENT & INFLUENCE
PROFESSIONAL SPOTLIGHT

An interview with

EDDIE MULLON, Entrepreneur, Fashion Technology Industry Expert

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Entrepreneur Eddie Mullon views the relationship between fashion and technology from the perspective of a technologist solving a problem of inefficiency. He started in the apparel industry in the early 2000s, recruited by one of his computer repair clients to build a sample management system for their company, which was having problems keeping track of where their samples were going—and eventually ending up. That solution has since expanded into a platform that also includes management of fashion shows and digital assets, as well as other areas.

Today, influence is a major part of sample management—specifically, how apparel companies can use their sample management systems to ensure the right products reach the right influencers—big-screen celebrities, small-screen celebrities, and social media celebrities alike. This is especially important in the age of Instagram, where there is a thin line separating influencers and consumers.

In this Q&A, Mullon discusses how technology

can be used to promote greater efficiencies and engage a wider audience of consumers.

Since sample management is where you got your start, what was it about it that piqued your interest in fashion?

I think it was the inefficiency. Because everything was handwritten, it used to take around 40 minutes to take items from the rail. I was able to take that whole process and then cut it down to about two minutes, by barcoding everything, which was then scanned. Just seeing the transformation from people who were going through this 40-minute process down into a couple of minutes really inspired me that I could actually make a big change. And as I started to understand the industry, I saw there were other areas of the industry that needed a lot of help like this.

How does sample management lead to influence, or how are the two connected?

If you're a brand, you need to get samples out to influencers, and that involves a lot of communication back and forth. Once you have their input, you have to send it to them and then either it's placed or it's returned, and if you're dealing with a large collection there's a lot of back and forth. The influencers not only take in samples, they also are very important to the brands.

As a brand, it's really important you get the right influencer, and you can either pay an influencer or you could find the right influencers who can get your product in the right market. For example, say you're a New York designer and you want to launch in Japan. You need to know the right influencers in Japan that are close to products similar to what you're looking to launch as well, because you then can run reports, see what their prices are, see what the engagement is, and see if they fit with your brand.

Instagram has really changed the world of fashion and the whole industry. About 10 years ago, a lot of the influence was with Vogue or other publications and Anna Wintour, et cetera, but Instagram gave power to influencers to reach the consumers and create trends and that really has transformed the industry—influencers have a lot of power because they're connected with the consumer. And brands want to reach the consumer, so they need the influencers.

How important do you think data and systems are to the industry in general, but also specifically to sample management and influence?

Data is really important, but there's a passion in fashion and creativity, so you can't rely solely on data. Plus, if you're launching a new product, you can have all the data and you can understand everything, but at the end of the day you need to

engage with the right influencers. You need to have the relationships. I think relationships are so key. A lot of this is strategy and relationships, and the data is a part of it. Data makes you more aware—which is good, and you can be a lot smarter—but it's truly about the relationships. Otherwise, it doesn't work.

TECHNOLOGY SPOTLIGHT:
Sample Management

The process of managing the different samples that a company produces for photo and video shoots, runway and trade shows and celebrity endorsements can be difficult and time-consuming, especially for companies with multiple lines and a large number of samples. Keeping track of the whereabouts of each sample was traditionally done via spreadsheet. However, the process of managing the information in this format was a tedious, manual effort that was often abandoned. The result was often many samples that were lost or forgotten, lost investment and unprotected Intellectual Property.

Samples by Launchmetrics is a point solution application that is designed specifically for managing the tracking of samples and sample collections. Using RFID and barcodes for inventory and tracking of samples, the software registers when items are checked in and out. It requires users to fill out information, such as where the item is (available or on loan) and its expected return date. All the information is stored in a database that users can access from a web-based interface or a mobile device, which they can also use to scan samples to

check them in or out from any location. The software also allows users to reserve items for future use, which are currently out on loan.

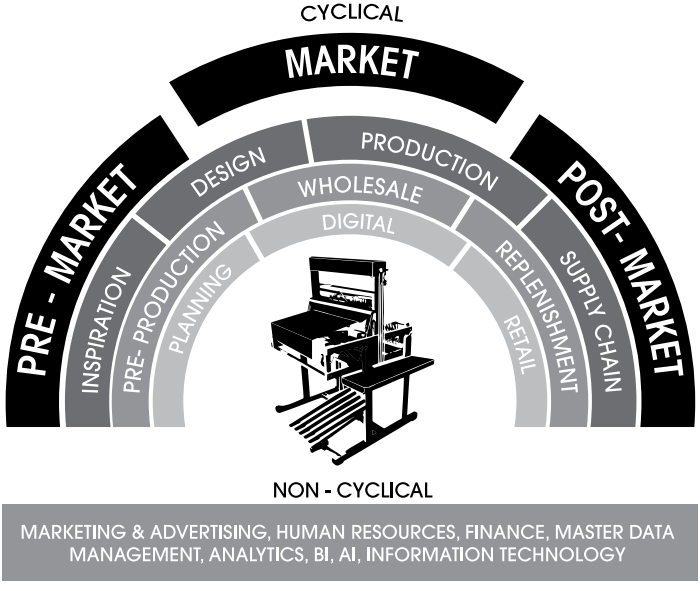
Metrics provided by Samples enable organizations to analyze missed opportunities for coverage because of unavailable items, review the top requested samples, conduct audits of sample inventory and forecast future sample needs, based on historical demand. This information can be helpful in ensuring that there is an appropriate number of samples in the categories most requested by magazines and PR firms.

Many, if not all, the processes can be managed within a product lifecycle management tool, which allows companies to manage a line from inspiration to inception to retirement but does not handle commercial transactions. Project lifecycle management tools include design information and product development information, including the cost of elements, and information regarding requests. It also can help companies keep track of purchase orders for development and for the initial cost of goods sold, so companies can track samples and tie them back to the final SKU. Certain project lifecycle management tools can track

samples at a detailed level, such as when the samples left the company, when the samples were returned, what the samples were used for, who wore the sample, etc..

A note on cut-trim-make versus piece goods: The majority of companies now buy piece goods rather than cutting, trimming and making their items. This is primarily because most companies don't own a factory. Cut-make-trim is very important historically and the process shouldn't be discounted. Even in today's technology-centric environment, cut-make-trim is still being taught. However, while cut-make-trim has its place in certain circumstances, such as with high-end runway designers, it is not the most popular method of creating garments. However, companies with technology allowing for mass customization are emerging, as discussed earlier.

Phase 2: Market



The Fashion Lifecycle: Market processes

The second phase of the fashion life cycle is the Market phase. This is the point at which orders are placed and the final decision on what items will be sold is made. As with the pre-market phase, the technology used during the Market phase is determined by the business model of a company—design-driven or merchandise-driven—and their unique circumstances.

Design-driven organizations tend to sell their collections or lines wholesale directly to retailers, and/or retail through their own branded stores. Ralph Lauren, Kate Spade, and Tory Burch are

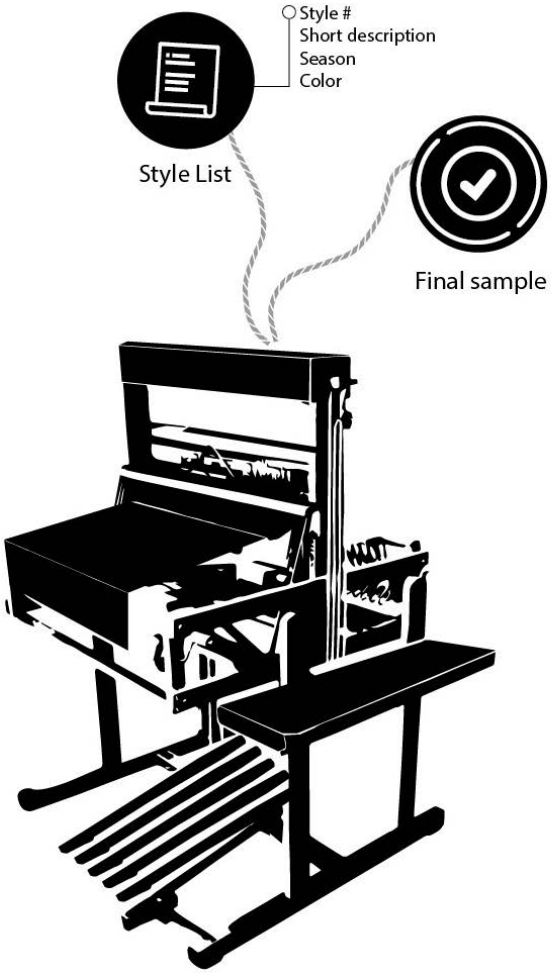
examples of designers or design-driven companies that sell wholesale to retailers, such as Macys, which also sell other brands, as well as retail through their "company" stores, which only sell their brand. Their goods typically are sold during market events, and their output can be based either on projections determined during the pre-market phase or on the orders generated during the market events.

Merchandise-driven organizations, meanwhile, tend to work with wholesalers to procure items that retailers can sell under various labels, including their own private labels. They, too, have market events, but their emphasis is on getting to market as quickly as possible. H&M is a perfect example of a merchandise-driven company in the "fast fashion" space. It strives to have apparel from "runway," not really an H&M event, to its store shelves in about six weeks. Therefore, it relies on suppliers to produce items as quickly as possible. In fast fashion, timeliness and price trump quality of goods. Items are not meant to last more than a few seasons (about as long as the item is projected to be in style).

Digital Asset Management

Both design-driven and merchandise-driven companies rely on images to help sell their goods. After all, a customer is more likely apt to purchase something they can see, rather than just read a description of it. As a result, companies take many photographs of

their items to use in line sheets, magazine advertising, on billboards, in catalogs and even online. Starting with images taken of samples for advertising purposes, companies recognize the importance of keeping their digital assets safe and organized.



Inputs to Digital Asset Management

The practice of digital access management—or managing, collecting, labeling and organizing different digital media types—came about when companies realized that, like tracking a sample to the SKU, tracking images and other data assets related to the SKU across the life cycle can also be advantageous. A picture of a sample used for line sheets can be associated to a SKU. The company can then track the image, wherever it is used and use the data to determine various things, such as audience, reach, buying trends etc.. The more information a company can track about the digital images, the deeper the data and, hence, the more insightful the intelligence.

A case in point is Ralph Lauren's 'Polo Point', or so it was named when first developed, the company's collection curated in an image format with the physical behind it. Ralph Lauren captures and archives every line and collection that has walked the runway and associates them with early line drawings and the things that inspired the pieces. This includes pieces from worldwide shopping events over the course of the history of the company. The stages follow in digital format and, whenever possible, they look to track things, such as how many were purchased after one show, for example, and where images showed up on social media sites.

Outputs from Digital Asset Management

TECHNOLOGY SPOTLIGHT:
Digital Asset Management

Fashion is now marketed on a number of different platforms to reach a vast and wide-ranging audience. Photography and print media are now accompanied by video, social media and websites, as vehicles for presenting new lines and highlighting new styles. Therefore, a company has more marketing assets to manage, in addition to photographs, including videos (long and short) and records of items that are considered inspirations to a seasonal line.

Technologies, collectively known as being in the domain of Digital Asset Management, are being used to help companies collect and manage their images and other important media related to lines, from fashion shoots and runway images to videos, .gif images, print advertisements and "vines," or looping videos.

Adobe Lightroom is this type of digital asset management offering. Part of the cloud-based Adobe Creative Cloud suite—which also includes Illustrator and Photoshop—Lightroom enables users to upload, store and access their photos from any location, provided they have internet access. Images are organized via searchable keywords

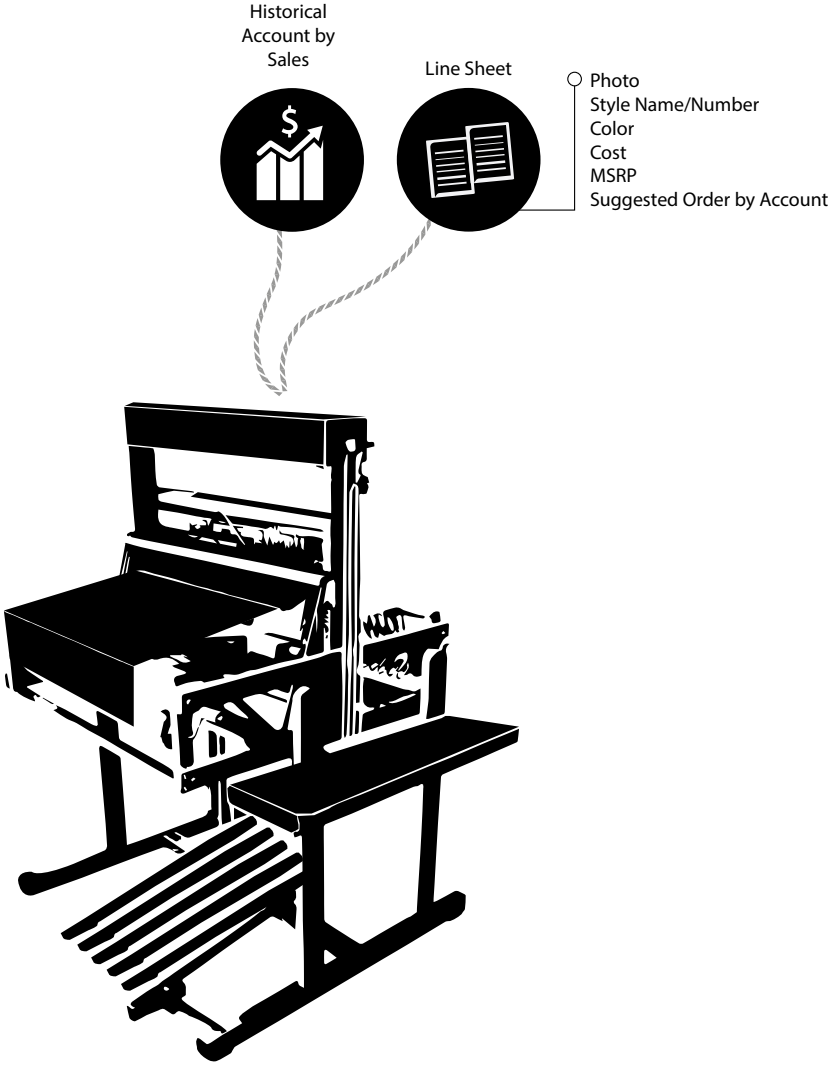
that are automatically applied, so users can find specific images quickly and easily.

Bynder is another company with a digital asset management solution for digital media. Its web-based solution enables controlled access to images, photos, videos and creative files, as well as audio files, presentations and documents.

Despite the importance of images in today's multimedia marketing strategies, there is still a lack of digital asset management technologies. In response, some fashion companies have created their own homegrown solutions that address their unique needs for asset management. For example, one iconic American brand has developed a system that has images but also includes a comprehensive inventory of physical items collected worldwide to serve as inspiration for seasonal lines. Those items have been photographed and their information captured in the system with RFID tagging and storage in museum format with climate control. The items can be requested and tracked electronically for hands-on use, when needed. This proprietary system also allows for virtual viewing and arrangements, seamlessly tying the digital and physical worlds into a unified process.

Sales and Ordering for Design-Driven Companies

Designers tend to work in three ways: create some pieces on their own, work with organizations to make patterns which become pieces and contract with an apparel manufacturer to produce on their behalf. They then generally show their collection at fashion week runway shows, which occur at multiple times per year for their biggest seasons in locations around the world. Some show their entire line or collection—everything they can sell—while others show more stylistic designs that typically aren't for sale but highlight certain styles or fabrics that will drive the market (they hope).



Inputs to the wholesale sales process—better known as Market

Following each show, designers host market showrooms to sell whatever they are selling for that season to the wholesale market. These are business to business transactions. Sales to individuals generally happen at a point later in the lifecyle.

At market, buyers will work with the designer's commercial team, which usually includes sales representatives and, sometimes, merchandisers. Sales reps will work with buyers to place orders for their stores. Line sheets that have the style level details of the product offered for sale, along with the product's picture, are critical during this activity. Cost and Price is two key data elements needed during Market, although I have met an extraordinary commercial sales woman who, when the Production team hadn't gotten the pricing data into a new system on time, told us ' don't worry if the system doesn't have the price, I can sell it anyway'. She did and it was amazing.

Because orders are being placed for items that sometimes won't be available for months down the road, it is critical that these companies are able to forecast demand accurately. A market event occurring in May, for example, is for merchandise that will hit the store shelves in late October or November of that year. That's why the steps taken, and systems used, from Excel to the sophisticated demand planning solutions, during the pre-market phase to determine market demand are critical for both buyers and sellers.

In addition, there are generally two or three deliveries during a season: an initial delivery, which often is enough for retailers to begin selling the merchandise, and a second (and third) to fill out lines and replenish stock.

The majority of merchandise-driven companies begin producing or procuring the items in their line or collections before a market event, based on projected demand. Other design-driven companies, however, don't produce anything other than samples, until after the market event. In this scenario, buyers place their orders with the designer or the seller, who then either manufactures the items themselves or places an order with a contract manufacturer with an agreed-upon production schedule.

There is another population of companies that don't just buy during the showroom period after market. Many make a commitment before market on certain products that they are confident will sell. However, they won't do a second or third delivery, if they don't sell well enough. These are typically pieces that have wider appeal. Merchants are compensated on how well the lines perform each season, so they tend to gamble on items that are considered "sure things."

Merchants often deal with the issue of their designer bosses getting rid of merchandise right before market, because they don't like the style, color, trim or other reasons. To counter that,

marketers and merchandisers often put out styles that have not been pre-ordered and, understanding what the designer's taste is, they know the designer will get rid of. There is an art behind this tactic. Children, don't try this at home.

Sales and Ordering for Merchandise-Driven Companies

Certain retailers are in what's known as fast fashion, or apparel that moves from runway to store shelves in a short period of time at inexpensive prices. The collections or lines these merchandise-driven companies sell, take their cues from the cuts, fabrics and styles shown at market, as soon as weeks before hitting the stores. Retailers including H&M, Old Navy and Forever 21 are considered fast fashion, with a nimble supply chain that can produce inventory, based on customer demand in short lead times.

For these companies, which are attempting to predict the trends being set by designers, or copy current trends, procurement is much different. In fast fashion, merchants develop a plan that outlines how many of each item is needed in each category (outerwear, casual, etc.).

Once the merchants have done their high-level analysis, market experts in each category determine what styles are hot and will sell well. They often don't go deep into specifics, such as secondary

materials, fasteners and embellishments. They get bids from manufacturers, who show the market experts what they have that fits their criteria and what they can create. Designs are modified, until they meet a particular price point that is determined by the merchants.

Merchandise-driven companies that don't have their own retail establishments, approach their sales differently, showing their lines or collections at market and taking customer orders. This approach is similar to design-driven companies. However, with merchandise-driven companies, the merch group often develops a merchandising plan by customer, which is then provided to sales. Alternatively, a merch plan in total is provided, which salespeople then figure out by customer. Either way, total amounts are provided ahead of time for the salesforce to sell to.

In these organizations, the head merchant is generally the most powerful person in the company. They determine how much of each piece will be created to sell. Sales plans are tied to the merch plan, which itself is tied to the financial projection for the year—a plan that is revised three to four times a year, based on market/economic trends.

Market Process and Technology

During the market selling period, the designer's commercial team takes orders (sometimes using

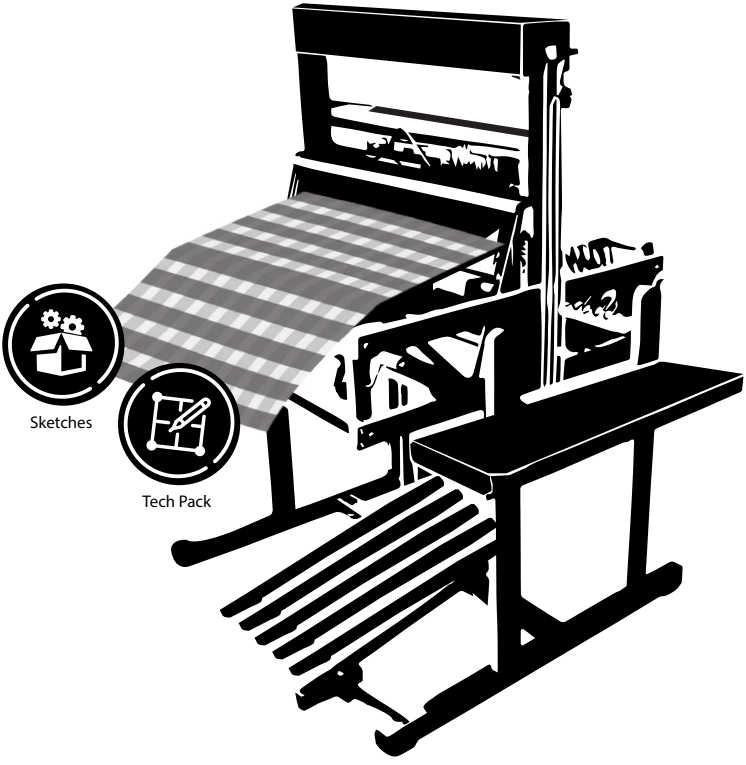
an Excel spreadsheet) and creates pro-forma invoices. Tablets loaded with apps, such as Threadvine or Joor, are helpful in this phase, since they can create the invoices on the spot and include pictures, drawings or other items that are useful to the buyer. The commercial team can also track actual sales versus projected sales and make adjustments, where needed.

If commercial teams don't have live technology, they often make notes about each sale and buyers provide a spreadsheet of their orders. Then, using the order entry function of a larger tool, such as SAP, Microsoft Dynamics or other enterprise resource planning (ERP) program with a front end designed for entering orders or uploading spreadsheet, Sales can input their customer orders.

Before the orders can be logged, however, the system must be loaded with the SKU's/Items that make up the collections or line, as well as all design and product information. Customer information must also be loaded into the system, before their orders can be entered.

Once the orders are logged in, Sales aggregates them and updates sales projections accordingly. If the company has its own direct to consumer sales channels, like retail stores or an e-commerce site, the sales projections for that product must also be factored into the overall projections. This gives the Production team an accurate estimate

of demand for that season or line of products. If the styles haven't been made, merchants will then give the information to production, which will order the product or tell the stitching crew to begin production.



Outputs from Market activities

BUSINESS-TO-BUSINESS TECHNOLOGY PROFESSIONAL SPOTLIGHT

An interview with

MONA BIJOOR, Fashion Technology Entrepreneur, Investor

linkedin.com/in/monabijoor/

Mona Bijoor has a unique perspective on the impact of technology in the fashion industry. As an entrepreneur and founder of the Joor digital wholesale marketplace platform, she understands how important data and technology can be in helping companies extend their brand beyond the showroom and expand their reach to a global audience.

Bijoor started in the fashion industry as a management and private equity consultant, helping companies in the retail and consumer product space. After receiving her MBA degree, she switched her focus to operations and eventually worked as a buyer for various well-known brands. It was during her tenure that Bijoor realized a need to bring technology to the buying process. Therefore, in 2010 she launched Joor, which today is a website, mobile application, and suite of ecommerce integration services that brings brands to retailers online.

In the following Q and A, Bijoor discusses her perspective on technology in the fashion industry as it relates to business-to-business commerce.

Let's start with some of your thoughts on the fashion industry in general and what trends you're seeing.

There are a few major trends going on in fashion and retail. Today, what I'm seeing is this rise of digital, direct-to-consumer brands, whose go-to-market strategy is to initially bypass, but then backtrack and get into, the physical store and wholesale. And that has led to this need for convenience. So, I think, now, fashion retail is really about the need for convenience, number one, and that could be in the form of one-day shipping, or free shipping, or delivery to your door.

Number two is this need for personalization. We're seeing this in beauty brands, where you can customize the type of shampoo that makes sense for your hair type. And then to some degree, we're seeing a third trend, which hasn't fully emerged, but it is this notion of "no brand."

Where do you see technology making an impact in the fashion industry?

I like technologies around what the store of the future will look like. I think it's going to be about the experience you have when you walk into the store: Is it intimate—do the salespeople know you? Do they have personal data on you?

Millennials and Gen Z's give up data, if they feel like it's being used for a worthy cause—if it's going

to get them better or faster service. So, how is that data being used and furthering the customer experience for the customer? And that could be anything from client relationship management (CRM) software to more general software, where it's cashless and customers can walk into the store without their wallet.

Also, in fashion, specifically, is robotics—the ability to use robots to manufacture 80 percent or so of the garments—and the way in which the factory is now structured for sustainability, where there's no kind of waste going out into the water when you're producing denim, for example. There's going to be a lot of innovation around the factory setting and how to obviously speed up the production, but also do it in a sustainable way.

And then the third trend that I'm looking at a lot is artificial intelligence, the use of bots for customer service and big data in trying to figure out the kind of customer purchase behavior. This is going to happen very, very quickly—within the next two to three years, because AI is pretty easy to adopt. There will be just a major shift in the amount of knowledge that not just retailers have, but everyone has about the consumer piece.

Do you think fashion brands are thinking more about business-to-business technology these days?

I think that's kind of where they were about

five years ago now. Today, it's like table stakes; you have to be on a B2B platform. Joor was the first, and now there's several to choose from. But I don't know how you would survive as a brand, if you weren't using B2B technology.

TECHNOLOGY SPOTLIGHT:
Wholesale Sales

The wholesale sales process has changed dramatically, thanks in large part to technology. Take, for example, the internet, which has transformed what was once a manual, travel-intensive process to source and purchase products into something that now can be done online via virtual marketplaces. Today, wholesale buyers have the ability to do most—if not all—their buying from the comfort of their desk chair.

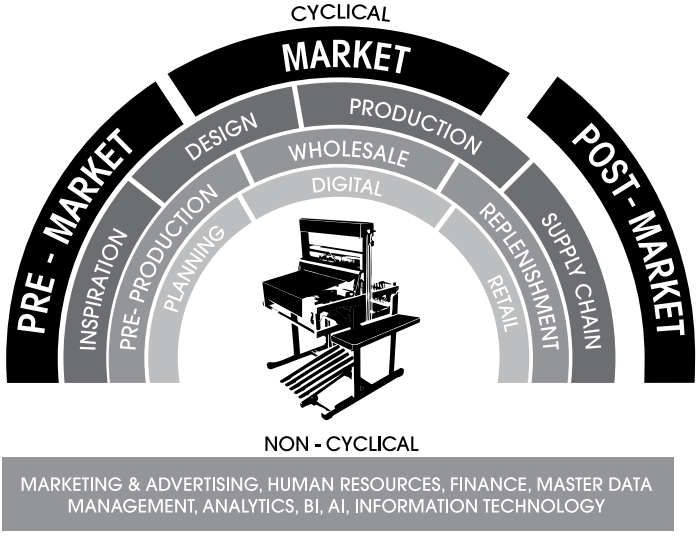
Joor is one such online marketplace. The site, founded in 2010 in order to enable brands and retailers to connect and transact business online, rather than at fashion shows or other buying events. Joor has since expanded into a mobile application, which offers a suite of integration services to expand the buying/selling experience. Joor is designed to help companies drive incremental revenue and cut costs, while being able to analyze the performance of their offerings.

Brands can use Joor to connect with buyers anywhere in the world, while retailers can use Joor to discover and access brands equally as far-flung. Today, the company boasts more than 1,200 men's fashion, women's fashion and home

brands on the site and works with more than 150,000 retailers worldwide.

Beyond simply ordering, Joor also manages customer, inventory and historical data, so both buyers and retailers can ensure they have the intelligence they need to make informed decisions. Plus, Joor also integrates with enterprise resource planning (ERP) technologies to enable seamless access to data for tasks ranging from estimating shipping costs to determining product margins, further streamlining the process.

Phase 3: Post Market

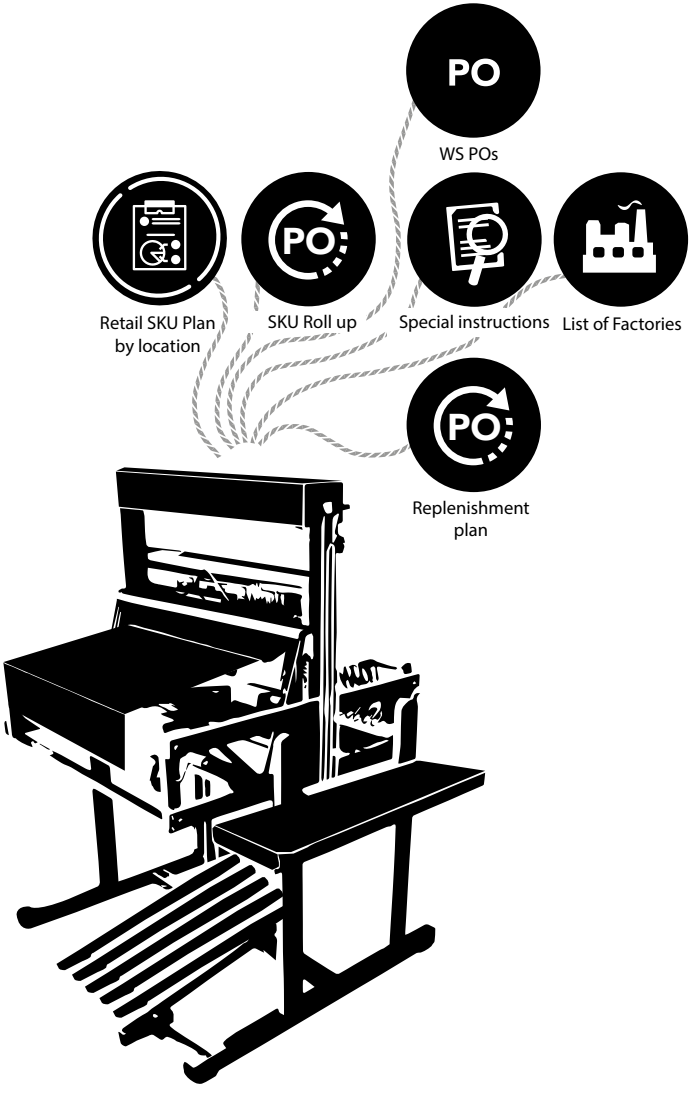


The Fashion Lifecycle: Post-Market processes

Production

For both merchandise-driven and design-driven companies, orders to Production look the same. Production works with the design and/or merch teams in the pre-market phase, as well as during the design phase to create samples. Production works with different manufacturers to have samples made, which then go for review. Once it has been determined that the garment can be created at a particular price point, the production team sources what it needs, if a customer is buying early. If there aren't any early orders, Production may wait until a large percentage of orders comes in at

market, then will start committing to manufacturers to produce the goods. Percentages and exact processes vary by company, of course.



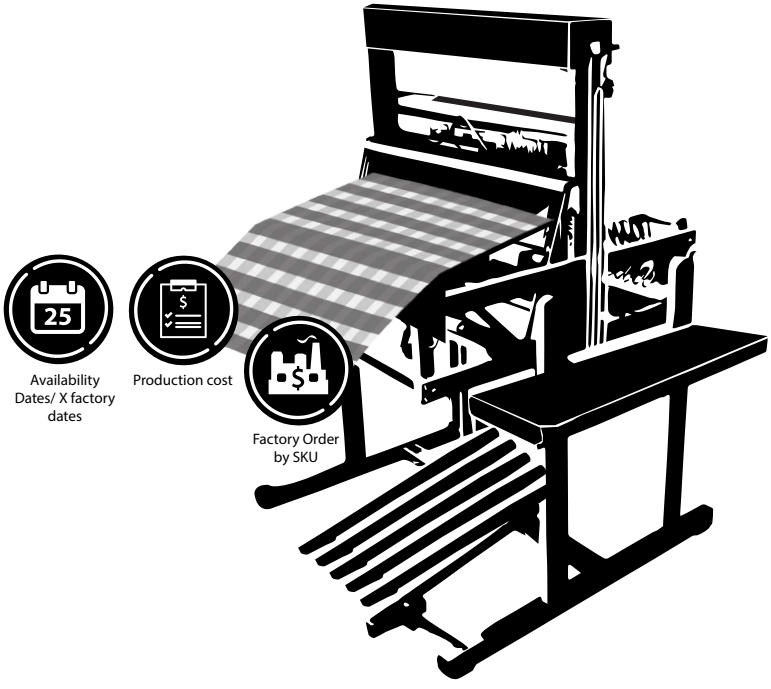
Inputs to the Production process

Those in Production do more than handle the sourcing of supplies and manufacturers. They also travel to the factories, where their goods are being manufactured, to ensure that everything is running smoothly, the workers are being treated fairly and the factory has passed safety inspections. Production teams know where a factory is located, who owns the factory, how many people work there, the condition of the facilities, the overall working conditions, the age of the workers, etc.. Part of their job is to find factories that are acceptable, vet them and manage the relationship with them. The vendor compliance function can also be split out from the Production function in larger companies and is sometimes even outsourced, when a very high degree of risk needs to be minimized or compliance oversight is necessary.

During manufacturing, Production oversees quality control for each item: Does it meet its specifications? Is everything in the right place? Is the manufacturing schedule correct? Once Production approves the quality, Logistics takes over to ensure that items are shipped and delivered to the right customers in the right locations at the right time.

Production also oversees the amount of inventory that is returned due to poor quality. Most tend to use Microsoft Excel or other spreadsheet programs to track this information. However, there are specialty case management tools that store

transactional information, such as what was sold, to which customers and on which dates. Some systems and processes are sophisticated enough to handle 'batch' management that allows product to be tracked by a specific quantity of units manufactured over a specific time.

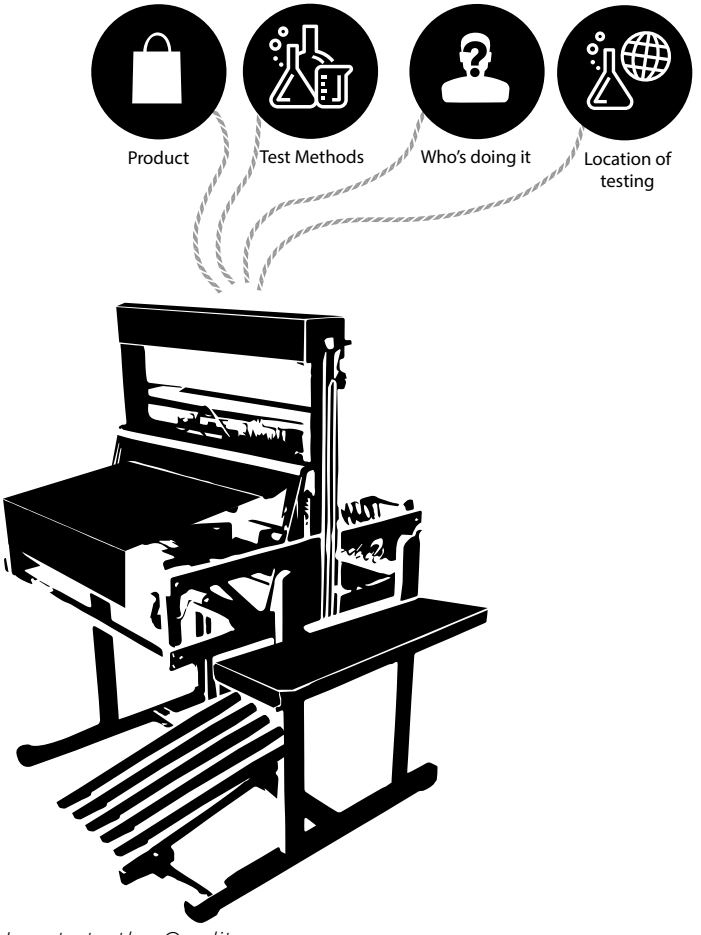


Outputs from the Production process

Quality Control

Rarely do companies source all their items from one factory. The majority of companies are using multiple factories in one or many regions, depending

on how many—and how many of each—items are being manufactured. With so many systems in play, quality becomes a big factor.



Inputs to the Quality process

When items are being produced in multiple factories, companies often set goals around quality

that they expect the factories to adhere to. However, unless the company has been working with a particular factory for a while, chances are that it doesn't have a quality control/quality assurance program on-premises. Therefore, the company must have terms and conditions, such as refunds for garments that are not accepted because of poor workmanship, and a way to check the quality of items being made at some point in the process.

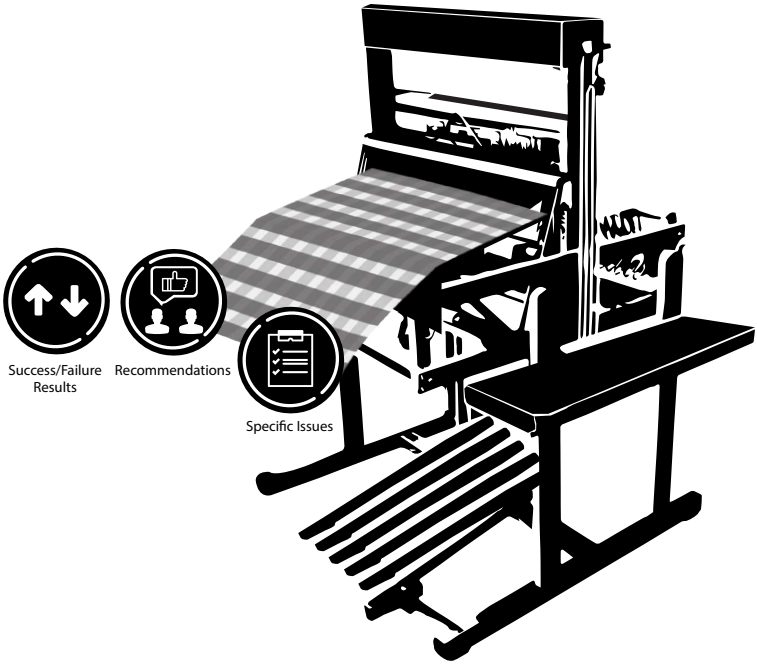
Some of the important data points include a preferred level of quality and a way to measure the quality. This is information that can be measured by the company to evaluate its manufacturing process over time and to determine where any quality issues may lie. That information then can be used to make any necessary changes, such as to the design of the garment, the elements used in the garment, such as buttons and zippers, to the choice of factories used. Without connecting the quality message back to production, a company will always be reactive. However, being able to tie an incident to a set of incidents, thereby illustrating a larger problem, and then correlating the problem to production, shipping or fabric selection, for example, can help a company make more proactive, intelligent decisions.

It isn't unusual for companies that use the same factories to set up their own quality control/quality assurance at the factory. This allows them to reject

damaged or unacceptable items before they have been shipped, thereby saving transportation costs, as well as lead time and rework. The factory can also address the problem faster, rather than months later, when issues with the garments come to light in the retail setting, where they are on display. If quality control/quality assurance is done at the factory, who the end pieces are sold to and who shipped the pieces are irrelevant. There are fewer data points and less errors from a time perspective, and the process occurs closer to the point of creation.

Companies using multiple or new factories, may outsource their quality control/quality assurance through local brokers. These brokers do factory inspections, looking for things, such as whether the factory is adhering to basic human rights, whether the finished product is acceptable and even whether the factory is making more stock than necessary and selling the extra on the black market. Brokers can also find new factories or work with factories to help them produce better-quality garments.

Smaller companies may not be able to afford to use brokers to perform QA, so they do their own inspections when garments have already shipped. This takes the process further away from the factory. It impacts not only the rate of production but also the quality. Therefore, companies must pay attention to quality control and quality assurance, whatever their size.

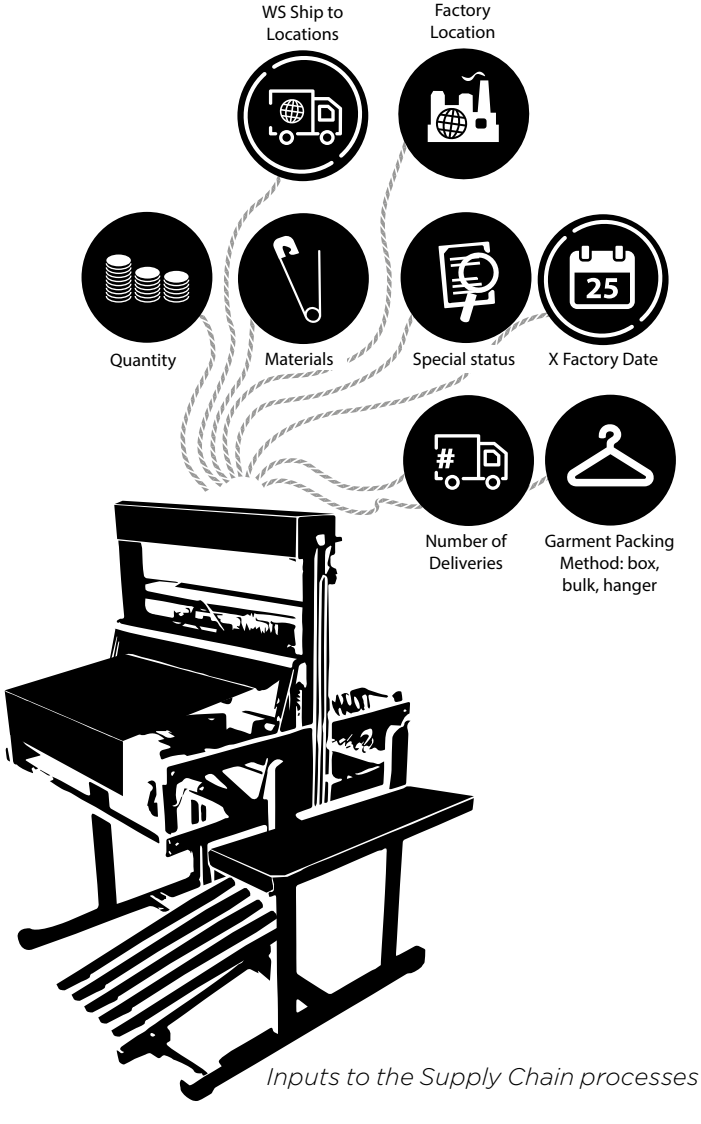


Outputs from Quality control

Supply Chain

Designing, selling and manufacturing/producing a line are all important phases in the life cycle. However, they are useless, if the inventory doesn't have a way to reach its final destination. That's where the supply chain comes in. In short, supply chain is the method by which items get from the point of manufacture to the sales outlet—either a physical retail location or a warehouse for online sales—where it can be sold to the consumer. In fact, it continues to the customer's door, if the transaction

is an online sale or shipped to the customer from the store. There are broader definitions of supply chain. However, for our purposes, we will limit the scope of these activities.



Inputs to the Supply Chain processes

Supply chain has a part early in the process, when raw materials and components such as fabric, buttons and other accoutrements are chosen, and materials and/or manufacturing commitments are made. However, it arguably plays its largest part post-production, especially in our model—the most common used today—where the designer purchases piece goods and does not take a position in raw materials. It comprises a number of elements, including shipping/transportation, warehousing, allocation and fulfillment. Each is important in the process and has its own set of considerations, as well as technologies that help to streamline the process. Supply chain is perhaps the least creative step in fashion, but its importance cannot be underestimated—the sheer number of moving parts in the supply chain, make it perhaps the most challenging set of activities in the life cycle.

When a retailer or distributor purchases goods for resale, they need a way to move those goods from its source to its final location. The channels a company sells into, will drive a portion of its supply chain logistics strategy—the logistics when selling to retail stores that are directly owned and operated, will be different from those when selling to a distributor.

For example, if a company sells exclusively to Walmart, goods will be delivered from the

manufacturing plant to Walmart distribution centers, in as direct a method as possible. Retail store owners, however, ship either directly to their retail stores or to their regional distribution centers, which then fulfills orders to the stores. When a product is imported, it is generally brought over in bulk and cleared through customs in the bulk format: Imagine trying to clear 500 individual boxes at different times for different locations through customs—it wouldn't be efficient.

RFID, or radio frequency identification, technology could be transformative to the supply chain, replacing both UPC and barcodes. RFID can track inventory at the item level, from manufacture to final sale, helping to reduce shrinkage due to misplaced, lost or stolen items.

There are many uses for RFID: Manufacturers can use RFID to track garments as they go through the manufacturing process, while warehouses and distribution centers will know exactly where particular items are located. For instance, they'll know that an extra-small hot pink cashmere sweater is located in Aisle 29, Shelf 2, Box 35, and that it's the only sweater left that is both hot pink and sized extra-small. Because it doesn't require scanning of barcodes or UPC codes, RFID makes inventory control faster and more accurate. It can also be done at the carton, pallet and container level, working your way up the transportation unit hierarchy.

However, RFID requires an infrastructure of scanners, software, hardware, tags and other technologies across the entire supply chain to work effectively. All participants in the supply chain—design houses, manufacturers, logistics companies, warehouses, ports of entry, wholesale companies and others—must have the technology required by RFID. This is a level of investment that many companies can't—or don't want to make. Therefore, RFID—once considered a "revolutionary" technology in the fashion space is growing at a slow, more "evolutionary" pace.

Supply Chain: Merchandise Pickup

For most companies, merchandise comes from multiple manufacturers or distributors in different locations. Therefore, multiple shipments can occur simultaneously. Most or all those shipments will arrive at centralized, regional facilities, where they are consolidated and readied for shipment to the next location, whether it is a holding center in the United States (if the manufacturing or sourcing is done overseas), a distribution warehouse or with some more advanced distribution methods, direct to a retail store.

Merchandise is normally packed for shipping in one of two ways: in bulk (all pieces are similar in every way, such as all the same size, same cut and same color) or pre-pack, a pre-determined

collection of pieces in different sizes and colors. Pre-packs are designed to be shipped either direct to their final destination, such as a retail store, or to a holding center, such as a warehouse. Pre-packs are generally not broken apart, until they reach their final destination, while bulk lots normally are shipped to warehouses and broken apart for further distribution, either as part of individual orders by retailers, consumers or as pick-packs assembled at the warehouse.

The size of the shipment can often determine the way it is packed. There is a hierarchy of packing that begins with units and ends with shipments. Manufacturers pack their merchandise accordingly, based on factors including not only the size and weight of an order, but also whether there are multiple customers for certain merchandise, type of product materials, final destinations and any unpacking/repacking instructions. Each of these unit types has specific data associated with them and will also reference the greater pack—for example, 1 of 2—as well as having the smaller units referenced, whenever possible. For example, a carton may contain 52 boxes of a particular shoe. A pallet may contain eight cartons, the container may have 24 pallets and the shipment may have two containers.

Supply Chain: Moving the Goods

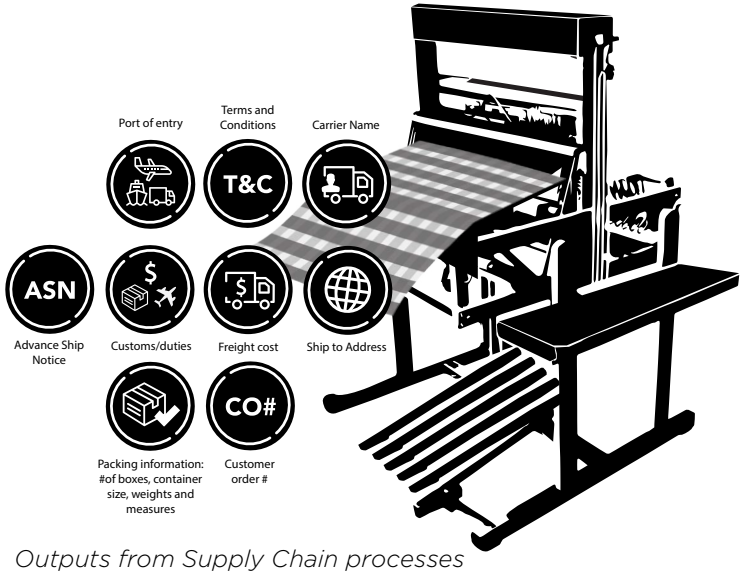
Regardless of where merchandise is manufactured,

it needs a way to get to its destination. Depending on the type of merchandise, the destination and the length of the journey, companies can ship goods via train, plane, cargo ship or truck or a combination of all four. The transportation methods are determined with an eye to moving merchandise quickly and cost-effectively.

U.S. companies that acquire or manufacture their merchandise outside of the United States, will often employ customs brokers and shipping expediters. Customs brokers manage the interactions with border authorities in and out of the municipalities and across borders, while shipping expediters help navigate the rules in each economic zone to move merchandise from one place to another efficiently. Each country has its own rules for importing and exporting goods, which companies must know, along with providing information, such as the cost of each product, a description of the product, its location of origin and its components. Brokers are tasked with understanding those rules and regulations and helping companies navigate them successfully. However, in the end, it is the company's responsibility to have the required data and information available about their products.

Shipping expediters, also known as freight forwarders or non-vessel operating common carriers (NVOCCs), help companies to determine the most effective way to manage the actual shipment

motions, which can vary widely depending on many factors. NVOCCs don't own any of the vessels used to transport the goods. They have access to all those vessel operating companies, air, sea, train and truck, but generally they remain consolidators and organizers rather than operators. Some companies may ship direct from the manufacturer to the local distribution point in the country of final sale, while others may pack the merchandise at the manufacturer into segments that are arranged directly for the final destination. This is a process known as "pack by door." The methods they use are chosen with the goals of low-cost and fast delivery. With so much merchandise moving internationally, trade agreements also play a large role in the sourcing and logistics of the products.



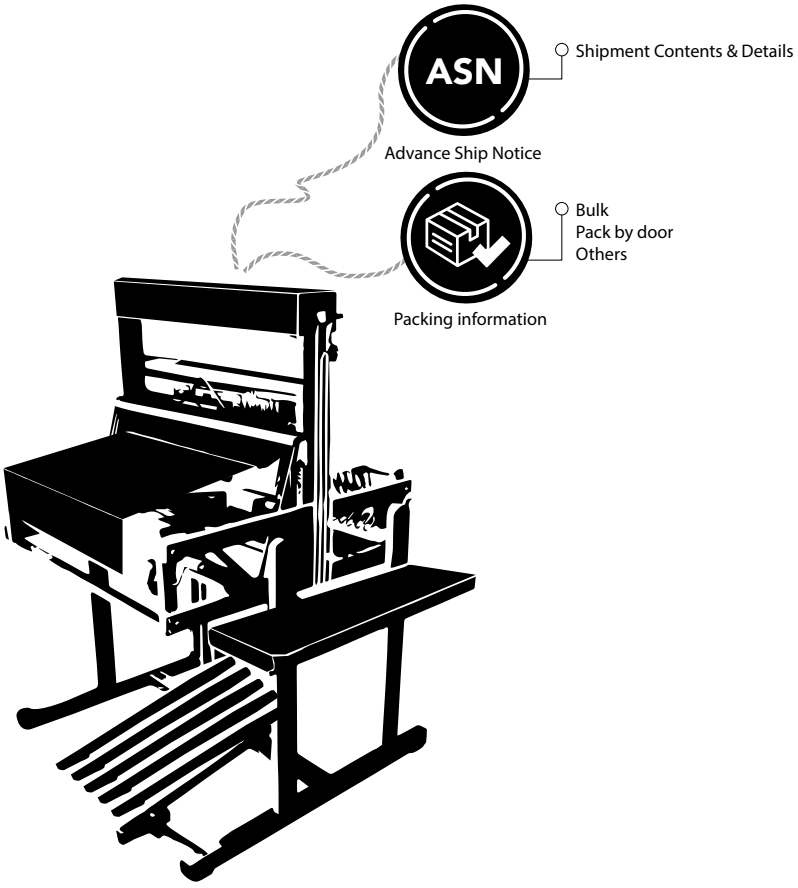
Outputs from Supply Chain processes

Supply Chain: Warehousing

Once merchandise has been shipped, it will arrive at either its final destination or at a warehouse facility. It will then be housed as inventory or repacked for further shipment, alone or with other merchandise arriving from other manufacturing facilities.

Once merchandise is delivered from multiple sources and locations, it is then usually organized into deliveries that are pre-determined (much like pre-packs), with certain numbers of goods in different styles that can be sold together, such as boots, belts and handbags. All the goods in the shipment are then packed, with each type packed in the appropriate cartons. The cartons are then loaded onto pallets.

In most situations, companies use a warehouse and a warehouse management system to log in merchandise, validate the contents and immediately ship it out to its final destination. Companies may also have some merchandise units that don't have a destination. In these cases, the merchandise is stored to sell to customers later or is held and earmarked for certain retail locations, that don't have the room to store the merchandise on-premises.



Inputs to Warehouse Management processes

Companies that don't have a facility in a particular region, often employ third-party logistics (3PL) companies, which help with warehousing considerations. Most companies don't own a warehouse in countries or regions where they are moving fewer than 30,000 units a year. Therefore, 3PL companies

will supply warehouse space and human resources to them. In some cases, the warehouse may simply be a layover location for the merchandise. This is a place where the merchandise is unpacked from a shipping container and immediately relabeled by the store or customer distribution center to be shipped out by trucks to their final destination. This is known as a cross-dock shipment. These 3PLs are generally built and selected for the types of products they intend on housing and attract clients with these merchandise categories. Take jewelry as an example: It wouldn't be the best decision to hire a 3PL that did not have serious security measures and actual safes, if your jewelry line was anything more expensive than the costume level. For companies that operate in mostly high-end "garment on hanger" (GOH) products, it wouldn't do to have only shelves and no hanger rails for GOH items.

Supply Chain: Allocation

Most merchandise shipped by the manufacturer has already been sold or purchased for the company receiving the merchandise. A retail department store that receives 500 pairs of sneakers, for example, usually knows which of its locations will receive the shoes for sale. Therefore, the merchandise will be allocated accordingly. Most likely, their merchandise is pre-packed or packed by order at the manufacturing facility, if possible. Brand retailers

may have a plan that details product at the style/size/color level (SKU) by door. When it reaches a company's distribution center, the product can be released automatically, or the retailer can validate a pre-existing allocation and then release it. There are a number of options, based on the business model but allocating and releasing product can be a cumbersome and labor-intensive activity. The more that can be done beforehand or automatically, the smoother the process is, but with less flexibility.

Sometimes, however, a company will order extra units of merchandise to accommodate potential customer demand or other business considerations. Because that extra inventory hasn't been already sold or directed to a particular customer or retail location for sale, the company must decide where it should be allocated. That decision can be based on several factors, including current inventory levels, expected demand, promotions or even weather patterns. A geographic region experiencing heavier-than-expected snowfall would be preferable in allocating extra parkas, than a region with an average January daytime high of 75 degrees.

In determining allocation of extra inventory, companies will often look at historical data for both the merchandise and the destination—how quickly did the merchandise sell and in what areas did it sell the best? What was last year's sell-through? If the merchandise is parkas, for example, are other

parka styles selling well in particular areas? These types of questions can help companies determine the best allocation choices.

In every case, it's critical that companies compare their allocation to their plans. How well did the company project that the merchandise was going to perform and what were the actual results? If the company does its planning in Excel or another program not linked to its ERP actuals, it often can get less-than-optimal results. The more difficult it is to link the plan with actuals, the more likely it is that the plan will not meet expectations. Timing is also a factor. A company may not find out how poor its plan is, until it is too late to make any reactive decisions, relative to its performance.

In some cases, allocation may be a manual process, in which a company fulfills orders placed by their customers. In other cases, allocation is reserved for online orders, in which customers order merchandise, which is picked from inventory and then sent out. Still others reserve extra inventory strictly for replenishment. However, replenishment is generally done only for carryover merchandise. Rarely, if ever, is seasonal merchandise replenished, since the production cycle can be too long to effectively get a seasonal item from its source of manufacture to the end consumer in a timely manner. Replenishment from a regional warehouse is a different matter. If a store does not have a

large stock space and the company has a regional warehouse, the store may choose to replenish sold inventory nightly or weekly, based on pre-determined inventory levels or patterns.

Supply Chain: Pick, Pack and Ship

Each of the different types of sales models—retail, wholesale and ecommerce—has a different set of needs during the pick, pack and ship process. Therefore, the warehouse must be managed to accommodate those needs and expedite the process in the most efficient manner possible.

To begin, each sales process requires a different setup in the warehouse to support the business. The physical layout accommodating each sales model will be different, as are the warehouse workers' job tasks. In certain environments, such as warehouses owned by large ecommerce companies, many tasks are automated to the point, where only a few workers are needed.

In wholesale, warehouses generally don't deal with merchandise below the unit level. They will often have pallets or multiple cases of goods to perform cross-dock motions. As a result, their warehouse processes must support activities that address multiple units in a carton. This involves determining what and how many are in a carton, for example, and when the units are scheduled to be delivered. Even the tools used to move the goods

can be different, which means the processes related to them are also different.

Retail warehouses, however, deal with merchandise at the individual level—although much less than ecommerce warehouses. Retail stores generally order multiple cases, which are broken down at the facility and put on shelves for future orders. The granularity of that motion, however, often depends on the merchandise. High-end jewelry, for instance, is managed at the piece level, with each one scanned and stored in a secure cage with high security. Costume jewelry, meanwhile, is usually broken down and stored by the box, which has a certain number of pieces per box.

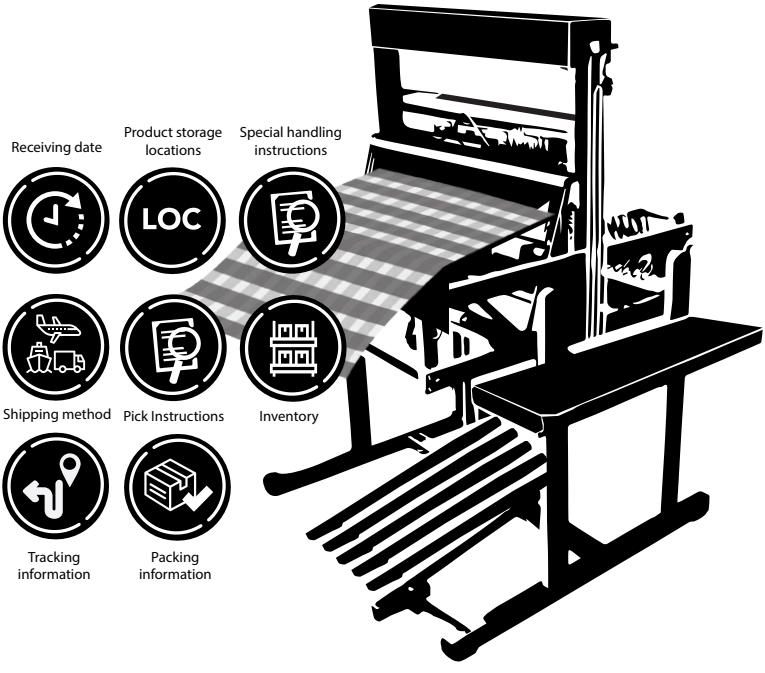
In addition, retail warehouses typically send merchandise to a prescribed set of business partners, whose addresses and shipping preferences (including method of freight and speed of delivery) are known well before the merchandise is shipped out.

eCommerce warehouses work in real time on several levels. Because ecommerce sites sell to end users, they often deal with smaller amounts of merchandise per transaction (such as a sweater and a skirt). That means every case must be opened, so merchandise can be picked, either by a human or an automated system, once an order is received. What's more, the time to prepare and ship the order is much quicker than in retail. Once an order

is placed, the merchandise must be located in the warehouse, picked, cleaned and bagged (if necessary), boxed and shipped, normally within 24 hours or sooner of receiving the order. With ecommerce, the customer is less likely to cancel or return the goods, the faster they receive it from ordering. Think of the popularity of Amazon Prime.

Since ecommerce sites sell to end users, they don't have purview into customers' preferred shipping methods and speeds, until orders are actually placed. For orders placed for next-day delivery, the time to prep and ship is much more compressed than for orders with a standard 5- to 7-day delivery.

The data collected in warehouses for each sales model also varies. Information, such as the number of hangers or the amount and type of plastic bags required during the picking and packing process, is necessary for warehouses that break down cartons and prep garments for cross-dock shipments or even individual orders for ecommerce shipments. Each customer's preferred shipping companies and delivery methods are also critical in keeping inventory moving throughout the process. These and other data will differ, based on the sales model that the warehouse operates under.



Outputs from Warehouse Management processes

Supply Chain: Logistics

Every step in the supply chain relies on logistics, which is an umbrella term that describes everything involved in the movement of goods from Point A to Point B. Every company involved in the supply chain, including the customer, uses logistics to manage their part of the supply chain, from the manufacturer ordering buttons for a shirt all the way to the retail store receiving the finished piece. Each company also relies on some type of technology to help keep the supply chain moving.

There are different systems for supply chain management, including specialized solutions that handle the details of customs billing, freight movement and other in-transit motions. Much of that information, such as shipment tracking numbers or container ID numbers, lies with the customs broker and freight forwarder, who need it to perform their duties.

Freight forwarders track where merchandise is during the shipping process, as well as the other information such as number of units, the size of the boxes, as well as weights and dimensions. Some of this information, such as tracking numbers, freight forwarders generate on their own or are from the shipping partner. Other information includes the number of units or dimensions they receive, or would like to receive, from the manufacturer at the time of pickup.

If merchandise is coming from outside the United States, customs brokers will track information, such as when the shipment has left the manufacturer and when it is arriving at the customs place. They also need to know other details that the company and the manufacturer will have to provide, including what the merchandise is at the unit level and how many are being exported and imported. Each unit is also assigned a harmonized tariff schedule (HTS) code, which is used to classify and define internationally traded goods and determine the tariff/duty rate of the product.

Customs wants to know the product origin, product makeup and contents—all information the customs broker must know. Exotic materials, such as ostrich or alligator, have rules regarding their import/export, so it is imperative that companies specify the types of materials, when they send their purchase order to the manufacturer. At the production phase, the content makeup is available on the technical specification, but it is data that must be accessible later for the customs broker, as well as the Consumer Products Safety Commission. This sometimes poses a challenge, since exposing this data from a product development system, or a simple workbook, to a complex logistics tracking system can prove labor intensive and/or technically expensive, in the case of live interfaces.

Customs brokers need to know the point of origin, since taxes are often paid based on the manufacturing cost at the place of production. A company importing merchandise may be required to pay tax on what it bought from the manufacturer (the finished goods). Terms and conditions of sales contracts determine where ownership and liability exist and where transfer points are. Companies must know those Terms and Conditions, to determine what they need from its supply chain.

Other information, such as shipping schedules, are also necessary to get merchandise through customs. The freight forwarder needs to provide that shipment information, which includes the

number of units being shipped, the number of pieces in each unit and other related data, including a destination, the vessel of transport and value.

At the company level, a logistics department manages information regarding what merchandise is coming in and what is going out. What merchandise is leaving the manufacturer? When is it expected at the ports? When is it expected at customs? When will it reach the company's warehouse facility? Freight forwarders relay all this information to the logistics department, with the exception of when it is ready at the manufacturer, which comes from the manufacturer itself.

Companies that manage their own inventory will have warehouse management systems that detail information on each unit, including location (warehouse and aisle, shelf and/or bin in that warehouse) and whether it's available to be picked. Once a unit has been picked and put on a conveyor to be packed and shipped, locators and checkpoints connected to the warehouse management system show where the unit is along the way. The system also alerts whether it needs to be packed as part of a larger order and scans the unit to verify it is the correct item. The unit is then packed into a box and assigned a shipping label, and registered carrier information is updated, including the company making the shipment and its expected delivery, along with tracking information.

Another important consideration during the

shipping process, but generally not for warehouse management systems, is understanding the burden of ownership for invoicing. Those "incoterms" help determine when a company can invoice its customer for merchandise. In most cases, the burden of ownership ends when the merchandise is picked up for shipping. A supply chain management system will have the product movement data, which then feeds into the financial systems, or module, if the company is using an integrated platform, which will handle incoterms and invoicing functions.

Value-added services are also important in the supply chain. In the more traditional sense, these are services offered by the warehouse logistics provider, such as quality control, adding price tags to merchandise not tagged at the factory, or cleaning and repackaging units that are returned. These services must be tracked at the unit level, if the company wants to attribute the expense to the cost of goods sold, according to its accounting rules.

A supply chain management system helps manage these value-added services, storing data that reflects the performance of the value-added service provider. This information can be useful during contract negotiations, since hard data can be provided in a structured manner. The information also can be useful for accounting purposes in determining the actual cost of goods sold, including the VAS at the unit level. For this to work effectively, the operational system must be linked to the

financial system, tying together the work order for action and the cost per unit for accounting.

There are several point solutions that manage certain aspects of the supply chain, such as quality control, or shipping, for example. Applications that can connect to a supply chain management system can help provide a comprehensive view of a specific area of the supply chain, highlighting any bottlenecks or other issues that might impact the shipping and delivery of merchandise.

Electronic Data Interchange, better known as EDI, is another solution that extends the supply chain system. EDI streamlines business processes by enabling companies to electronically communicate information that traditionally was paper-based, such as invoices and purchase orders. EDI consists of standardized sets of documents that define the information which companies share with one another electronically—inventory, invoicing, purchase orders, etc. EDI is an old and inflexible technology, but it has widespread adoption in the United States between trading partners. Therefore, companies need the capability to store information and transact in different channels, since each has its own communication stream, depending on the technology. EDI enables companies to share these documents and electronically integrate the data from one company's systems to another's, speeding transactions and reducing data entry.

SUPPLY CHAIN IN A CONNECTED WORLD
PROFESSIONAL SPOTLIGHT

An interview with

GREG HUBBERT, Global Supply Chain Expert

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The supply chain is a critical part of the fashion technology lifecycle and is almost wholly reliant on technology to ensure that products get from Point A to Point B. Supply chain and logistics professional Greg Hubbert understands exactly what impact technology has at all points of the supply chain and considers the systems and solutions he uses in his job, as indispensable tools in getting product to market and into the hands of customers.

Hubbert entered the fashion industry after spending a number of years as a supply chain professional in the industrial automation sector, tasked with optimizing the supply chain and logistics process for a global apparel company. During his tenure in fashion, Hubbert has seen how technology-enabled organizations can outperform their competitors in multiple ways, from quicker times to market to higher retail sales.

In this Q&A, Hubbert discusses the impact of technology in creating a highly effective supply chain for apparel companies of all sizes, including luxury.

What do you see as a catalyst for technology adoption in fashion companies?

A lot of times, fashion houses are startups. So, the founder probably knows a lot about design and nothing about IT. And it really comes from the people who are around that person and bring other ideas in. So, that outside influence coming in, will determine how quickly these companies will adopt outside technology.

The attitude toward IT, I would say, is product-centric: Whatever technology can provide to enable the product to be better and be made more accurately and faster, that's of value. And then you get kind of concentric rings coming out of that. If you ask the head of a fashion house, "Do you want a PLM system or a transportation management system?", they'd say, "I don't know what a transportation management system is, but I've heard of PLM, and yeah, we probably want that."

What are some of the things that you see that are misconceptions, when it comes to technology in the fashion space?

Especially in a smaller company where you may have limited people who have outside experience with the technology, they take it at face value—what they're being told it can do. In their own minds, they envision what that will be. And, when you're bringing in that technology, the challenge is being able to get the appropriate input from the

right people who can vet it and who can challenge what setup is being proposed for the system.

Also, quite often, these people speak from what they know, and they'll try to just reinvent this technology in the vision of what their current system or processes are doing, as opposed to saying, "We should really start with a clean slate and re-engineer these systems from the bottom up, not basically just go and make a copy of what we're doing today on this nice, new, shiny platform."

What are your thoughts on blockchain technology, and where do you see it having any impact in the fashion space?

I think any of us that have been in supply chains long enough, have kind of seen these technologies that come up that are going to solve everything for us. And there are lots of good ideas around them. But they don't always materialize into a lot of good, practical applications. RFID is one example.

Blockchain, I think, has some benefits, where you have the ability to go look at the entire flow of your product coming from its origin all the way through to its destination, and are able to understand where it passed through. So, for example, if I'm a drug manufacturer, it might be very important that I can see every point that a particular drug moved through. I know the factory where it was made. I might be able to go and track where all the components that went into that drug came from,

so that I have this complete history.

I think from a luxury standpoint, blockchain would be helpful in being able to eliminate the effects of counterfeiting. So, if you're able to go and see this particular handbag, you'd know what factory it was made in, where the leathers are coming from that are going into it. Having that complete visibility certainly would be beneficial.

What are some of the skills people entering the fashion industry will need to have from a technology perspective?

Having a very good set of Microsoft Excel skills is very important. So much is done with spreadsheets in a smaller company. Those who have a good set of skills get utilized very well and end up getting lots of other opportunities within the organization because of it.

I think the other skill people must have is problem-solving. In other industries, the life cycle of a product could be years—literally, you're selling that exact same item over and over and over again. And as a result, you're able to refine the supply chain around it.

In apparel, however, the product is always new. You're making it for the season, and then you're making something new. And every time you make something new, potential issues could come up. Being someone who is able to go and get out in front of those issues, able to go solve for them, is critical.

TECHNOLOGY SPOTLIGHT:
Supply Chain Technologies

There are many technologies used along the supply chain, each with a different area of focus. However, they are all designed to simplify the management of the tasks involved in the management of supply chain activities, from paying suppliers to managing inventory and order fulfillment. Supply chain technology is especially relevant (and practical)in the fashion industry, where suppliers, logistics companies and customers are scattered globally.

Two technologies are particularly relevant in the global supply chain: electronic data interchange (EDI) and warehouse management systems (WMS). EDI enables the electronic exchange of business transactions such as invoices, purchase orders, shipment authorizations and shipment acknowledgements. WMS, meanwhile, focuses on the operations that occur within a warehouse from the time products enter a warehouse, until they are sent to customers, including inventory management, picking/packing/shipping and auditing.

EDI can help organizations optimize their accounts payable and accounts receivable flow, by sending and receiving information almost instantly and reducing the amount of transactional errors associated with illegible hand-written invoices or

misplaced faxes. The automation involved in EDI enables employees to focus their time on tasks that bring more value to the company, instead of time-intensive tasks, such as keying in accounting information.

WMS enables organizations to see where their inventory is at any time, regardless of location in or across warehouses. When used with an inventory management system and a transportation management system, WMS can manage the supply chain operations from manufacturer to retailer and give SKU level location information, as needed, for operational efficiency.

In the fashion space, GSX by OpenText and Manhattan Warehouse Management System are among the more popular solutions for EDI and WMS.

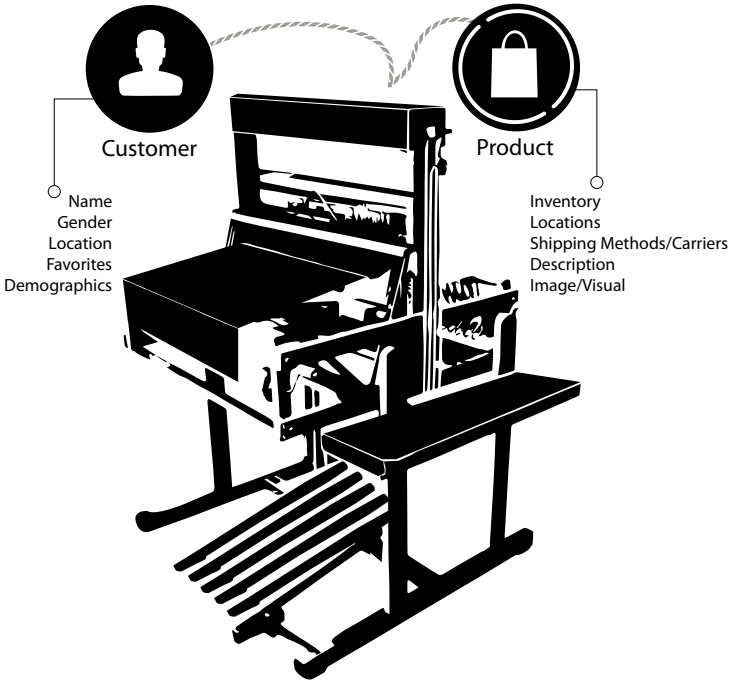
GSX enables companies to exchange transactions electronically with suppliers, vendors and business partners. It supports all the major EDI standards—document formats that are outlined in international standards—to facilitate electronic transactions from a wide range of companies and helps to reduce the time and amount of paperwork associated with manual transaction processing.

Manhattan Warehouse Management System handles all warehouse operations from inventory management to shipping and receiving and order fulfillment. It has web and mobile-based solutions that can offer machine learning and artificial intelligence in coordination with pre-defined operational activities and workflows to offer effective

warehouse management solutions. Some of the functions of WMS include cross-docking capabilities, omnichannel fulfillment, advanced order fulfillment and labor management.

Reaching the Consumer

As noted in the previous section, the supply chain is the method by which items get from raw materials through manufacturing to sales outlets. Once the items reach their intended destination, companies must then get them into the hands of their customers, a process known generally as retailing.



Inputs to activities related to Reaching the Consumer

Reaching the consumer: Omni channel sales

There are three main channels by which goods reach their intended audience: wholesale, in-store retail and online or virtual retail, better known as ecommerce. Each plays an important role in getting goods in front of customers. However, the motions attached to each are quite different, as are the interactions between company and customer.

Retail is not the same experience as it was in the past, when physical stores and catalog sales were the only methods a company had to get its goods to customers. As a result, it was easy for a company to "own" the relationship with its customers. After all, often customers had few, if any, other options.

That has changed. Retail now includes in-store, online and a combination of both, and all are vying to own the customer relationship and influence their buying decisions. Advances in technologies now enable companies to more easily understand their customers' buying habits, based on historical data, patterns, as well as artificial intelligence, which helps the company interact with customers on a micro level.

Reaching the consumer: Aiming to own the relationship

In today's retail environment, companies also strive to understand whether the customer made a purchase at a store location or via a technologically

driven interaction—and, if so, whether the purchase was made from the company's online store, a mass retail site, such as Amazon, or via social media sites, such as Facebook or Twitter. Companies also want to know whether the purchase was made via a computer, tablet, smartphone or even using an intelligent digital assistant, such as Amazon Alexa or Google Assistant. With each new method of reaching the customer, companies hope to increase their visibility to the customer and increase their sales.

However, each mode of interaction also affects the relationship between the company and the customer. Each transaction that doesn't directly come from the company through its physical stores or website, can reduce the mindshare a company has with its customers.

Assume, for example, that a customer wants to purchase a red leather belt with a gold buckle. This is an accessory item that is normally available at Levi's, but is out of stock at the local store. However, the belt is listed as available on Amazon through a fulfillment agreement with Levi's. It's only natural that the customer would order it through Amazon, since it is in stock through the site. In theory, Levi's hasn't lost the sale, since the belt being sold is coming out of its inventory. However, Levi's has lost mindshare with the customer, who will likely turn to Amazon next time s/he can't find an item in the store. That is if s/he goes back to the store

at all. Next time, it may not be Levi's inventory the customer selects, when they buy on Amazon.

In the same vein, social media sites are becoming rich avenues for companies to find customers. By placing ads on Facebook, Twitter, Instagram and other such sites, companies can reach their target audience and beyond, since viewers share the content with their friends and followers. Clicking on the site takes the customer directly to the company's online site, where they can learn more about the product and place their order. The social platform is paid a commission for driving customers to the site. Some platforms are building capabilities to allow the end user to purchase directly in the social system, pushing the supplier further from the customer.

Such a sales motion, while having the benefit of reaching a wide audience, doesn't promote a customer relationship with the company. Customers will instead tend to associate that product with the social media site and might look for it there, instead of going to the company's website. What's more, the social media site now has information regarding a customer's shopping habits, likes and dislikes and other information that can be used to provide a richer, more personalized shopping experience, moving it closer to owning the customer relationship.

Each of these and other motions, including enabling customers to pay through a third-party

payment system such as PayPal, Apple Pay, Samsung Pay or shop through an aggregator site, such as Google Shopping, are designed to create a better shopping experience. While the customer generally benefits, companies must work harder to maintain that one-to-one relationship with their customers.

The many ways in which a company can promote its products and reach customers, including physical locations, company website, third-party ecommerce sites and social media sites and others, all serve to ensure that customers receive the same information and pay the same price for the product, no matter how they shop. In doing so, a company is taking an omnichannel approach to sales, with each channel funneling the sale back to the company, rather than a wholesaler.

An omnichannel approach helps companies optimize their customer interactions and minimize others' relationship with the customers and their products. A company that designs and sells red belts with gold buckles, for example, wants its customers to purchase directly from it. This not only allows them to own the customer relationship, but also to minimize any margin erosion. Therefore, it works to ensure that its shopping experience is better than buying on Amazon, as an example. It can create an omnichannel supply chain that enables customers to purchase the belt online and pick it up in the store. If the customer is in the store

and the belt is out of stock, the customer can still purchase it and the company will deliver the belt to the customer—even by messenger in a matter of hours, in some cases. This is especially true, if it's something like that gold buckle with the big 'H' on it that recently took the market by storm.

Omnichannel also supports the concept of the "endless aisle"—or, in other words, showing customers all a company's products that are available. In physical stores, where space is limited, a company may have only a few versions of a product, such as a skirt on display. However, the skirt may come in five different fabrics with hemlines of varying lengths and various trims. An omnichannel endless aisle experience would include equipping salespeople with tablets that enable them to show customers every available cut, color and style of that skirt. They would then have the ability to order and pay for the skirt in the store and have it delivered, wherever the customer wants: to the store, to the customer's residence or place of business or even to another store location.

Reaching the consumer: The Wholesale Model

One of the early mass approaches to reaching the customer, wholesale, has taken on many different forms over the years. In its purest form, a wholesaler sells goods to companies, who then sell to the

consumer. A department store is perhaps the best example of the wholesale model—it buys from the individual brand and sells many different types and brands of garments and accessories, providing a "one-stop shop" for customers.

In a wholesale environment, companies sell their products to the department store, often at a "wholesale" or discounted price. They also provide incentives, such as co-op advertising dollars and additional discounts, to position their products attractively and help bring customers into the store. Many designers choose to start in wholesale environments, because it can be an easy way to reach a mass market. However, it is also a complex relationship with a number of considerations, such as who controls pricing, who controls markdowns and when markdowns should occur. Wholesale environments also traditionally take over the customer relationship, since their name becomes synonymous with carrying certain brands.

Luxury brands, in particular, enjoy the perks of the wholesale channel. However, they want to keep tighter control over pricing—after all, the luxury market is aspirational and eschews the perceptions that accompany the word "sale." Such a mindset has given rise to the "shop in a shop." It is a boutique that is located within a department store, offering brands the foot traffic and mindshare a wholesale environment offers, along with the ability to control

the narrative and market positioning of their products. This includes how they look, how they are positioned, what colors are displayed and even the styling of the shop. Brand employees interact with their department store sales team to ensure that the displays look, feel and communicate in the appropriate manner. Companies such as Ralph Lauren pioneered this approach.

The extent to which brands control and influence their positioning in a wholesale environment, evolves over time and is more active closer to the customer. Indeed, "shop in a shops" are changing the traditional wholesale relationship. Salespeople working in those environments often are employees of the company, not the department store. The inventory is owned by the company, not the department store. In effect, the company is simply renting space from the wholesaler. In this way, the company retains ownership of the customer relationship. It doesn't concede the last mile of the relationship to wholesalers.

Other wholesale types exist, in addition to the department store model, including commissionaire and concession models. Companies doing business outside of their home country, can employ commissionaires to sell their products on their behalf, but under the commissionaire's name. Commissionaires do not own the inventory. They are paid a commission by the company, after the product is sold.

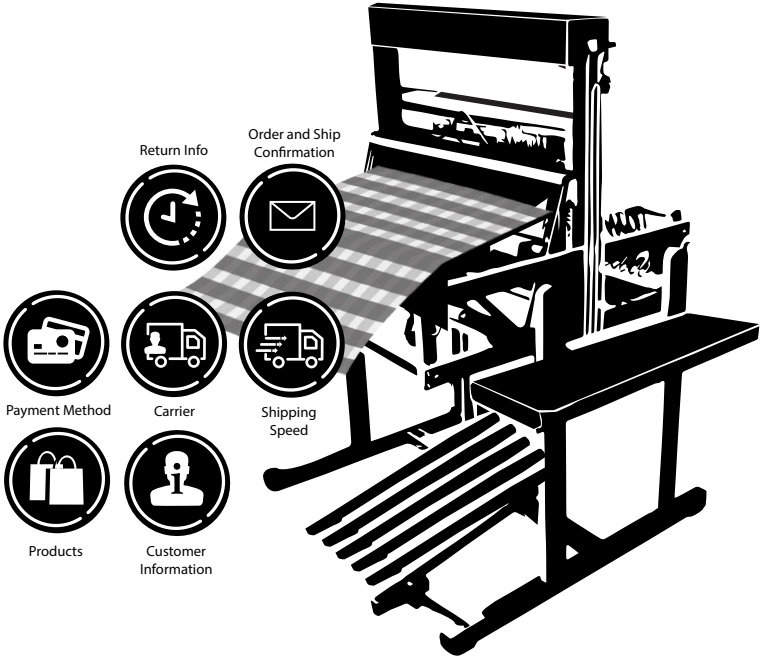
A concession model, on the other hand, often keeps the brand name intact with the product. Concessions are essentially the company's retail outlets. However, they are legally independent and contractually allowed to sell the product. Concessionaires purchase the inventory under a wholesale model and usually are able to control pricing and markdowns.

Usurping Traditional Models

Times and methodologies change, but the goal of reaching customers has remained the same. In retrospect, Sears, Roebuck and Company, which was founded as a catalog mail-order company in 1893 and didn't open its first retail store until 1925, was the quintessential department store. It offered just about anything the average consumer needed and carried a number of different brands, including their own private-label brands. The Sears catalog was the precursor to internet shopping. Amazon is now the "Sears of online," offering just about everything the average consumer needs, including its own private-label merchandise. The Internet has replaced the paper catalog: new delivery channel, same goal.

Amazon is a wholesaler, a retailer, a concessionaire and a commissionaire. The model by which Amazon works with its vendor companies varies. It takes inventory, marks up the price and pays the company, when the inventory is sold. Conversely, it could not take the inventory and simply be paid

a percentage of the sale. Amazon can handle the supply chain, or its vendor companies can handle it. It is a model that is usurping the traditional retail channels and made possible by the power and popularity of the internet. If Sears had understood the potential opportunities of the internet and put its catalog online back in the 90s, one wonders whether Amazon would even exist today.



Outputs from activities related to Reaching the Consumer

Reaching the consumer: Omni channel technology

Each sales channel utilizes different motions to get

products to customers. However, the technologies that enable them to run efficiently, are the same no matter which channel. Each technology serves a different purpose in helping companies run at peak efficiency and can create a seamless shopping experience for the customer.

The need for customer relationship management (CRM) systems arose from companies' increasing use of omnichannel to reach customers. CRM systems manage customer information such as name, address, gender, size, style preferences and other related information to enable retailers to better serve them. In the early days, CRM systems usually were notebooks kept by salespeople in stores. With the advent of online shopping, however, salespeople no longer had insight into all their customers' purchases. At the same time, customers expect companies to know their purchase history and their personal data, such as size. CRM systems were designed to capture customer information from all sources to provide the company with a single, yet comprehensive view. This information not only helps companies service their customers more efficiently, but they also can better understand how to reach and interact with those customers.

In the luxury space, where privacy is often a necessity among its customers, the efficiency afforded by CRM systems can actually cause more problems than it solves. In housing certain

customer information, a luxury retailer could literally open itself to lawsuits. The company must determine how it will collect and utilize that data, without harming itself or its customers.

The relationship with the consumer and the collection and understanding of data is critical to a company's decision-making. The techniques for collection are standard. How the company uses it, makes a difference. It can impact a wide range of strategic decisions, ranging from locations of new stores to discontinuing certain clothing sizes.

In short, CRM systems help maximize the efficiency of the customer interaction and make the relationship the best it can be, in order to meet customer needs. This is essential in today's environment.

Reaching the consumer: Putting it, and Keeping it, Together

Technology has certainly helped to streamline the retail process. However, since borders have vanished and companies can do business from anywhere in the world, rules and regulations are complicating the process.

For instance, a growing number of countries have set strict rules about what type of customer data a company can collect. Some countries prohibit the data itself from leaving the country. Yet, as a society we are highly mobile, thanks to the ease of traveling internationally, and we shop wherever

we go. The laws haven't kept up with the behavior of retail in general and customers, in particular. Therefore, companies are challenged with understanding not only market and customer needs but also the rules and regulations that make it difficult to look across political and geographic borders. This is especially true, when they can't decide and/or change frequently—Brexit anyone?

Master data management and CRM systems, in particular, can help companies to better control data, as they navigate the myriad regulations that can potentially stymie companies that aren't in control of their data. Setting controls for customer information by region, aggregating historical sales data and locking down control over certain sensitive customer information, such as unique identifiers (social security numbers, for example), can help ensure that companies comply with the rules, no matter where they do business.

TECHNOLOGY ADOPTION IN THE AGE OF OMNICHANNEL
PROFESSIONAL SPOTLIGHT

An interview with

JENNIFER McMILLAN, Retail and Luxury Operations Executive

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Jennifer McMillian is an accomplished professional in the retail operations space, having worked for various fashion companies in multiple roles including human resources, general management and senior leadership. In each role, she has worked with myriad technologies and understands the numerous benefits that technology can bring to an organization.

In an increasingly omnichannel sales environment, which incorporates both brick-and-mortar and e-commerce, technology and data will be keys to success for fashion and retail organizations. Specifically, understanding customer sentiment, sales trends, and other key performance indicators will enable organizations to make smarter business decisions, based on actionable intelligence culled from data and analytics.

In this Q&A, McMillian discusses the importance of technology in helping companies build and manage a successful omnichannel sales strategy.

How have you seen the fashion space evolve as technology is being adopted by more fashion companies?

I think the business is slowly adopting technology. And I intentionally used the word "slowly." Because our hands have been forced by a lot of the direct-to-consumer players. But even knowing how far advanced they are, I think traditional fashion apparel brands are still sometimes reluctant to take that plunge into the world that we know as very data-driven and analytics-heavy.

We are making baby steps, putting in core systems that are necessary to operate day to day, but also trying to move ourselves closer to the direct-to-consumer businesses. But I would say probably still not moving fast enough.

When you look at the big players that are digitally native, their roots, they are technology companies first and they are retail companies second. So, we will never keep pace with them. However, it will become necessary to get better and better at it over time.

Where do you see data and systems playing a role in the fashion space?

Data is the cornerstone to everything and anything that a brand in the business does, even if it's not a digitally native brand with the access to data that some of those players have. I think about my

day-to-day: Every day, I wake up and I look at a sales flash, which is an aggregate of data of our performance and our results from the day before and a handful of other key performance indicators. When we go into a store, there's a tremendous amount of data that's aggregated through our point-of-sale system that allows us to reach our customers very quickly and to segment our customers in different ways to then reach out to them. Data exists to influence every single decision that, in this direct-to-consumer business, we make on a daily, hourly, almost by-the-minute basis.

The relevance and importance of data and technology in the omnichannel experience is 100 percent critical and interdependent on one another. Even the old dinosaurs of the brick-and-mortal world, realize that you must be omnichannel to survive and you must employ technologies like buy online, ship from store; buy online, pick up in store; empowering your sales associates with digital tools in-store to be able to buy from your online channels, if the inventory doesn't fit in-store. Therefore, the interdependency of the data and the technology to enable that business is, again, a critical component of any retail business.

Can you think of some examples of some companies that are using technology to their advantage and how they're using it?

A lot of the digitally native stores are utilizing technology in a way that simplifies the customer's experience. Anything that helps speed up the customer's journey in the physical store from a technology perspective, which you see a lot of the digitally native brands using. I think some of the early adopters to mobile point of sale, which can get you in and out of the store in five minutes.

People are coming to a store and they either want to be empowered by technology to get them in and out quick or they want be romanced and sold to, so these companies that are technology-first have really found a way to make it work. You can have the romance experience, if you want it. But you can also have the very time-starved, time-efficient experience if you don't. Which I think is really cool.

TECHNOLOGY SPOTLIGHT:
Point of Service Technology

Point of Service or Sale technology can have a wide variety of scale-ability and features. The type that is chosen by an organization, depends on several factors including the size and volume of transactions, the type of transactions (online or in-person) and other considerations, like geography. Systems can be simple solutions designed for individual one-off sales or more complex offerings that include functionality, such as customer profiling, product recommendations, personalization and inventory management across in-store and online channels.

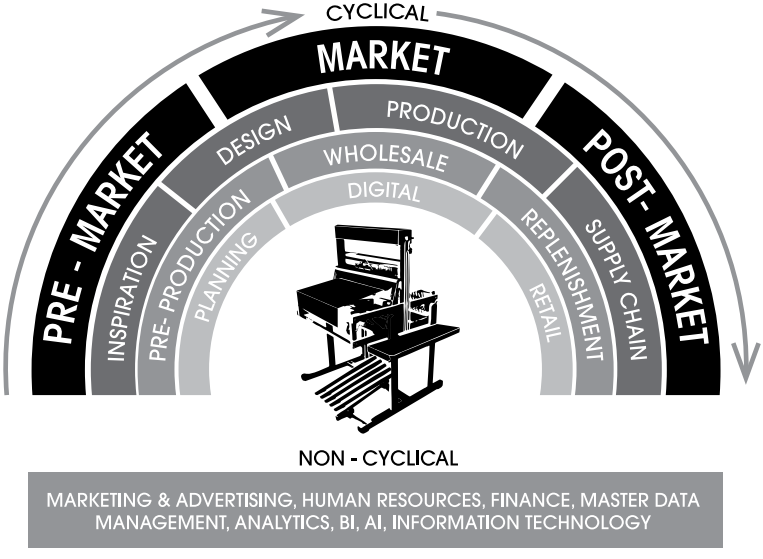
Among simpler sales-based systems, a number of solutions have been designed that work with handheld devices or with small-business systems to enable credit card and cash transactions. The two best-known examples are Square and Clover. They both offer a card-swiping module that connects to or pairs with a mobile device, such as a smartphone or tablet and a mobile app that facilitates the transaction, with the funds directed to the seller's bank account (minus a transaction fee). They also offer a line of counter and mobile POS devices that include access to information on sales,

inventory and other data important to managing the sales process.

Of the more complex systems available, Epicor offers functionality for businesses looking for more than simple transactions. Epicor has an integrated POS system that handles customer orders and transactions, as well as inventory management, financials and retail workforce management. It is designed for omnichannel selling environments—online and in-store—and as a hybrid solution, that can be used from any location with an internet connection.

The more advanced features and on-screen analytics of Epicor enable users to optimize their purchasing, inventory and business performance. Users can also track their margins down to the SKU level, which can help retailers to maximize sales by "rightsizing" their inventory and adjusting prices accordingly, and can better forecast demand and plan inventory, based on past sales.

Non-Cyclical Activities



The Fashion Lifecycle - Cyclical and Non-Cyclical Activities

The processes that we have discussed so far, are cyclical in nature for the fashion, apparel and luxury industries. The activities tend to happen every season. There are other activities that are not driven by the season, as much as they follow a regular business cadence. Take payroll, for example. Everyone needs to be paid, once a month, twice a month or weekly. Whatever the cadence is, the product season has little influence on the overall activity.

Master Data

Master data is, quite simply, the core data that every channel needs in every step to get products

manufactured, delivered and sold to the customer. This information includes key attributes of the product (type, styles, sizes, colors, cuts, etc.), the origin of the product and its unique product identification number—a universal product code (UPC), electronic product code (EPC) and/or European article number (EAN)—which is used across all channels and makes it unique and scannable/registerable.

If a company is only selling in its own stores and internet catalog, it doesn't need a UPC/EPC, just a unique product number. However, if it is doing business with anyone else, each of the company's products needs a UPC/EPC or EAN. UPCs come from an organization called GS1, which controls those blocks of numbers and barcodes, and are available from resellers or directly from GS1.

There is currently a move to switch to an open standard, such as QR codes, which are not controlled by a private organization. Radio frequency identification (RFID) is also under consideration as a way to augment and extend a product's unique identification. There are benefits and drawbacks to both of these technologies.

Master data is important, because it contains all the product information related to the supplier and the customer, as well as the terms and conditions. This is critical information that provides insight into who a company is transacting with and how, so the company as a whole knows how it's doing business. In retail, companies want to bring at least some of this information across its channels and into other

technologies, such as in-store point-of-sale or point-of-service systems. Salespeople don't need to know which company created a garment, but they do need to know the price of the garment and the product content. Similarly, for online, ecommerce systems must not only have the pricing and supplier information, but also must be able to provide customers with a picture and description of the garment. It would be useful in both instances to have product origin or fabric content available. They are both elements of master data that sometimes aren't easily available at the point of sale. The salesperson might have to actually look at a garment's label to get the data. This is not possible in an online transaction, or with something out of stock in a local location but available from remote stock.

However, the multiple systems a company uses, such as PoS and e-commerce systems, often are siloed from each other and from the master data. That means that master data must be duplicated to different systems. This is a time-consuming, mostly manual process, especially for smaller companies that can't afford high-tech integrations. As a result, companies are challenged in understanding the nomenclature of an item across its channels, what it is priced at to the consumer, how it is described, etc. They could have an item that is described as "Running Sneaker in Blue" for $89 at their wholesaler's department store and "Teal Jogger" at $99 in their own PoS system at their retail store, even

though it is the same item. It is also necessary to consider the complexity of language and currency.

A master data management system holds all the core data and can integrate with once-siloed systems to ensure that companies have a unified, comprehensive set of data attributes they need to run their business effectively and better service their customers.

For example, many companies struggle with integrating customer information, like product information, between online and in-store transactions. Assume, for example, that a company already has a customer's name in its PoS system, thanks to integration between the in-store PoS and credit card system. However, its e-commerce system isn't integrated with the PoS system, so when the customer buys something online and shares her name, email address and mobile phone number, for example, the company doesn't know that the customer is the same person.

Even in physical stores, different locations use different types and versions of PoS systems, which aren't always connected. As a result, the customer master data becomes fragmented and siloed. The company again has no idea that s/he is the same customer shopping in a different location.

Connecting CRM tools with master data management systems can go a long way in helping companies better understand their customers and help them make the decisions that will impact their customer relationships.

TECHNOLOGY SPOTLIGHT:
The Role of Master Data Management in Fashion

Master data management (MDM) is an effective way for organizations to get an end-to-end view of their operations, providing a single point of reference for defining and unifying their critical data elements. In fashion, MDM enables companies to gather, manage and unify data about products, customers, suppliers, locations and assets. MDM is not about tracking transactions, it is about the data used in transactions.

There are many benefits of MDM. It creates a central repository of data, so all stakeholders have access to the same data dictionary. Therefore, they can share a common understanding, while making business decisions. MDM also requires that all data entered into the systems must adhere to rules regarding style and nomenclature, improving the accuracy of data across platforms.

Having all the data definitions in one central repository also enables organizations to better utilize the power of big data and analytics to provide business insights and spot potential areas of opportunity or growth.

There are a few options for MDM in the fashion space. However, one of the most popular is

Informatica MDM. This is an end-to-end solution that covers data quality, data integration, business process management and data security. Informatica MDM enables organizations to acquire data from any location, including on-premises, in the cloud or from third parties. This gives organizations visibility into data, relationship patterns and variations, so that they can make any necessary adjustments.

Informatica MDM is a modular solution. Therefore, organizations can create a system that works best for them. Modules include identity resolution, customer experience, business process management, customer relationship management integration and product distribution.

Marketing and Advertising

There are few activities that stretch across every company in every market niche with equal importance. Marketing and advertising are two of those activities. Whether a company is a large design house with thousands of customers or a small boutique with a handful of high-dollar clients, they rely on marketing and advertising to promote their goods and their place in the industry.

Marketing and advertising span all phases of the fashion cycle, from pre-market to post-production,

and runs parallel to whatever processes are occurring within a particular phase. Marketing efforts ebb and flow, as needs dictate, during each phase. Introducing a line during Fashion Week, for example, will require greater marketing and advertising than closing out a line at the end of a season. Nevertheless, each phase will see some sort of marketing and advertising occur. Marketing and advertising in fashion also has a cyclical element related to the product. As one season closes, another one is kicking off. Brand marketing and advertising is less season-related, since you are promoting your overall company, not just a specific season of offerings.

The terms "marketing" and "advertising" are sometimes used interchangeably. However, it's important to note that they mean two different things. Marketing is defined as the action or business of promoting and selling products or services. Advertising is a component of marketing, along with market research, media planning and social media and sales strategy. 'PR' or Public Relations is also a part of these activities. How you are perceived in the community, can be as big a factor in building brand and product loyalty, as any marketing campaign. Put them together and you have the most likely chance of achieving whatever your goal might be. However, you need to be careful. These things can take on a life of their own. Just ask Nike about a kneeling ex-NFL quarterback. Agree or

disagree with the QB's actions, Nike clearly got its money's worth with the campaign—but did it get more than it bargained for?

The Marketing Plan

Marketing is usually done for two tracks: non-seasonal, which doesn't focus on actual items but is designed to create and foster brand awareness; and seasonal, which is much more focused on the product itself. Seasonal marketing generally requires items to be available for inclusion in advertising campaigns that tend to follow a particular theme, such as safari or country estate. Themes promote the inspiration for a seasonal line and will run through all marketing and advertising efforts for the season. That helps enable the companies to track the success of a line and its related marketing.

All companies, whether design-driven or merchandise-driven, should have a marketing plan that includes the theme and how it will be communicated (visually and textually). It should also include the ways in which the marketing will be conveyed, including print advertising, social media efforts, promotional giveaways, etc.. Since fashion is a visual industry, photographs and video have the most impact of all media. Therefore, deciding how visually seasonal lines will be represented, drives a large part of the marketing plan.

Another important element of the marketing

plan is the budget. This includes the cost of just about everything for marketing the line, from advertising space in magazines to on-location shoots, social media campaigns and even gift bags given out at fashion shows.

Market research, which should be included in the marketing budget, is another important element in the marketing plan. To help ensure that their campaigns will be a success, companies conduct demographic analysis to determine their target audience, as well as the most impactful methods and media to reach the audience. This research is done either in-house or through a third-party research firm.

Images, video and other content, which is driven by the seasonal theme, is developed for each particular media outlet to ensure an appropriate mix. The type of content is determined in the marketing plan and is developed based on what is listed in the plan. A company that doesn't include video sites in its marketing plan, for example, probably wouldn't waste its budget producing video content. Likewise, a marketing plan heavy in print advertising, will need a fair amount of still photography.

In determining their marketing plan and budget, design-driven companies also include what is known as co-op dollars to use for advertising with retailers that carry their brand, such as large department stores. Co-op dollar values are based on the sizes of orders and quantities, with retailers

agreeing to sell a certain amount of goods at a certain markup price to earn the co-op dollars. These are often decided in negotiations with the retailers, as part of the marketing plan to promote the brand or the commercial sales discussions, when buying into a line.

When Marketing Begins

The actual marketing of a seasonal line kicks off during pre-production, and Market is the main marketing activity. When a seasonal collection or line is created ahead of Market, samples or "top of stack" items—first-run production items—are brought to the event for display. Items for runway shows are usually pre-production and can differ from actual production designs, while first-run production items also can be sent out as press samples to be photographed for media use.

Merchandise-driven companies, such as large retailers with in-house agencies, often request press samples for their marketing and advertising campaigns. They are created after a line has been finalized but well before the line is released for sale.

Marketing and advertising in the wholesale space is similar, in that top-of-stack or press sample items are sent out to be photographed for advertising campaigns.

Regardless of who is in charge of marketing and advertising efforts, both design-driven and

merchandise-driven companies want to get their product available for photography and videography, as quickly as possible.

There are a few different types of samples, as we discussed earlier. For advertising, it is usually press samples that are loaned to celebrities and media outlets to be photographed, which the company should expect to get back (unless they are given as a gift, with the idea that the celebrity will wear the item). There are also commercial samples that are sold to partners—sometimes as part of a co-op agreement—which the company will not receive back.

Marketing Throughout the Lifecycle

As we've already noted, marketing efforts don't just happen at the beginning of the season. They occur in different forms throughout the entire life cycle of a season. Beyond the initial advertising and promotion at the beginning of a season, marketing also occurs as brand awareness through activities, such as making outfits for the Olympics, for example, or end-of-season promotions to clear out inventory for the next season.

Social media has emerged as an effective vehicle for both collection and brand promotion, by targeting key audiences. Just about every major designer now has an active social media presence. The social media activity of the designer often drives brand awareness and sometimes even mild scandal, which

can be great for gaining eyeballs, if you subscribe to the 'any press is good press' mantra.

The market image in design-driven companies is closely tied to the persona of the designer. Due to the personalized nature of social media, having a designer tweeting about his/her latest favorite color palette, for example, can be extremely valuable to a company's marketing efforts. Social media sites, such as Twitter, Instagram and Snapchat, can be extremely effective vehicles in reaching target audiences for both seasonal activities and general brand awareness.

More esoteric yet valid activities also count as marketing for brand-conscious companies. Celebrity placements, for one, can generate interest in invaluable ways. An example is a photograph on social media or in a celebrity magazine of an actress, like Kate Hudson, wearing a particular sweatshirt, on her way to get coffee. The sweatshirt was provided to her, before it went into production. Therefore, a well-placed photo of her wearing it, will hopefully pique interest early and spur sales.

These and other activities promote the brand and the line at their introduction and into the season. Further into the season, as the line begins to taper, the marketing activity focuses more on cleaning out inventory. At that point, sales and marking down items replace promoting items.

Expensive luxury brands struggle with having

sales, because they never want to be associated with the idea of discounting. However, even the most expensive luxury retailers grapple with end-of-season merchandise. Some simply have a shelf in the store on which everything is marked down, and the salesperson shares the information with customers, as needed. Their struggle to get rid of merchandise without having sales in their stores, led to the concept of outlet stores and then, ultimately, to adding the product to sample sales. Many just destroy excess inventory, when it is deemed beyond commercial value at its high end price.

TECHNOLOGY AND BRAND AWARENESS PROFESSIONAL SPOTLIGHT

An interview with

PETER LEVY, Marketing and Brand-Building Executive

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Building and maintaining a brand is critical in the fashion space. Designers live and die by the reputation of their brand, regardless of the size of their company, putting a literal spin on the mantra, "Image is everything."

As a professional in the brand-building and brand-awareness space, Peter Levy understands the nuances in creating and nurturing a company's image, not the least of which are finding the right way to highlight the brand for marketing purposes without hindering the creative process—or, in Levy's words, "How commerce could really let art be." Social media is one example of technology that has enabled Levy's clients to extend their brand awareness and reach a vastly wider audience of customers.

In this Q and A, Levy discusses the role of technology in brand awareness, as well as its impact on other areas, including inventory and time to market.

How have you used technology to help your clients further their brand awareness?

We use social media as a sentiment indicator—who are the influencers that have the most social media impact? The first time we used it, we looked at the top influencers, and without question globally we saw it was the models and the designers who had more social-media impact over, say, athletes, because they were speaking to a lifestyle.

Also in inventory management, when we were trying to launch brands. What we would do in places like Berlin where we had a fashion week, we'd say about a designer, "This is fashion's future," but nobody had heard of the designer outside Berlin. So, we'd get a local retailer and use a department within a store as a showroom during fashion week, but there was no inventory there. The inventory was all managed online and shipped. This was about 10 years ago, and we were around the edges of it, but the industry was way behind in technology. But observing it now clearly, without technology this whole generation of brands wouldn't exist.

What impact do you think the fast fashion brands have had on the fashion industry in general and their use of technology?

Well, for instance, in China, everything is computerized. People wonder how they manufacture things for less money. Well, that's because they're not retrofitting machinery; they're bringing in raw materials and they're being laser-cut with no waste. They can spot errors quickly. That is technology

that's allowing things to be competitive. In the U.S., however, I always say, they're trying to make a typewriter work like an iPad.

In fast fashion, they have the ability to deliver something in 48 hours, because everything can be tracked not only from an order or design but from inventory management and sending it out to be shipped. But it's not just fast fashion, it's customization—it's the ability for someone who's making custom shirts in London to know in real-time what their inventory of raw material base is.

I think fast fashion is great, because they've been able to react quickly to things. I think certainly the internet is helping push things in real time, where the retail world is not having to wait six months if you're in fast fashion. If there's a trend, they can immediately bring it to market.

I think technology will become more seamless, and companies are realizing that they need to update their technology, if they're going to stay competitive. And I also think stores will become more and more like showrooms, which is more and more like a runway. People should be able to see things, try things on, touch things, because they still want to do that. And shopping is social. So, as long as you can touch it and feel it and be able to return it and it gets to your house and you can spend the rest of the day with friends walking up and down Madison Avenue having fun, I think it just becomes more and more natural.

Is data something that's become ubiquitous now as a driver for marketing campaigns or influencing campaigns?

Definitely, because you can see immediate results of people that you're either using as influencers or you're associating with or what networks you're putting on or who you're affiliating with. I think otherwise you're just taking a complete risk.

Companies that do it well have turned it into a lifestyle, where it isn't just about fashion but it's about food and it's about furniture and it's about travel. But theirs is a two-way conversation, as opposed to just advertising, which is bombarding people.

Do you think we'll ever see a decline of the in-store experience?

I think you'll see an increase in the experience. Not the actual commerce, but it's going to change. But today, if you come into a store with beacon technology and Bluetooth, a brand can tell you their story as soon as you walk in. They can have things set up where they're actually customizing things in front of you. I think experientially that will increase.

Technologies Used in Marketing

There are a variety of tools used in marketing and advertising to help not only manage the process and the specific efforts, but also measure the outcomes and determine a marketing plan's ultimate success. There are some basic tools, such as Excel or other spreadsheet programs to track budgets and activities. Others are more advanced, such as digital asset management systems that digitize content for both archiving and managing current workflows to streamline processes and expedite marketing efforts to various channels. DAM systems also include tools to help track items, such as the fonts used in an advertising piece and whether the company will have to pay to use them.

Throughout the life cycle and as part of their marketing plans, companies collect extensive data that they use to measure customer sentiment. At the introduction of a line at Market, companies will measure the customer reaction and use that information to better hone their sales process. Sentiment could be product-specific or market-specific, such as a negative social media post about a designer or a company by an influential person, which ends up affecting consumers' attitudes. Likewise, sentiment can be monitored at the product level, such as how many people are talking about that particular sweatshirt Kate Hudson wore, while getting coffee. This information can help

companies in their decision whether to purchase additional units to meet anticipated demand.

Other data that can prove to be vitally important in a company's marketing efforts, include those related to web advertising, such as the number of website hits and click-throughs. Service provider companies such as Nielsen, AdTrack and DoubleClick provide web metrics that are distilled into market-centric information, such as the success of a particular item or campaign, how much time customers spend on an ad and its click conversion ratios.

Some companies, especially those in fast fashion, are working to make this information available instantly. For example, Tommy Hilfiger and Gigi Hadid recently collaborated on a fast-fashion line of clothing that they showed at Market. Certain elements of the line were immediately available on the website, so they could track customer response immediately and make adjustments to the marketing plan, almost on the fly. They had escalated the season's schedule, so their marketing and production were occurring at the same time.

In the past, marketing was more art than science. The pitch—and getting people to listen to it—was very art-driven—'just say badda-book, badda bing' or think Mad Men. Data is now driving much of the marketing efforts, enabling companies to base many of their decisions on history and somewhat scientific predictions. Knowing what's

happening in-season faster, is important because companies then can move faster to address it, such as replacing an ad with another to address a different demographic. The more data a company collects and analyzes, the faster it can react.

TECHNOLOGY SPOTLIGHT:
Marketing & Advertising Technologies in Fashion

Marketing and advertising are critical activities for every industry. They help to create brand awareness and to support and extend brand reputation. In fashion, marketing and advertising can take many forms, from glossy spreads in magazines and commercials on television to product placements and influencer endorsements on social media.

Due to the vast array of media available for marketing and advertising a brand, season or line, software platforms have sprung up to help organizations that are performing multi-channel marketing to manage their assets digitally. Opal is one particular platform that is useful in fashion. It brings together assets to help content marketing, direct-to-consumer advertising, brand marketing, agency, internal communications and external communications.

Opal assists organizations throughout the entire marketing life cycle. It starts with strategy and planning, continuing to creative and production, review and approvals, facilitation and communication and finally delivery and distribution. The platform enables users to create a road map for their campaigns, including social assets, press releases, video

uploads, web updates and more. It also includes a content solution that allows the company to interact across stakeholders on key presentations.

The Opal system is web-based and integrates with an organization's existing marketing tools to ensure that all stakeholders can access the assets they need, from wherever they are. It also integrates with other tools used by an organization, including productivity, project management, assets and file storage, publishing and analytics tools. As a result, companies can manage their entire M&A process from end to end and have all their assets available in one place. This can help to streamline the marketing process, by making them available instantly, as well as to reduce duplication and encourage the reuse of media content.

Behind the Scenes: The Tech That Runs the Company

As a business, fashion is often viewed from the outside as glamorous, exciting and trend-setting. On the inside, however, it is a business that is like most others. It has many of the same departments, processes and technologies found in any other business, from hospitality to banking.

For example, each company has a human resources department, or at a minimum HR functions,

which uses technologies that are specific to HR tasks, such as employee management software. It also has a separate finance department, which uses its own type of technologies, such as accounting programs. Powering many of these technologies is an IT department, that manages the hardware and software that enables many of these systems.

The technology that runs the company in fashion is often the same technology that runs companies in other verticals. There are few differences between them at a macro level, except for a few "tweaks" to the systems that address the specific rules, regulations and procedures of each industry.

Human Resources Systems: Hire to Retire

Human Resources functions are, at their basic level, hire-to-retire, or the recording of activities related to employees over their time entering through leaving an organization. The traditional approach to human resources—also known as talent management or human capital management—works well overall, in fashion as well as other industries. However, in fashion, many companies approach HR in a fragmented way. They start off as a small company and often hire employees without any real strategy around recruiting, retention or development. For most organizations, that's not necessarily a bad thing. Startups often rely on "bootstrappers," who are able and willing to do what's necessary to grow

the company in order to be successful. At some point in a company's growth cycle, the HR function must mature and HR systems can help with the organization of activities and data required during that maturation.

As with any organization, human resources is responsible for recruiting, hiring and onboarding employees, as well as management of their salary, benefits and performance management. Salary can be either a set yearly wage, an hourly wage or commission-based wage, or a mix of all of them. Therefore, payroll must operate on a tiered model to accommodate the different configurations.

Benefits covers any non-monetary incentives offered to employees as part of their compensation package, including medical insurance, paid time off, retirement accounts, clothing allowances and more. Benefits normally are similar for all full-time employees, no matter what their compensation structure is. However, they increase with job level, like salary does.

Performance management is usually handled by both human resources and an employee's manager. It covers such things as how well the employee meets the goals of the job, what type of education is necessary to ensure the employee remains productive and advances to a higher job level and succession planning. This involves identifying whose position the employee will be most

qualified to fill, should that other person leave the company. It will also address who will take over the employee's position, should they leave the company or move into the higher position.

Understanding that few employees stay with an organization for their entire career, human resources also handles offboarding, or the process by which an employee leaves a company. Offboarding includes paperwork to continue certain benefits such as health insurance or retirement accounts, collection of company-owned assets, such as key cards and computers, and an exit interview to understand why the employee is leaving (if the departure is of the employee's choice).

Human resource management systems handle many of the administrative tasks associated with hiring, managing and discharging employees. These are all tasks that require a certain amount of sensitive employee information. Companies in all industries have an obligation to protect an individual's personal information. Therefore, it is critical that HR systems are secure. The security of the data for the company as a whole is paramount. HR is, therefore, increasingly tasked with rights management, which is the level of access that an employee has to company information. For example, a mailroom employee should not have the same access to sensitive financial information, as an employee working in accounts payable who

needs to manage invoices and pay suppliers. The accounts payable employee should not have the same level of access to design files, that a production manager should have to source materials and contracts with sewing houses. Rights management is designed to protect the company's IP and to safeguard against fraud.

Rights management is also designed to protect the company against employee malfeasance. If, for example, an employee is fired but still has access to company systems, that employee could wreak havoc in retribution, such as delete an ERP server. If a store employee has a grievance against the company and has email access to everyone in the company, she could send an email to everyone that airs her grievance and potentially divulges sensitive company information.

Security is a top priority in HR environments, due to the sensitive nature of information flowing through its programs. The hiring process alone—collecting data on a large pool of applicants and then accumulating additional information about individuals who are hired—results in an inordinate amount of information that is sensitive to individuals. Where does the HR organization store applicant and employee information to protect it?

The collection and storage of employee information, including payroll, benefits, performance management and security access (rights

management), usually occurs in disparate systems and, the data is found in different places. However, HR must share that personal information with many organizations to ensure that employees are paid the right amount and on time, have health insurance when they visit a doctor and are contributing to their retirement accounts.

Although these systems are disparate, they all share some common data, such as employee name, date of birth and Social Security number. In recognition of that fact, a growing list of services provider companies now offer suites of talent management applications and the option to manage the employee life cycle for HR departments. In smaller organizations, they actually act as the HR department on their behalf. This helps to consolidate data and processes, as well as limiting exposure for the brand.

Rights management surrounding network access is one of the tasks these HR services providers can handle, in conjunction with IT department security teams. Many of them have identity management platforms that they use to set up email addresses, telephone extensions and unified communications accounts. For example, based on information from the HR system, they include: their name, department, manager, role and more.

In addition, a number of cloud-based and self-service suites are available to manage the policies

and procedures of a company, from posting job descriptions for employee recruitment to working with multiple providers for employee benefits and streamlining the offboarding process. These technologies have become beneficial in enabling companies to focus more on the "performance and knowledge management" of the talent pool, such as employee reviews and education for everything from on-the-job training to succession planning and sexual harassment prevention. These activities help to ensure that employees are armed with the knowledge they need to do their jobs effectively, safely and within the confines of the law.

In the fashion industry, where employees are dispersed in several locations worldwide from company headquarters to retail stores, and sometimes far away in sourcing offices, effective HR systems are paramount. In this environment, communicating with employees can often be more difficult. However, many of these employees interact more with the general public than they do internally. It is critical, then, that employees understand what is expected of them by the company. The technology used by HR must be centered around the company's policies and procedures to understand employees' roles, inform decisions regarding those roles and fill the gaps where necessary—or discipline/reward the employee, when appropriate.

TECHNOLOGY SPOTLIGHT:
Human Capital Management

Organizations of all sizes and in all industries need to manage their human resources effectively. An effective HR department can handle all aspects of employee management, from recruiting, hiring, onboarding and retention to compensation, benefits and other aspects of human resources. A poorly run HR department can take its toll on the organization, in the form of mismanaged benefits programs, slow reaction to HR events (such as approved raises and promotions) and little to no communication regarding important company events. This results in low employee morale and high employee attrition and turnover.

Human capital management software can help HR departments to run efficiently and effectively. They do this by streamlining the tasks involved in HR management. In addition to the large ERP providers, who have built or acquired HR modules for their existing product suites, there are a number of companies which provide these functions via the cloud including: Zen Benefits, BambooHR, Kronos and Zoho, among others. Workday is a very popular HCM platform. It enables organizations to conduct all activities related to HR, from one web-based system.

Workday and others include functionality related to:

- Organization modeling
- Compliance
- Workforce planning
- Recruiting
- Talent management
- Compensation
- Payroll
- Benefits
- Time and Attendance
- Expenses
- Learning

Employees have access to their information via the web and mobile devices, with the ability to view information, such as available time off and paycheck details. They can manage tasks, such as requesting time off and viewing their benefits instantly, rather than sending a message to HR and waiting for a reply. A dashboard gives all users, including employees, managers and HR professionals, an at-a-glance view of the most relevant and most requested information and their HR-related to-dos.

Managers can use HCM systems to identify the skills and strengths of employees and to reallocate resources to address staffing or other issues on the fly. The system can allow them to monitor symptoms of employee morale, provide feedback

and assess employee retention risk. These proactive activities can help breed a culture in which employees feel more valued, potentially reducing employee turnover.

Finance Systems

Finance functions are, at their basic level, record-to-report, or the recording of transactions as they occur and the reporting of those transactions over time. There are cyclical activities that occur regularly—paychecks are issued on the 15th and 30th of every month, tax payments are due every quarter and other actions, such as understanding how much money a company owes and is owed. These activities are the same as other industries.

However, there are certain things that set fashion apart from other types of businesses. The first difference is that fashion companies must plan two ways: according to accounting principles and according to product calendars. Different companies have different numbers of seasons, depending on what they produce, and how they approach their markets. Those seasons rarely align with accounting periods. Therefore, companies need to understand which accounting period(s) will include which season(s) and products. That information is

critical in forecasting sales and determining their revenue goals and expenses for their calendar year, whether fiscal or seasonal.

Many companies in the retail sector have pushed the end of their fiscal year to the last Saturday in January, known as the 4-5-4 calendar because each quarter will have its first period with four weeks, second with five weeks and third with four weeks. Other companies end their fiscal year on the last Saturday in March, known as the 4-4-5 calendar, to include all holiday financial activity, including returns. If its year ended December 31, all its post-holiday returns would impact the next year's books. It makes more sense to include both the big purchase cycle and potentially big return cycle in the same fiscal year.

Companies in the fashion sector tend to build two separate forecasts: a traditional forecast and a product seasonal forecast, which is specific to each season and each product line. They then drill their forecast down to wholesale and retail. If a company has stores, how many units will it sell in each location? A company's fall season merchandise must be ready to ship in May, in order to be in stores by August. To arrive at the distribution center in May, the merchandise would have been sold at market in January—an eight-month lead time that must be recognized by the calendar and the forecast. These long lead time production cycles

are changing. However, the financial disconnect between season and fiscal period remains, even with shorter lead times.

Most companies must take their forecasting to the category level at a minimum, so they can project where certain merchandise should be offered. For example, will heavy flannel sell as well in San Diego, as it will in Maine? Regional distinctions are important, both domestically and internationally. A company should understand when to send its flannel south of the equator, where the seasons are flipped. Companies not thinking or not aware of these distinctions, will lose a lot of context, if they haven't matched their seasons and their merchandise appropriately. Many apparel companies forecast to the style/color/size level, which can be tricky. However, when it is done properly, it can yield excellent results. The same is true for the shoe business. They not only have to plan at the style category level, they also have to go to the size and sometimes width level with location proximity. This is because many fashion shoe companies do not make enough of each size for every location, to have every size of each style. Therefore, they may want a half size to be close to the store with the nearest full size, so they can get it to the other location fast, if needed.

Most companies, therefore, have two levels of financials that run in parallel and are brought

together several times per year. The level of sophistication is company-specific. Large enterprise resource planning (ERP) systems can record the tangible information: numbers of units, margins, top-level and bottom-level costs, revenues, expenses, cost of goods sold and administrative expenses. Plans and projections, meanwhile, focus on what the company is selling and where, down to the style/color/size level. Sales projections go deeper, to look at who the company is selling to and the style, size and color. This information is important for production, especially for them to know what the merchandising plan is. With the ERP systems, production can see the types and cost of raw materials, labor costs and other financial tangibles. It is information that they can use to plan accordingly to meet their goals. Companies must keep their production costs down and ensure that the manufacturer's suggested retail price (MSRP) will meet its financial goals. For the most part, planning information is specific to an organization and traditional accounting packages generally don't have the technology to handle these projections. The systems are also disparate, which means that data is often duplicated across systems. Traditional financial data housed in the financial engine is rekeyed into industry-specific merchandising planning tools to enable seasonal style/color/size planning. These silos speak to why

master data management can be so important, as discussed earlier.

Just like a company plans for its revenue, it also must make a plan for its expenses. In general, expenses include costs across the business including fixed costs, rents, salaries, etc. They also include variable costs, which are tied to the revenue model. If a company opens a new store, it should have revenue projections that over time will offset the investment that goes into it. Of course, companies sometimes open stores knowing that they won't make money but understanding they must have a presence in the particular area. This should be considered a brand marketing expense. However, an accountant would be unlikely to list it that way.

The cost of goods sold is another example of a variable expense. Companies sometimes won't project revenue for certain items or, if they do, will project based on the costs associated with selling it through different sales channels (wholesale, retail, online). If the margin (how much money the item will generate after its cost) is too low, companies will adjust. The higher the cost to create the product, the lower its margin will be. This is true, unless the sales price can be increased at a greater rate than the expense cost. This is simplified for sake of illustration. There are other factors that are involved. However, the premise is the point: If the cost goes up and the price doesn't, a brand makes

less. One of the reasons brands work so hard at being considered "luxury," is to be able to command the market premiums and margin premiums that go with that position.

Profit is tied to both revenue projections and unit projections, and margin supports profit. The most successful companies are those that manage margin throughout the entire production life cycle. How efficient a company is in its building, buying, purchasing, shipping and managing all the activities of a particular item, is key to its ability to drive its margin, which hopefully results in healthier profits.

Below-line expenses are looked at as investments, with the idea that if a company is investing in itself, it wants to generate more revenue over time. Even the smallest companies think about where they are investing, whether it is in marketing, product placement or other activities. If it's not building its own brand but instead licensing a name, a company will have to pay a royalty fee. That will be a component of the cost of goods sold and the right to use. It is potentially a variable cost on units and a fixed cost on time or product season, depending on the contract model.

The investment in below-line expenses will depend primarily upon the business. Companies need to be able to see where they spent their capital and compare it to where they planned to spend it. They also must be able to slice and dice data,

from period (month) to quarter to year.

Remember our point on fiscal calendar types from earlier. Apparel tends to operate a 4-5-4 or 4-4-5, so that holiday returns can be included in the company's annual bookings. The type of fiscal calendar is an important element. If a company doesn't track data at a daily level, how does it reconcile a month vs. a period? A month ends on the last calendar day (the 30th or 31st), but a period generally ends on a Saturday or Sunday. Companies must know this information to plan accordingly. How does the company overlay the fiscal calendar with holidays or seasons? Similar to the revenue, reconciling seasonal with traditional GAAP expense is very important.

The cost of goods sold (COGS) is directly tied to a product. This is made for a season, so the connection is direct. Therefore, a company may have a 100-piece fall line and activities that span nine to 12 months for that line, but not all in the same fiscal year. The activities will lead in to pre-production; the company will sell, produce, ship and sell it commercially direct to consumers; advertising occurs; and finally, leftover merchandise will be liquidated. All of these are activities that could occur in a nine- to 12-month period, or greater, that spans two separate fiscal years. Companies need to track the regular expenses related to their line, such as advertising and brand-building, either for

the company or for a specific line or season. They will also want to know the COGS for that line or season. Therefore, they must have a way to track it that is not directly linked to the fiscal calendar, but to the product or even the lunar calendar. This assumes that they can time-box the production and sale of the items in question.

Systems and processes that automatically attribute expense-related activities to season activities, can enable companies to look at not just product but also margin and operating expenses for those seasons. Companies want to track every dollar they spend. They want to do it in a way that, when the expenses are related to a product or seasonal activity, the company is equipped to handle the dual relationship of fiscal and product/seasonal.

Companies operate in fiscal years, yet their seasons run beyond a set fiscal year calendar. They need to see how sales fit into the fiscal year, including seasons and replenishment (non-seasonal, recurring and basic stock). Therefore, a company's reporting system must support the type of company it is. Its business process systems also need to track accordingly. If a company does some level of basic stock replenishment, it needs to understand volumes to determine how people perceive the product. The company can then either shift out of replenishment or reinforce its current position. However, if a company mixes

its basic stock replenishment numbers with its fashion season numbers, it can't tell whether it is doing better with its seasonal or its seasonless merchandise. The recording and reporting systems need to be built in a way to tag on the buy side, sell side and production side. They also must report on all those tags together, separately or in any way a company needs to support its operations. That reporting becomes extremely important in determining operational health, opportunities and risks.

There are many nuances in reporting between baseline business activities and fashion apparel retail specific activities. It's not just the calendar and seasonality. The system also must understand prepacks, shipping modes and methods and other things specific to this industry. Most systems, however, generally don't offer this functionality out of the box. Service providers and systems integrators must "tell" the systems how to handle them.

TECHNOLOGY SPOTLIGHT:
Financial Accounting

Financial accounting is an activity that is not specific to the fashion industry. As a result, there are a number of different software technologies available across all verticals, from general-purpose to industry-specific solutions. They are all designed to address the financial aspect of doing business—general ledger accounting, accounts payables, accounts receivables and recording assets and expenses.

Larger organizations tend to use financial accounting systems that include multiple feature sets to address multiple tasks and that have robust audit capabilities. There are several products that have a strong and deep customer base, including Microsoft Dynamics AX/365, Oracle and SAP FI. The latter product is used by a number of larger, publicly-traded apparel companies.

SAP FI is a component in the SAP family of enterprise resource planning (ERP) solutions, which manage the financial transactions within enterprises. It is a module within the SAP ecosystem that integrates with other modules, including Sales and Distribution, Logistics, Materials Management and Human Resources.

Microsoft Dynamics AX/365 is also a part of

the Microsoft Dynamics family of components that integrate to create a customized solution for an organization. The overall technology is used to manage operations such as finances, manufacturing, distribution and human resources, and is available as a cloud-based or on-premises solution.

Oracle Financials is also popular in enterprise environments. It is similar to the others, since it consists of modules to enable a customized ERP solution. Financials, procurement, project portfolio risk management, enterprise performance management and others are available for organizations to manage their operations effectively.

These 'suites' of products are designed to automate and streamline an organization's financial management processes from end-to-end.

Reporting, Analytics, Business Intelligence and Artificial Intelligence

Reporting, analytics and business intelligence go across every process in fashion design and selling, as well as over all time periods. When it comes to the data powering these activities, the adage "garbage in, garbage out" applies—the information must be "clean" to be useful.

In looking at all elements that make up collective

activities (both cyclical and non-cyclical), companies need to report on every activity on a functional/transactional level, as well as a holistic level and perhaps over time (example: comparing days to one another). However, the data is housed in different solutions, from ERP to Excel spreadsheets and Point of Sale, often with little to no integration. How can a company report from all things across the business? For example, how can a company see how long it takes to go from designing a product to having it on the shelves, and where can it shorten that cycle? If it is using multiple systems plus a production company, a customs broker, a shipping company and a wholesaler for end product sale, it can't really know.

Certain technologies to integrate data, such as reporting engines or data warehouses, can work across multiple systems to generate information, based on these siloed data sets. However, these technologies can't account for data that is entered incorrectly or varies from master data information, such as the color description (blue, dark blue, indigo, etc.). Therefore, getting holistic data across these platforms, becomes a new challenge. This is because there is no easy way to normalize data. More data doesn't necessary mean better insight, when the information is fragmented, inconsistent or incomplete.

Data warehouses house data that has been

collected from various sources, ranging from internal systems to social media and beyond. Using data warehouses, companies can normalize data to create historical reports, spot trends and view information over time. Companies are not just looking at data for a point in time, but over time and across different scenarios for better information. That data then can be fed into an analytics engine, further slicing and dicing the data with different views and takes. This allows it to further spot trends, make predictions and suggest actions to take. However, the same issue applies: garbage in, garbage out.

Artificial intelligence can take the data from analytics engines, data warehouses or other unstructured data points, such as social media. It can look for repeatable patterns and determine the impacts of positive or negative actions, and even make recommendations for the company or the customer. Sometimes the outcome is good, such as the system suggesting a particular belt to go with a pair of pants or a purse. However, there are certain instances, in which the algorithm powering the artificial intelligence is incorrect. An online shopping site could continually suggest jeans and casual shirts to someone who regularly buys business clothing. This type of error could even cause a company to lose customers.

As a related example, one of my music streaming

apps plays commercials in Spanish. However, I don't speak Spanish well. This means that I am deriving no value from the commercials. It's a waste for the companies, whose commercials I'm hearing. Although it was amusing at first, it is now just annoying. If the music streaming service is using AI, it's not being done well. If they aren't using AI, maybe they should be. I suppose I could just stop being cheap and get the paid subscription to eliminate the commercials. This would fix my problem, but not theirs. What I do instead, is use another service—and the music streaming service has lost a revenue opportunity. However, I still have a mildly humorous story to tell.

Business intelligence is now primarily about collecting and providing data to help companies work smarter. However, machine learning can put the data into action, by analyzing the data to determine whether certain thresholds or conditions have been met—such as the temperature dropping below 45 degrees—and then recommending that a retailer buy more jackets. The system could also simply take the action and order the jackets, based on historical data and past user actions. However, this scenario requires that the data is clean. Unfortunately much of the data in the current systems in the fashion space is too fragmented and unclean to achieve positive repeatable outcomes. It is coming, however.

If any data in current systems need complete oversight, it is master data. Companies must have normalized data at the core. Without it, their analytics or reporting data will be greatly compromised. Disparities in color nomenclature, product descriptions or SKU numbers undermine the analytics. Data not input in the same way across platforms is bad data. It won't provide the insight and intelligence that companies need to be successful. They can invest large sums in reporting and analytics tools, but without good master data, the outcomes will be inadequate.

BUSINESS INTELLIGENCE & BIG DATA PROFESSIONAL SPOTLIGHT

An interview with

CHANDAN PANDEY, Business Intelligence and Data Architect Expert

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Chandan Pandey has an impressive background in both business intelligence and fashion, having been immersed in the fields for a number of years. He started in IT in 1995 and has worked in many industries, ranging from manufacturing to retail. Over the course of his 23-year career, he has been involved in projects that include data modeling, mobile application development and business intelligence.

In the fashion industry, Pandey has provided his expertise in business intelligence to a number of well-known design companies to help them make the most of their data. Business intelligence tools have become important in helping these companies grow, by using their data to provide insights that help them make smarter decisions.

In the following Q&A, Pandey discusses the importance of business intelligence in the fashion industry.

What is your perspective on the importance of data in the fashion industry?

In the fashion industry, things move slower than in other industries such as retail, so pricing is very important. It's not a quantity business, it's a quality business. And a lot of planning is involved; when you're doing business intelligence, you want to have a view into what happened this year and what happened last year for comparison. That gives you historical perspective, and from there you can determine how much you're planning to sell into the season.

But in this industry, it can be difficult to compare this year to last year properly because items change every year. So, it becomes that much more important to know your product. You will always hear people say things like, "Forget about the shirt—I care about just the material." So the product has to be broken down in any number of ways before it can be analyzed properly. You need to see, for the same product, thousands of different attributes; you need to understand them, and the data has to be used in a way that gives them a sense of what and what not to produce.

Also, the biggest challenge in this industry is managing the inventory. Most of the items are being produced somewhere else and then shipped to many different locations, so people have to figure out what is selling where—and if it's not selling well, can they ship it to somewhere else?

But because of the lead time in fashion, just about everything is planned six months in advance. And by the time things hit the shelf, things may

have changed: Something might be selling better in Japan than in the U.S., but it might be already too late to make any changes, because that shipment is already on its way to the U.S. and it can't be diverted to Japan.

So, now, as people are understanding that a little bit better, they're slowly trying to make certain adjustment and trying to use the data a little bit more in all these phases, so that they can make better decisions vertically.

What are some of the things companies struggle with in BI analysis and reporting?

Inventory management seems to be the big issue. Take how products are ordered in the fashion industry: a designer will make some samples and put them in their showrooms, and then buyers come in and place their orders. Then they have about six months before they see the product, and a lot of things can happen during that time—they can change some of the orders, they can cancel, they can ask for more.

So, now, I'm seeing companies trying to manage those orders—where to send the items and how much to send, so those locations can maintain a decent inventory without too much that might end up going to off-price iteming. That's the biggest challenge.

Companies also are starting to use the data to be more innovative with their inventories. For

example, one brand with multiple locations swaps inventory between stores to keep their inventory fresh. So, customers walking into each store continually see new items.

If you understand how your inventory is coming in, and when things are selling at what location, that's a huge thing. It enables you to do things like inventory-swapping. It will keep your customers coming back, expecting to see new things.

What are companies doing with BI technology that perhaps they could not have done, or not done as well, without it?

The biggest thing BI has solved is that now, companies don't have to depend on paper reports anymore. Before, one report was generated and everyone came to a meeting with different numbers and said, "I don't trust this number, because my number says this." Now, everything is in one place and there are tools and technologies in the back end, so now we have come to a point where people trust the data. The BI says this is the number, this is the number.

Looking ahead, what are some of the technologies or the big drivers that are going to be helping the fashion space in general, in your opinion?

Text analytics, for one thing—translating data into plain English, so anybody can understand

it. Instead of getting a big, detailed report, text analytics could analyze the data and pull out two or three of the biggest things impacting the business. Then, if somebody has a concern, they can look at it in the report.

Right now, though, to have that simple solution, a lot has to be worked out on the back end. But tools are coming to help.

I think the industry is moving in that direction; everybody is trying to do some kind of statistical analysis, some kind of data mining to generate a plain English output. I think that will definitely help the fashion industry, because there is too much data right now.

TECHNOLOGY SPOTLIGHT:
Analytics, Reporting and Business Intelligence in Fashion

The increasingly competitive landscape in retail and fashion means that companies must be attuned to the activities of both their competitors and customers. Nothing can bring this type of insight like data and analytics. It enables companies to be more agile and intelligent in their business decision-making.

MicroStrategy is a company that is known for its analytics and mobility expertise. Its technology lineup for retail is well-known in the fashion space. The company offers a suite of tools for analytics, including mobile visualization, data discovery and data visualization and enterprise level security and data governance.

The suite provides visibility to information necessary to help companies achieve their goals faster and more efficiently. It also has pre-built solution sets for rapid deployment. According to Microstrategy, the Customer Insight Analysis solution can be configured to collect and analyze data from various sources to support real-time decision-making. Retailers can use this information to create more targeted promotions, customize in-store selection

of apparel based on customer needs and create highly personalized shopping experiences.

The suite can also be used for merchandising optimization, providing insight for retailers to adjust product types and inventory levels based on, for example, geographical needs and store sales volume. Sales reporting on best- and worst-selling items helps organizations to see and understand issues surrounding their inventory. Therefore, they can modify future product orders, initiate markdowns or markups and negotiate vendor returns.

MicroStrategy's solutions are designed for a variety of environments. As with most Business Intelligence platforms, the solutions must be built for each company, utilizing their data types and sources. This can be a challenging and time consuming task. With many BI platforms, garbage in equals garbage out. However, with a properly executed MicroStrategy deployment, businesses can get valuable insights into otherwise confusing information.

Information Technology and 'Systems'

The view of information technology has changed over time. This shift has become more pronounced lately. IT used to focus solely on information systems. It was considered to be an area that only a

few 'geeks' understood. Companies would give money to the IT department and it would go do things. They wouldn't know how long it would take, what it was going to get and what the value of investing in it was. No one knew what would come out on the other end.

Some industries realized the power of systems and embraced them earlier than others. Fashion was not one of them. In the retail apparel or luxury goods space, there was no need to jump into the tech game. They didn't need to be early adopters or leaders—their businesses were simple enough that they could calculate their yield on paper. As an industry, fashion had always lagged behind. It has adopted tech very conservatively—and through a necessity-based approach. There wasn't a huge fundamental realization that technology was going to alter the fashion apparel and retail spaces, until the last few decades.

The 1990s were still very non-digital in the fashion world. Companies were in no particular hurry to invest large sums of money to purchase or update old, outdated systems. The Y2K problem, which was the somewhat unfounded fear that a glitch in computer systems would render computers useless in the year 2000, was the catalyst that forced many companies to upgrade.

Around the same time, the internet and accompanying dot-com boom pushed a greater number

of companies to embrace, or at least tolerate, IT. However, many companies still refused to sell online. Major brands didn't launch online, until well into the new millennium, because they feared losing customers. They insisted that their customers would never purchase online. However, history has shown differently, even in luxury, where people like to touch things. Once customers are familiar with a brand, they will be happy to do their shopping online.

The shift to a more technology-centric mindset really occurred, when companies started to see new startup competitors making breakthroughs that they were not able to achieve. IT in fashion still lags other industries. The IT department is still primarily seen as a cost center, not as potential revenue-generator (at least not a revenue growth contributor).

Even almost 20 years after Y2K, some industry veterans still consider technology to be a back-office service, rather than a strategic business contributor. However, as those veterans leave the industry and younger employees fill their ranks, more companies are taking notice and focusing more on the importance of technology. It is a trend that will continue, since the integration of technology must be done seamlessly for an omnichannel experience. Once this becomes a have/have not issue, those companies without a seamless interaction with customers will fall away.

The new generation of tech-savvy businesspeople will not accept ineffective, outdated or inefficient solutions. As it has in other industries, IT will evolve more as a strategic business partner and will blend into the overall fabric of the business. Everyone in IT, from operations managers to coders, will understand the value of being able to communicate directly with their constituents (the people who make and sell what the company offers). IT personnel will become a part of the business operational divisions and will deal in a more open, collaborative environment. IT will shrink in a traditional sense, but also expand, as the average millennial who understands technology becomes the extended IT department.

That evolution also will create a willingness within organizations to change and adopt, or at least consider the possibilities.

Companies will continue to need IT people. However, from a business standpoint, service providers will become a larger part of the IT equation. The landscape will be transformed to include data scientists, developers and other traditionally back-office positions, who will help manage the additional technologies offered as a service or in the "cloud."

The evolution of IT will take more time in fashion than in some other industries. However, the majority will ultimately move with the rest of the pack.

New brands will take advantage of new services provided by new companies, as well as the new features available. This will create new experiences and new business models. Altogether, the new brands or those willing to evolve, will replace slow adopters.

A Look Forward: New Technologies

Old-School Systems vs. New-School Systems

Traditional data systems are, for the most part, incapable of handling the complex processes of today's fashion environment. Providing an excellent customer experience now requires companies to move beyond ensuring a particular item is in stock, to actually being one step ahead of the customer's desire and demands. Old-school systems give companies data that they use to pivot. New-school systems are more predictive, with prebuilt analytics that can tell a company where to send merchandise and when. Today's systems are less about reporting and more about business intelligence and artificial intelligence.

Old school reporting is still used and has several purposes. However, it is tabular in nature and contains general static information that doesn't tell much beyond the state of that element at a particular time. Users can take that information and combine it over time periods, locations or other data points to see trends, by looking at the numbers. Reporting tools then allow slice-and-dice analytics, which is helpful for a company to understand the status of the elements of its business.

As a company grows, the data it collects can tell it much more than simply how much it sells per square foot. To understand what the data is telling the company, many companies have hired data scientists. These individuals can look at data and help collect, clean and interpret it, using analytics tools. These data scientists are critical in helping companies build the models that will help them make intelligent decisions, based on the data.

The next generation of tools, after traditional reporting systems, include key performance indicators, available as a "dashboard" program showing a collection of graphs and KPIs tailored to the business. Users no longer need to interpret data from static paginated row/column reports. These tools are more visual and present data in real-time that companies can use to make operational decisions at a more granular and timely basis. They can take the data further in order to be predictive such as: What would happen if?... From that information, companies can discover the impact of changes in advance. The data will show things numerically or graphically, based on what it is fed or what it acquires. This generation of reporting systems can tell what KPIs are likely to change over time, adding another layer to the evolution of the information presentation.

The next logical progression is learning, predicting and making specific suggestions. The systems

collect data, analyze the outcomes of potential scenarios and learn from the actual outcomes. Over time, the systems have learned what users do, based on the predictions, recommendations and human-induced outcome over the history and later can take action. They will have moved through the business intelligence cycle beyond reporting, to actually conducting a transaction from an informational setting, or at least recommending an action, if not actually doing it.

This is where systems are moving toward. Data collection can be a massive undertaking, yet that is how business intelligence turns into artificial intelligence to go beyond predictive analytics and well beyond filling inventory, to sending a manufacturer a purchase order for creating new products. Business systems are evolving. They are moving from reporting to understanding, analyzing, predicting, suggesting and intelligently transacting. If it's within the realm of the predictability model, it just happens.

For the system to be effective, however, it must have access to and visibility into as much data as possible. Without the right—and right amount of—visibility, the output generally can't be broader than the input. The scope of data is extremely important, as is its breadth. This will enable companies to make better recommendations and actionable items. That feeds into the entire life cycle. If data exists in siloes and is not structured or configured to the business,

the company won't get the intelligence.

A new breed of tools is on the horizon that can help companies get the right information to the right data systems for true, actionable intelligence. PANDESCO's DoorSharp Channel Management System, highlighted earlier, focuses on the data that companies need to be able to curate exceptional customer experiences. DoorSharp provides an independent method for the collection of data, related to the point of inflection with the consumer. It collects data from inside and outside a company. It provides insight and enables better decision-making. It also enables critical operation steps that were previously siloed in other systems, or no system at all, to be included in the data sets being used to drive decision making.

Within a company, each platform usually has multiple pieces of information. For retail stores, there is point-of-sale information at the customer level (such as inventory, cost and units); traffic counters that tell how many people visit the location and store information, such as square footage, number of registers, landlord, physical location, style and building type. Each type of data is located in a different system or program. DoorSharp takes all of this seemingly separate data and normalizes it into visualizations that intersect with a company's business processes.

Companies also want to understand how their

retail stores are doing. By loading all of its store information (including sales, square footage, traffic, etc.) into DoorSharp, a company can view the data from an operations perspective to see that traffic is up in a particular region but sales are down.

DoorSharp also mines information from the internet at large, to help companies better recognize trends that would impact their business. It's helpful to know that a particular item, such as a hobo-style bag, is trending upward in Florida. This enables the company to shift stock from other regions to meet demand in Florida. However, DoorSharp goes beyond that, to help explain why a trend is occurring. In this example, hobo bags are trending upward, because Beyoncé tweeted about hobo bags, or because someone took a picture of her using a hobo bag. Therefore, it's trending or people are searching online for hobo bags at a higher-than-normal rate.

DoorSharp looks at the world for information related to external factors that companies should be interested in. That advanced information includes social media and even weather—if a snowstorm is coming to New York and hobo bags are trending in Florida, companies can extrapolate that they should send stock to Florida, so they don't lose sales from the snowstorm.

Having a level of intelligence beyond charts and graphs, is the future in creating customer-first experiences that ultimately drive success. Nowhere is that more important than in fashion.

On the Horizon

The fashion market today looks very different from 20 years ago, due in large part to technology. In 20 years, the space will have evolved far beyond what it is today. New processes, practices and systems will transform the fashion space into one that is more technology-driven than we can imagine. However, it will, hopefully, also be more user friendly.

New-generation and cutting-edge technologies, such as the Internet of Things, augmented reality, machine learning and digital assistants are shaping the way that apparel is designed, buying decisions are made and consumer opinions are formed and acted upon. Intuition and experience are slowly giving way to predictive analytics and intelligent data. This enables companies to make smarter, more informed decisions regarding just about everything in their business, from choosing which buttons should go on a blouse to understanding whether a customer is more likely to purchase a dress with short sleeves or long sleeves.

Of all the technologies changing the face of fashion, the one with the potential to have the biggest impact (and to result in the biggest change) is artificial intelligence. AI can have an effect on every aspect of fashion, from designer to manufacturer to shipper to consumer. It is now even being used to help influence decision-making at all levels. For example, designers and merchandisers can use AI to help determine what customers want, what their

merchandising approach will be and what their assortment will consist of. Logistics companies can use AI to determine the fastest route to transport product from the country of origin to destination warehouses. Marketers can use AI to create personalized programs for specific populations of customers, including those who reside in a certain geographic region, are a certain age, a particular size, or with certain proclivities, like sale buying or first buyers who want the newest before anyone else. The possibilities are endless.

The 2018 National Retail Federation Show was fertile ground for AI in the fashion sector. It showed offerings from a number of companies for both the back-office and customer interaction powered by AI. Among the more notable technologies were those that enhanced customer experiences, such as personalization or relevance, especially for online interactions. A female customer who makes a one-time purchase in a men's clothing store, may not care as much about receiving offers or discounted coupons in the same way she might care about receiving promotions from a women's clothing store. However, should the customer shop again at the same store, she may be considered a return customer and one who likely would be interested in receiving offers from the retailer. AI can enable retailers to understand which customers are likely to be one-offs and which are likely to be

return customers. This helps marketers to better target promotions to make them more meaningful.

On the logistics side, video-equipped robots are making their way into retail environments. They travel around stores to locate misplaced items, identify labels that have been turned away from the customer and detect incorrect pricing, among other tasks. Future robots will also help customers to locate items within a store and to retrieve requested items, such as a particular size or color of an item that is in stock but not on the floor.

Similarly, "concierge robots" can help customers in fitting rooms, retrieving a requested size of a garment or bringing the customer additional, similar items, based on the clothing the customer is trying on. The power of AI can identify which items the customer might be interested in, based on what she brought into the fitting room. The concierge robot also could suggest whole outfits based on one item, including accessories, such as shoes or a handbag. This will help to extend and provide a richer shopping experience for customers.

In the fitting room, "smart mirrors" are also being used to help customers find complementary apparel or accessories, see how their choices look in different lighting and alert salespeople when the customer needs help. Sensors embedded in the mirror can scan the customer's shape, to determine the best size and fit of a particular piece of

clothing. They can also suggest options that might be a better fit or more flattering to the customer's profile. Customers have the option of purchasing the items they try on using the smart mirror (which can be beneficial in increasing impulse purchases), even though the experience can seem intrusive and maybe a little weird. I personally don't need a mirror telling the sales person to get me the next size up. I'll pass on that experience.

On the sales floor, screens with conversational interfaces can help customers find particular items, based on questions. If a customer is looking for a pair of pants, the interface can direct her to the perfect pair, based on questions such as, "Are you looking for casual or business pants?" "Do you want a straight leg or boot cut?" "What color do you need?" Some screens can include sensors that can measure the customer's height and body shape to determine whether she needs a petite or regular length, and what size would be most appropriate.

AI is permeating the customer experience so much, that it has resulted in a new term, "predictive fashion." Using AI, retailers could learn a person's style, based on his purchase history and then create computer-generated images of items that match that style. The customer could then choose the items he wants to purchase, down to the color and even closure choice—button, zipper or snap, for example. Retailers then could create the

personalized piece of clothing for the customer. This technology also could help designers to predict broader fashion trends.

There are many ways to use AI in the back office. It can range from predicting the cost of certain materials, based on past and current market conditions, to determining the best mode of transportation (rail, truck or airplane) to get goods to their final destination. This would be based on weather conditions, traffic patterns and even the volume of air passengers. Merchandisers can utilize AI to help determine the right type and amount of product, based on customer sentiment from social media and online reviews. This minimizes the amount of overages or post-season inventory that must be liquidated.

AI also could be used to help retailers design stores that maximize customer flow and encourage an omnichannel experience. This could be done through a combination of employees and readily available technology that customers can use to place orders or to get more information on the fly. Using AI, retailers could design store layouts, based on the path customers take through the store and which racks or areas are visited most and predicted to be most visited.

These AI-enabled capabilities are close to reality, if not already in use. Farther-reaching implications of AI in fashion could potentially include

micro-personalization, or designs created specifically for one individual; intelligent fabric that can change to match weather conditions, such as becoming waterproof when it's raining or "thinning" when the temperature rises; or apparel that recognizes when it's wearing out and automatically reorders its own replacement, on behalf of the customer.

The next generations of fashion and technology are clearly not set in stone. Much can occur to shape the way technology evolves the fashion industry and how the fashion industry can shape technology. Understanding the benefits of technology, especially artificial intelligence, in helping all facets of fashion, will be key to maximizing the future possibilities and opportunities.

The one thing we know for certain—fashion will evolve, as will the fashion industry; and technology will be here to help it on its way.

Acknowledgements

There are so many people who have played a role in helping me achieve the things I have, who have helped me learn and grow and who have given me opportunities, sometimes at their own expense. To my colleagues, those I have worked for and with, I have been lucky to be surrounded by such talent. I hope that I have done right by you.

To Marty, Jr., Nancy, Scott and John—thank you for supporting me, teaching me, allowing me to take on challenges and providing me with a safety net, for pushing me into places I was unfamiliar, asking questions I did not know the answers to, offering up problems I could spend some energy solving, and having the confidence in me to get it done—or at least faking it and being pleasantly surprised, when it all worked out. Almost none of the content of this book would be known by me, without the opportunities and guidance you have provided. If I got some stuff wrong, that's on me—just don't count it against me come annual review.

Thank you, Mario, for the opportunity to get involved with FIT and have all the energy of those incredible students showing me what tomorrow looks like. May your retirement be special. You have earned it.

Thanks also to Michael and Judith at the DTech FIT Lab. I am looking forward to continuing the

adventure with you and the students. Andrea, Dakota, Derek, Olivia and Prue—you five were the first to read this book and were helpful in giving me confidence to keep going, giving critical insight without criticizing. You guys are great students. I look forward to working with you in the future as colleagues.

To Chandan, Eddie, Greg, Jenn, Mona, Noah, Peter and Tanya—I deeply appreciate you being willing to take the time and to help me make this work better with your insights.

A special thanks to all my RL fam. I spent so much time with you over the years, it's great to see you when we cross paths out in the Fashion world. I tell my students to be careful about burning bridges, because it's a small community. However, more importantly, enjoy the people you work with. They make the hard times easier to get through and give you someone to share the successes with. We've had many of both and you are all incredible.

Thanks to Debbie for the graphics work and turn around under pressure, also for telling me I might want to acknowledge some of the icons concepts were sourced from Flaticon.

And, of course, Charlene—meeting at a U of A alumni event and learning you were a tech writer was one of those light bulb moments. I already had the idea for the book, however, I had few thoughts on how to bring it to life and no real experience writing. I appreciate you letting me pump you for information and I am glad that we joined forces. You have been a great partner in this adventure.

About the Author

Many books have a third person view in this section —someone providing the often boring background and narrative that paints a certain picture for the reader about the author—the hype, or bonafides (see my Linked In if you must), depending on the approach. As of writing, this I don't have a publisher, I haven't even looked for one. I don't want to ask a friend or colleague to be my hype person. I would also find it weird to write about myself in the third person. This is my take on about me after more than a quarter century in this industry, or at least what I care to share at the moment. Note: I am not trying to come off as being negative, but my experience isn't all roses. I am trying to be real and authentic. This is a great industry. If you aren't in it, think about it. If you are, you're lucky. Imagine being in insurance. My apologies and condolences to all my MBA colleagues, who went in that direction.

I'm not sure where I learned the concept that business shouldn't be personal and that to be successful, you needed to be 'all business, all the time'. That is, except for when guys were out 'being guys'. That is today's version of meeting at the stuffy oak-lined, deep-padded, leather and cigar-filled private club. It is a place that I couldn't get into, even if I

wanted to. I don't mean physically get into. I can talk my way into and out of about any place or situation you can think of. I mean accepted into, as a member of the group. I tried all business, all the time. It didn't work for me, so now I reject this notion. I had to learn this and teach myself to believe that I cannot accept it and still achieve the things I set out to achieve. It took time and failure and has probably hurt my career on occasion. However, I feel good about rejecting it, as you can probably tell, or will by the end of this section. This is my personal form of rebellion on the stereotype of what a business person should be.

I never intended on getting into Fashion. It just kind of happened. The details are another story for another day. Those that know me personally, know I like to tell a good story. I like sharing myself with those that I work with, and, generally, I like when they share with me. When I first got into management, I used more of the skillset learned from my parents (both therapists), than I did from skills acquired in B-school. It seems like being a manager should have a mandatory co-pay from the team member, who walks into your office and says, 'can we talk for a minute'? Fashion is a unique industry. Personality rules the creative side of the business. There are larger personalities, sometimes with Broadway stage bravado, sometimes real and sometimes in a 'fake it until you make it' approach.

Learning to distinguish between them, becomes an art. I'm not big on fake bravado. One of the great things about this industry, is that over time those that aren't real, tend to be known for what they are, not what they try to portray. I just wanted to build things and run stuff—tech specific and not fashion specific. However, I don't have any formal technical training, beyond a coding class in grad school. I had to beg the professor to pass me with a theoretical paper, instead of a coding project that I couldn't get to work for the life of me.

I grew up in retail. At least that's what I call packing grocery bags and turning fruit at the market across from my house in Brooklyn, when I was a kid. I also pumped gas down the street from my high school and sold and installed stereos, when I decided that college wasn't for me, right after my stint as a pump jockey. Therefore, when looking for a job while working on my MBA, my 'direct to consumer' experience seemed to put me at Fashion's doorstep, as a potential future 'retail' expert. I had never paid any real attention to clothing, except to wear pretty much what the kids I hung around wore. GQ? Vogue? Please. I was (and am) a Car & Driver guy, who wore flannel and Timberlands long before there was an 'urban woodsman' look and almost no one willingly moved to Williamsburg. OK, sometimes a job is a job, and truthfully, beyond wanting to be an entrepreneur in the tech space,

I really didn't have any other plans, so when the opportunity arose - Fashion it was.

I got an internship in Fashion, took my brand discount and marched off to the employee store. I shopped—like a person possessed, and ended up paying them more than they paid me that summer. I had the nicest suits, 50+ ties of varying visual effect, shirts, shirts, and more shirts. My friends loved it. They got sweet gear at a nice discount. People got awesome gifts and I was the man. However, all that glitters is not gold. There have been times that I really didn't like the industry. In hindsight, it may have been more the atmosphere of business, than the industry itself. Or maybe it was me. I am sure that some combination is more realistic. I remember meeting a young woman, who never smiled. We got along OK, handled our business like professionals and she was a professional to the Nth degree. People were scared and intimidated by this woman. Who am I kidding. I was too. I had already gotten over myself a bit and dropped the suits and ties. It was not because they were bad, they just weren't me. I wasn't wearing them. They wore me and it showed. During our project, my colleague and I got to know each other a bit. One day while we were out of the office, I witnessed a smile. I asked why she was so serious in the office. In a moment of candor, she confided that she felt that as a woman in business, she thought it was

hard for her to command the respect she felt she needed to drive her version of success. It is an interesting thing and something that I had some experience with as a minority. Since then, I have heard the same from others. Therefore, my mission became clear. I would make her laugh in a meeting, loosen up and enjoy our success. At some point, it worked. We have been friends since. I went to her wedding in a nice little Upper East Side restaurant. She is more successful than ever. It is her own doing (of course) and had nothing to do with me getting her to laugh. I am not sure how much she laughs in meetings these days, because we don't see each other much. However, that day, something I knew intrinsically was re-enforced: perception and bias can be a bitch and our reactions can be extreme.

This brings me back, by the long route apparently, to me and this industry. It's a bear, or a tiger, or a lion—or maybe animal analogies don't work for it. I don't know. However, it is a serious business and it can bite you, if you're not careful. I have had people freak out, because a delivery of shirts was going to be a day late. They weren't special order, they weren't for Rihanna, it wasn't the end of the month, quarter or year. It was only a day, and there literally was NO impact. However, they freaked. It was like they thought they were a heart being delivered for a transplant. It wasn't even my or the systems I managed fault, it just

was. In this industry, I have also worked with some of the most incredible people I have ever met. I don't like the fake Broadway personalities (the real ones are great—because they're real). I don't like the drama (most of the time, although sometimes a little drama makes the day more interesting). I don't like the conservative approach to adopting new technologies and sometimes unwillingness to accept tech as a potential driver of growth and innovation. I don't like thinking that I can't be me to be successful and effective, which I do not any longer. However, once you've accepted the industry, your place in it and the other people in it, they tend to accept you. This is something that more of the world could learn from.

The people that make up this industry are like the world, like a UNICEF card. We have women CEO's and probably more female and LGBTQ executives than anyplace else. We have minorities (although not enough in senior positions) and people of all stripes doing awesome stuff. Although the business norms and biases of the rest of the world exist here, I just think it might be a little less so in this industry than others. This is good. I didn't seek out this industry and I've considered leaving it a few times in years past. However, it suits me, as a minority and as a person who generally likes others (although I am not a fan of stupid, no matter the industry). The inclusive nature can be welcoming,

the creativity atmosphere stimulating and the world view humbling.

Like most industries, this one has its faults. However, there is much more that is good, more good than many others. The people I share it with, have made it my home away from home. I'm proud of it, even when I'm frustrated by it. I've made life-long friends from it. I will put my kids through college on it. I write this book about it. I've traveled the world, seen incredible things and have great memories. There are some great stories that I share, while others are things which help to shape who you are but should remain close to the soul. I've sat in a colleague's garage on lawn chairs down in North Carolina, drinking beer and smoking cigars. I've been one of the first people at the hospital in Brooklyn, when a friend from work had a baby. I've taken a nap in another's kitchen, when an off-hours tech conference call I was on got too boring during a BBQ. I've lived, cried and loved in the decades being involved in Fashion.

I thank Fashion and all the people along the way, who have had an impact on my ongoing journey. This includes those few who tried to keep me down but couldn't and made me stronger. I also thank those others who worked with me, encouraged me, helped me grow, gave me opportunities and guidance, forced me to learn the importance of time away with family and friends, who let me

lead them (even when they knew more than me on a topic or another), and who gave me the freedom to be me, while working with you and for you. I say to you: Keep doing beautiful things, keep bringing joy and life to the world, keep leading in inclusion, keep creating and keep building. You be incredible —and I'll try to make the systems easier to get the shirts in on time.

The Lifecycle of Fashion Technology is a walk through the processes and supporting technologies utilized by design and apparel companies. It is short on deep technical content like coding languages, environments and computing hardware and longer on the business functions and data elements used as items are designed, produced and sold. Examples of the solutions used today, insights from industry leaders and visualizations help to make the processes clear. This book is geared towards the person interested in the industry and looking to understand it better from a process and systematic perspective, professionals looking to expand their knowledge and students deciding, if this industry is right for them.

Neil is an industry veteran, entrepreneur, U.S. Patent holder and professor at the Fashion Institute of Technology. He has more than 25 years of experience developing and implementing business solutions. With a focus on retail, consumer products, fashion and apparel, as well as a deep understanding of the challenges of growing a business, international expansion, and mergers and acquisitions, he brings historic knowledge, world perspective and a winning attitude to the table.