



# The Future of Retail

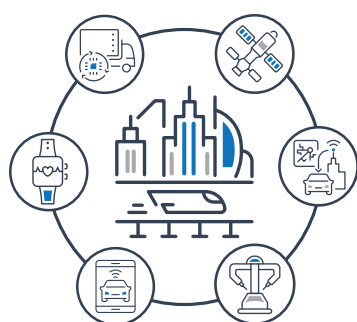
Algorithmic Retailing in the Business 4.0 World



REIMAGINING THE FUTURE SERIES

## EXECUTIVE OVERVIEW

We're living in a world where digital dominates every aspect of business and society, and the Retail industry is no exception. Advances in science and technology, along with societal shifts are changing the way goods are produced, shipped, shopped for and sold. And the combinatorial nature of these advancements is causing the pace of change to accelerate, often in unexpected ways.



Technological breakthroughs in robotics, artificial intelligence (AI), the internet of things (IOT), nanotechnology, quantum computing and many others are converging to create a [Fourth Industrial Revolution](#). As with previous industrial revolutions, the Fourth Industrial Revolution will bring radically new capabilities in the areas of Energy, Communications and Transport and fundamentally change the way we work, live and communicate with each other. And like previous industrial revolutions, it will bring drastic changes in Retail as well. Just as the First Industrial Revolution took us from the barter system to organized retail, the Second Industrial Revolution took us from single proprietor corner stores to mass retail, and the Third Industrial Revolution took us from catalog and retail shopping to ecommerce, the emerging Fourth Industrial Revolution promises to be just as transformative, and likely more so. Many believe the changes we'll see in this new industrial revolution will be unlike anything we've experienced in human history as technologies converge to blur the lines between our physical, digital and biological worlds.

For the Retail industry, these are exciting, and potentially perilous, times. On one hand, these emerging technologies will generate data, insights and capabilities that will give businesses the ability to create unprecedented, one-to-one customer experiences that drive brand loyalty and sales. On the other hand, these same technologies will elevate and accelerate changing customer demands on the experiences they expect from retailers. The shift in power we've seen in the past 20 years from manufacturers and retailers to consumers will continue to evolve into increasingly digital channels fulfilling 1:1 customer experiences.

Those that can keep pace with these changing demands will reap the rewards and unseat competitors that fall behind. In addition, automation enabled by robotics, AI, drones, chatbots and more will help nimble startups scale quickly and compete with incumbents faster than ever before. Look no further than

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## **A rapid shift from vertical, industry oriented business models to horizontal ecosystems.**

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the companies on the Fortune 500 as evidence of the imperative to keep pace with competitive and technological change: only 60 of the companies that appeared on the Fortune 500 in 1955 remained in 2017. Just 12 percent of the companies! The other 88 percent succumbed to competitive pressure, shifting consumer demands and technological advancements.

The Fourth Industrial Revolution is also causing a rapid shift from vertical, industry oriented business models to horizontal ecosystems, driven by capturing, creating and delivering new and differentiated forms of value. For the Retail industry, this new industrial revolution will create a shift from mass production of goods and one-to-many customer experiences to mass customization and one-to-one experiences as businesses become more intelligent, automated and adaptable to consumer demands. Meeting these new demands will be fulfilled through ecosystems that provide more purpose-driven goods and services to consumers with no regard for our traditional vertical industry boundaries.

As the ecosystem model becomes a business imperative, leaders need to establish how they will participate in the ecosystem, either as an ecosystem driver, or modular producer, or a combination of the two across multiple ecosystems. For example, fitness apparel maker Under Armour is positioning itself to become an ecosystem driver through its [Under Armour Connected Fitness](#) platform, providing custom fitness algorithms and tracking for users. The platform gives Under Armour unprecedented access to consumer data and insights that it uses to guide product development and innovation. In addition, the platform helps the company build a network effect in that consumers will purchase Under Armour gear because it easily connects to their apps and digital platforms. To date, the Under Armour platform has more than 200 million users and captures 10 billion data transactions per year.

Alternatively, companies may choose to participate as a modular producer in the emerging ecosystem model, providing value to multiple ecosystems at the same time with a narrower focus. Consider, for example, a clothing manufacturer leveraging material sciences to not only provide fabric for clothing to support the [Maker](#) ecosystem, but also provide advanced materials for the [Energy](#) and [Wellness](#) ecosystems.

There will be many factors that drive the optimal portfolio for your business. But regardless of the path your company takes, it's clear that a strategy that embraces ecosystem thinking and a strong focus on delivering differentiated customer experiences is a business imperative as we transition from a firm centric culture to one that's driven by purpose, agility, platforms, data and customer experience.

## **Ecosystem Drivers in Retail**

There are a host of technological advancements and societal factors that will contribute to moving us from vertically oriented industries to horizontal, purpose and experience driven ecosystems. Following are a few of the factors that will have an especially big impact on Retail.

### **Product**

#### *Material Sciences*

Other than fashion, clothing has changed little in the past several decades. Cotton and wool fabric have been used for centuries, and synthetic materials provide only incremental improvements to these natural fibers. Advancements in material sciences will transform clothing in dramatic ways. Sensors embedded in our clothing will monitor our body temperature and health, and provide data to our health dashboard and care providers instantly. 4D printed materials leverage the additive manufacturing process of 3D printing in combination with a material's ability to change shape and function. It will, for example, make a jacket cool and breathable until it senses moisture and lower temperatures from a rainstorm and transform to provide more insulation and become waterproof, keeping the wearer warm and dry. And our clothing will have the ability to harvest energy from solar rays and our movement to power our wearable devices, smartphones and even transfer energy to the Smart Energy grid.





### *The Maker Economy*

Empowered by inexpensive 3D printing capabilities, crowdfunding and equal access to consumers via the Internet, the maker movement is transforming the creation of goods from mass production to mass customization. This shift in production also shifts power and influence from large, capital intensive enterprises to individual prosumers who can create and market new products to a global audience almost overnight. As the focus on a next generation economy increases, so does the likelihood that it is driven by networks of prosumers rather than large corporations. Consider Etsy as just one example of this shift. The ecommerce platform that lets makers sell their handmade goods online has quadrupled revenue in the past four years and grown the seller-side of its marketplace to 1.9 million makers offering more than 50 million items.



### *The Sharing Economy*

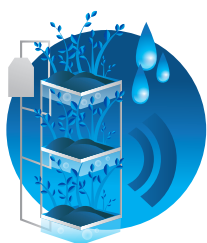
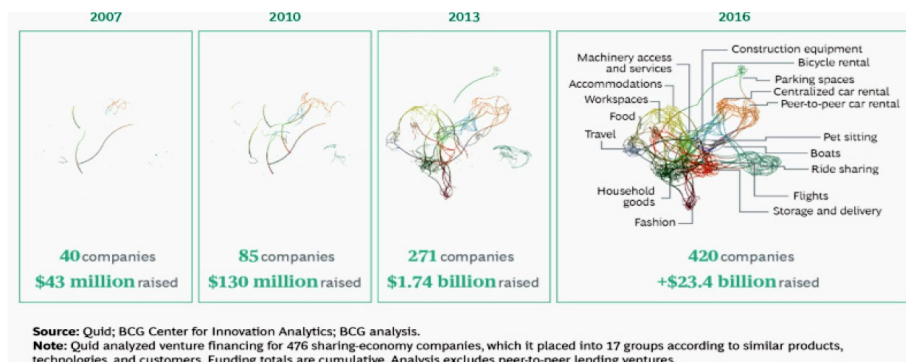
Once thought to be an economy restricted to Millennials and industries such as ride sharing and hospitality, the Sharing Economy has expanded across demographic groups and industries. Consumers have recognized that there is great value, quality and variety from sharing goods and services. In fact, a Boston Consulting Group study found that, among those who use sharing services, 57% of US survey respondents, 67% of Indian respondents, and 40% of German respondents said that well-priced, convenient offers could cause them to give up ownership altogether.

Platform provider Rent the Runway was an early entrant to the market and has raised more than \$400 million in venture capital and grown to 9 million users. Peer-to-peer clothing sharing site Tulerie acts as an intermediary between individuals to share their personal wardrobes. Virtually every category of retail has become a part of the sharing economy, from fashion to household goods to lawn tools and equipment. Based on venture capital investment in the sharing economy, this trend will continue at a rapid pace. In 2013, 271 sharing economy companies raised \$1.74 billion. By 2016, investments had grown to 420 companies and \$23.4 billion raised.



**Fig 1**

*More Than 400 Venture-Financed Companies Power The Sharing Economy*

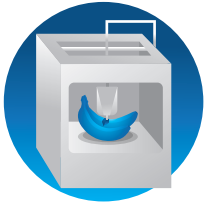


## Food

### Vertical Agriculture

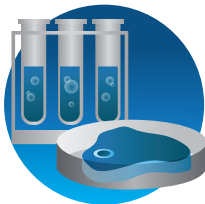
It's estimated that agriculture will need to feed an additional two to three billion people on the planet by 2050. This will be difficult to impossible with traditional growing methods, which require vast amounts of land, water and pesticides. In addition, traditional agricultural methods require many harvested crops to travel thousands of miles to reach their final destination at a retail grocery store, increasing spoilage rates and decreasing the nutritional value of fruits and vegetables. Consider that, according to the US Agriculture Department, 53% of fruit and 31% of fresh vegetables are imported from outside the country.

To combat these issues, vertical agriculture is rapidly emerging as a viable and long-term solution. Fruits and vegetables can be grown in buildings near population centers, controlled by artificial intelligence (AI) and watered by hydroponics. Vertical farming start-up [Plenty](#) estimates it can generate as much as 350 times the produce out of a given acre of land, while using just 1% as much water. If successful, vertical farming will have a massive impact on the fresh food value chain, from seed producers to growers to trucking to warehouses. All the while, bringing fresher, healthier and more sustainable produce to consumers.



### *3D Printed Food*

While today's version of 3D printed food is primarily limited to creating culinary works of art, tomorrow's version will look quite different. Already, [nursing homes are offering 3D printed vegetables](#) that are easier for the elderly to swallow and digest, but are better tasting and healthier than the bland purees traditionally used to feed those who have trouble eating and digesting whole foods. In the future, meals will be 3D printed for everyone, based on each individual's specific dietary needs, leveraging data collected from [contact lenses](#), wearable devices and other [devices](#) that measure vital health statistics. 3D printed food will not only fuel our bodies more efficiently and effectively than traditional foods, the waste that comes from traditional food packaging will be greatly reduced as well, through the use of biodegradable "smart" packaging.



### *Lab Grown Meat*

In the United States alone, nearly [26 billion](#) pounds of beef is consumed each year. This consumption comes with an ecological impact, as one cow consumes up to 11,000 gallons of water per year and livestock contribute as much as 15% of the world's greenhouse gas emissions. In other parts of the world, animal based protein is unattainable due to its high cost relative to other food sources. Both ends of the spectrum are unsustainable to meet the demands of a growing world population. Enter lab grown meats. Several venture backed companies are already close to perfecting the taste and texture of ground and pureed meats like hamburger and foie gras and whole muscle meats like steak aren't far behind. This will greatly reduce the cost and environmental impact of livestock production, making meat based protein available to the world's growing population. However, it will also prove massively disruptive to the entire supply chain associated with livestock production today.



### *Blockchain*

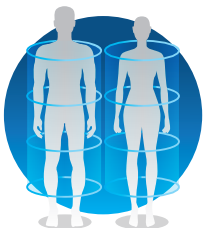
Blockchain will bring transparency across the retail industry through distributed ledgers that track items across the entire supply chain. This will prove particularly useful for foods such as [tuna](#) and olive oil, which are difficult to track and ripe for corruption and counterfeiting. In addition, retailers and consumers will have the ability to verify that goods like coffee were grown and harvested in a sustainable and socially responsible manner.



## Shopping Experience

### *Facial Recognition*

Facial recognition has the potential to condense the shopping experience by (with permission) allowing retailers to immediately identify a shopper and then, using AI and past shopping data, guide the shopper directly to and/or send store associates recommendations for the shopper that are likely to result in a purchase. In addition, facial recognition could be used to detect a consumer's satisfaction with a shopping experience and send associates for support when it's determined that the shopper is disgruntled or confused.



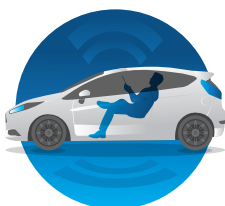
### *Body Scanning & 3D Printing*

The combination of body scanning and 3D printing will eliminate the need for a large stock of in-store merchandise and a "one size fits many" mentality. Using a mobile phone or smart dressing room, consumers will be able to scan their body to produce exact measurements and then modify fit based on their personal preferences. A 3D printer will then produce garments in real time based on their exact measurements and specifications. Shoe manufacturers such as [Adidas](#) are already testing this concept with running shoes.



### *Virtual Reality/Augmented Reality*

While Virtual and Augmented Reality are primarily a novelty in the shopping experience today, they are evolving rapidly and will soon be an integral part of the shopping and purchase experience. "Magic Mirror" virtual dressing rooms will allow shoppers to try on multiple colors and sizes without ever leaving the dressing room. And the same technology will soon be available in consumers' homes, making the ecommerce shopping experience even more seamless.



### *Autonomous Vehicles*

The rapid emergence of autonomous vehicles will free up time and mindshare for drivers who were previously occupied with piloting the car. This will give retailers new opportunities to provide a unique shopping experience to autonomous vehicle passengers. For brick and mortar retailers, geo-fencing will be expanded to include promotions targeted to autonomous vehicle passengers who are in close proximity to a store. And online retailers will have the ability to give passengers a virtual shopping experience through the vehicle's 360° [theater](#) system.





### *Automated Delivery*

Online retailers, grocers and restaurants will provide nearly immediate delivery of purchased goods as [drones](#), [robots](#) and [autonomous vehicles](#) are employed to deliver packages to a consumer's doorstep. These capabilities are already being widely tested and deployed in countries around the world.

### **Algorithmic Retailing: Thriving in a Business 4.0 World**

The amount of change that is coming to businesses and society, and the pace of that change cannot be understated. [Business 4.0](#), defined as adopting agile, automated and intelligent solutions hosted on the cloud, is rapidly becoming a necessity in order for businesses to survive and thrive in the Fourth Industrial Revolution.

## **Business4.0™**

The winners in this Business 4.0 world will be those that embrace ecosystem thinking and become a driver of the ecosystem. The key success factor in becoming an ecosystem driver is adopting a platform business model where multiple organizations build and offer products and services on the platform to create exponential value for stakeholders. Businesses that successfully execute a platform strategy generate a [network effect](#) that drives exponential growth and establishes a dominant position in the ecosystem. Look no further than Uber as a platform provider that has established a dominant position in the emerging mobility ecosystem. In just a few short years Uber has been able to upend an industry, create exponential value for consumers, scale nearly infinitely, and drive towards zero marginal cost. Amazon, Apple and [John Deere](#) are other examples of businesses that have established a dominant position by leveraging a platform strategy.

Another strategy that can be successful in a platform business model is that of a modular producer that provides incremental value across one or more ecosystems. Not every business can nor should be an ecosystem driver and platform provider. The key is shifting from a vertical industry focused paradigm to a horizontal ecosystem model. While this shift may seem daunting, it is attainable, and necessary for the long-term survival of any business. There are a number of steps that can be taken in the short term to begin the journey. All of these evolving technologies and business models are creating a consumer that expects retailers to know what they want, when they want it

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## Key questions business leaders should be asking.

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and the price they want to pay, in real time. The key is ensuring your business is able to keep pace with these changing expectations. As a start, you should ask yourself the following questions:

- Is my business actively working to embrace emerging technologies to fundamentally shift our products and operations to better meet customer demands?
- Has my company shifted to being a data-driven business that understands customer demands in near-real time, or are we using out dated metrics and data collection?
- Does my company possess a digital-first DNA, or does the inertia of old business processes, mindsets and capabilities prevent us from evolving to a Business 4.0 model?

We're heading into one of the most exciting and transformative periods in human history. The positive impacts on every aspect of life from wellness to connectedness to happiness and beyond cannot be understated. This transformation should not be looked upon as the end of the "good times" for your business, but rather as an opportunity to engage more meaningfully with your customers and exponentially expand the capabilities of your employees and the products and services your organization offers. In fact, in many ways ecosystem thinking and algorithmic retailing is taking us "back to the future". In the early days of retailing, shop owners intimately knew their patrons including what products they bought, when they would need them and what price they could pay. The difference is that today, retailers are striving to provide that same shopping experience at a global scale. This can only be achieved by embracing new business models and technology that will propel your company to success during this transformative time.

The key to succeeding is to recognize the opportunity ahead and start your company on the journey, adapt to the inevitable unexpected shifts that occur, and thrive in this new and rapidly evolving environment.

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**About the Reimagining the Future Series**

TCS' Reimagining the Future Series, produced by the Future of Business team, helps our clients and partners see the combinatorial effects of science, technology, digital forces and societal factors that are rapidly shaping our emerging future. The series provides inspiration, strategic ideas, actionable thought leadership and guidance to better understand the Business 4.0 journey and its implications to help business leaders reimagine and position their organizations for the future.

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Tata Consultancy Services is an IT services, consulting and business solutions organisation that has been partnering with many of the world's largest businesses in their transformation journeys for the last fifty years. TCS offers a consulting-led, Cognitive powered, integrated portfolio of IT, Business & Technology Services, and engineering. This is delivered through its unique Location Independent Agile delivery model, recognised as a benchmark of excellence in software development.

A part of the Tata group, India's largest multinational business group, TCS has over 411,000 of the world's best-trained consultants in 46 countries. The company generated consolidated revenues of US \$19.09 billion for year ended March 31, 2018 and is listed on the BSE (formerly Bombay Stock Exchange) and the NSE (National Stock Exchange) in India. TCS' proactive stance on climate change and award winning work with communities across the world have earned it a place in leading sustainability indices such as the Dow Jones Sustainability Index (DJSI), MSCI Global Sustainability Index and the FTSE4Good Emerging Index.

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