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# Realizing a Digital Supply Chain

A transformation blueprint for consumer packaged goods companies.

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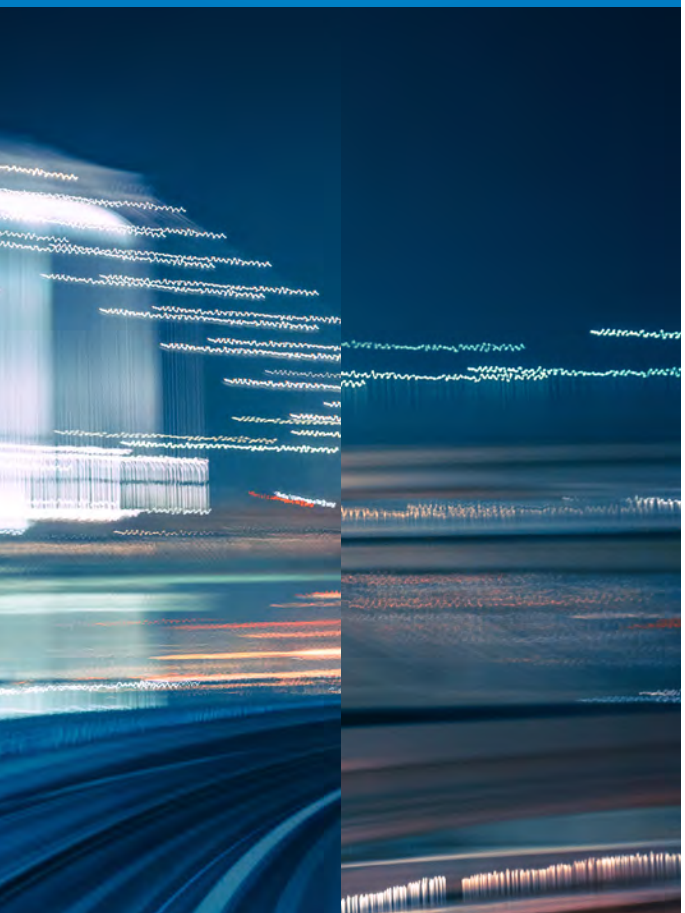

# Executive Summary

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## Digital Disruption of Business Models

Advanced technologies today, supported by apps, integration and platforms, are diluting physical and digital barriers – allowing them to interact seamlessly. The Internet of Things, social media and mobile devices, are redefining consumer engagement models – changing the way customers interact with organizations at various touch points. But, technology is evolving faster than the markets can adopt.

The tech-savvy consumer shops anywhere and anytime, expecting retailers to not just remember their preferences, but, create personalized shopping lists by anticipating their needs. The path-to-purchase is increasingly fragmented – immersed in a web of interactions with multiple brands, channels and online communities.

With customer expectations rising at an exponential rate, consumer packaged goods (CPG) companies are grappling to transform their supply chain and business models to respond to the new demands.

This point-of-view examines the capabilities that CPG companies must develop to achieve agility with improved operational efficiency and enhanced customer-centricity, but, at reduced costs. We deep-dive into the strategies for a successful supply chain digital transformation, and how evolving from a linear to a dynamic ecosystem using a design thinking approach, can unravel complexities and identify new investment opportunities – catapulting organizations distinctly ahead of their competition.

### 5 Major Technology Trends

- Internet of Things (IoT)
- Robotic Process Automation (RPA)
- Augmented Reality and Virtual Reality (AR/VR)
- Apps, Integration and Platforms
- Big Data and Advanced Analytics

# The Supply Chain Transformation Spectrum

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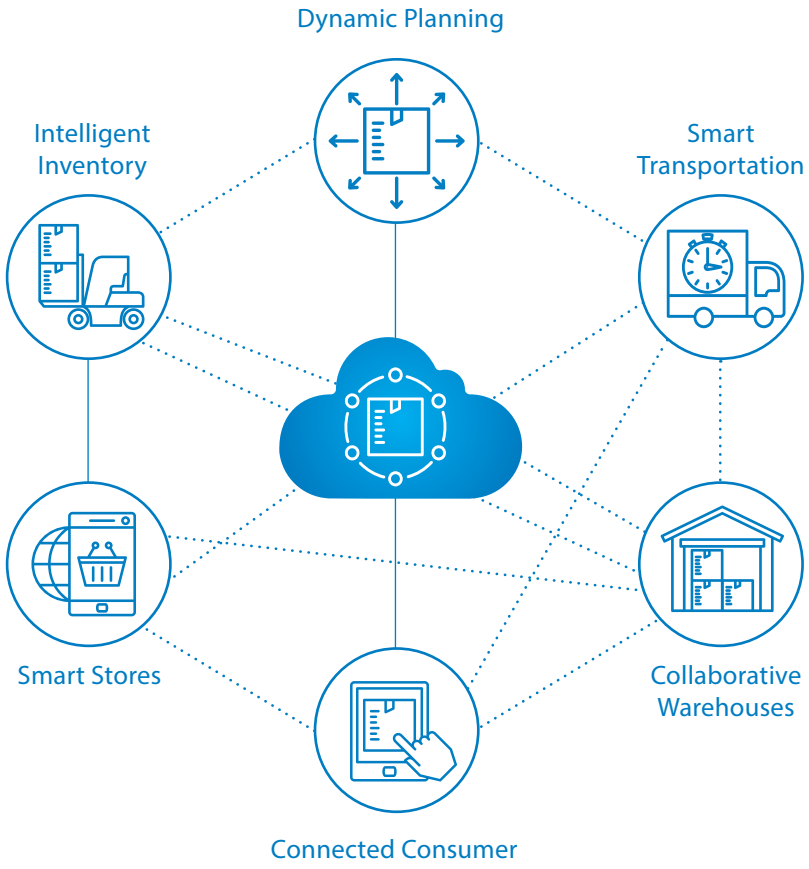
## The Supply Chain Transformation Spectrum

CPG companies today are steadily moving away from a linear supply chain to a smart, digital supply chain. The inter-connected ecosystem offers better responsiveness to changing business conditions and unforeseen circumstances. Supply chain events like demand upsurges and supply shortages can be predicted and tracked in real-time, allowing companies to modify product mixes, and balance demand and supply through integrated planning and execution systems.

### Connected Supply Chain



# Key Dimensions of Supply Chain Transformation

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A successful digital supply chain transformation program, as we envision it, should be driven across the following 7 key dimensions:

1. Integrated and Collaborative Planning & Execution
2. Advanced Procurement
3. Intelligent Manufacturing & Product Lifecycle Management
4. Smart and Collaborative Logistics
5. Digital Consumer Engagement
6. Seamless Value Chain Collaboration
7. Design Thinking at the Heart of the Digitization Journey

# 1. Integrated and Collaborative Planning & Execution

The digital supply chain of the future is shifting from an exception-based planning model to a multi-enterprise, collaborative and touch-less planning model. Technologies such as robotic process automation are set to synergize the inside-out and outside-in views and will tie the production plans to the demand and operations plans.

### Pro-active demand sensing and shaping

Statistical demand sensing through exploratory analysis can lead to the identification of demand variances, disruptions or opportunities with a significant reduction in time-to-market and increase in reactivity to market change or demand volatility. Machine learning can integrate data from inside the enterprise and from external partners, classify it automatically and generate micro insights. Demand and supply can be matched by advanced forecasting and predictive analytics to arrive at the push-pull de-coupling point – enabling postponement, reduction of bull-whip effect and customization of products.

### Ontology-based planning

An ontology model maintains a dynamic knowledge base, using actual data vs forecasted data analysis and mapping various process activities and actors in the chain. By means of 'what-if' simulations considering constraints and rules, an ontology-based approach will enable CPG companies to achieve collaborative planning, faster decision-making and shortened supply chain implementation cycles.

### Control towers

Control towers can be used to detect and predict supply-demand variations and optimize the inventory held at various points by automatically taking decisions to deploy inventory close to shipping points or holding the raw materials at an upstream node to postpone manufacturing of finished goods.

### Collaboration & information transparency

An agile operating model focuses on collaboration and information transparency between manufacturers, retailers, suppliers, and logistics providers for planning and managing supply chain events. Collaboration entails having a unified view of promotion calendars, supply-demand capacities, demand-signal data, flow-of-goods and consumer behavior, in real time. Sharing of standardized master data such as – product identification and locations of distribution network nodes, is also vital.

### Automation of replenishment orders

Machine learning technology can revolutionize the order replenishment process. Cloud-based SaaS solutions can make demand forecasts based on historical sales and other factors such as promotions, advertising campaigns, weather and store opening timings. Automatic replenishment orders can be generated based on demand probability curves considering parameters such as product availability and supplier delivery times. Machine learning algorithms can customize orders for customers on pricing or order quantity by simulating changes in demand.



# 2. Advanced Procurement

In today's complex environment with unbridled distribution methods, contract manufacturers, outsourcing and multiple payment methods, organizations are under tremendous pressure to meet regulatory requirements while containing costs and maintaining profitability. Global organizations today must adopt digital sourcing and procurement solutions to streamline and standardize their processes by a judicious application of machine learning, artificial intelligence and cognitive technologies.

### End-to-end procure-to-pay process

Automating the E2E procure-to-pay process will help companies reduce the purchase order, contract management and accounts payable cycle times. Digital versions of quotations, purchase orders and invoices will not help to create paperless processes but improve transparency, enhance the accuracy of financial and operational information, ensure regulatory compliance, and reduce processing costs through better auditing control.

### Spend analytics

Spend analytics is an important area of investment enabled by big data and cognitive spend analysis. Savings and pipelines can be tracked in real-time by applying predictive analytics to analyze the impact of payables and receivables in cash-flow management.

### Unified enterprise data strategy

A unified view of data is an essential component of a successful digital strategy. These include:

- Building a material master data repository integrating ERP and other transactional systems
- Standardizing data taxonomies across the organization
- Using machine learning to fast-track the integration of data from various sources
- Automating the process of aggregating and classifying data to drive improvements in planning

### Digital procurement assistance

Digital procurement assistance powered by cognitive technologies can be utilized to monitor raw material prices in real-time, and suggest substitutions based on expected volumes and operating margin.

### E-procurement and supplier risk management platform

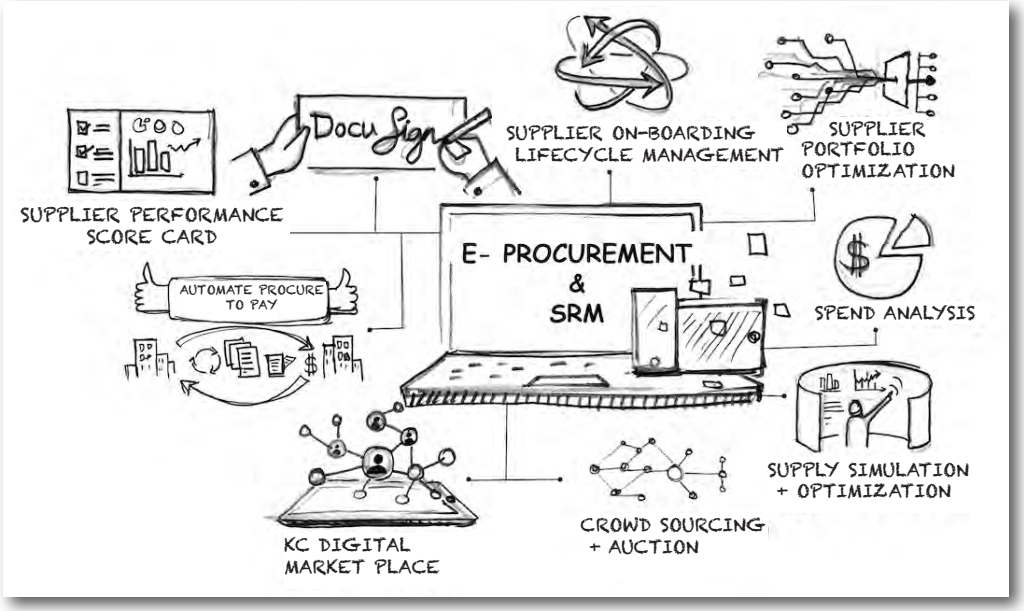
A one-stop e-procurement and supplier risk management (SRM) platform can bring intelligence from procurement data coupled with predictive insights, enabling risk assessment. Spend analysis and intuitive dashboards showing live performance ratings of trading partners along with recommendations, can help managers make informed decisions on the right supplier portfolio.

### Automation of contract management lifecycle

The contract management lifecycle can be comprehensively automated by identifying terms and conditions based on commodity, region or industry, creating customized contract templates and using digital transaction management services like DocuSign. Exceptions can be routed through a pre-defined workflow through the chain of command. Simplified contracts with less number of rules for better understanding and adherence will decrease processing times and accelerate payments.

### Blockchain technology

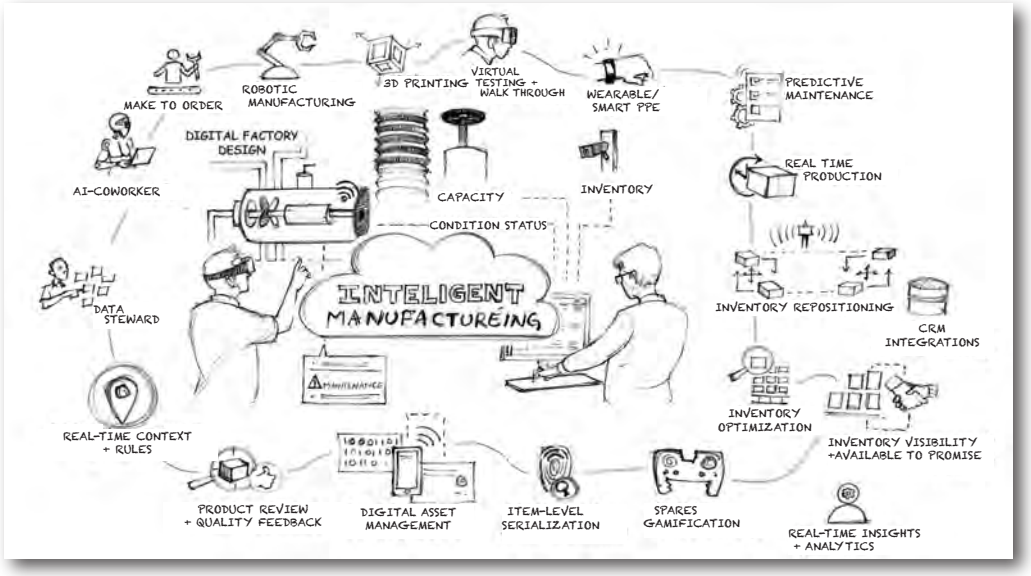
Blockchain technology integrating data from external partners through a distributed digital ledger database will enable multi-enterprise collaboration and trust. Automated transactions based on pre-configured conditions will improve operational efficiency.




Source: Infosys Consulting

# 3. Intelligent Manufacturing & Product Lifecycle Management

CPG companies are gearing up to digitize their manufacturing value chain by adopting RPA, robotics, machine learning and advanced analytics to connect and optimize their processes on the lines of Industry 4.0. Digital production floors, digital factory design, connected assets, IoT, virtual reality and augmented reality are truly transforming the manufacturing ecosystem.




Source: Infosys Consulting

### Connected machines, assets and products

Connected machines and assets fitted with sensors can talk to each other and provide insights about each other's capacity. Managers can view real-time data and operational metrics about the factory floor on dashboards and heat maps to understand parameters such as – equipment efficiency, ambient conditions and energy consumption. Smart packaging and labels that transmit data on product condition, aging and customer interaction can help in inventory management and faster replenishment.

### Predictive preventive maintenance

IoT-driven sensors can alert when a physical asset in the factory is exceeding acceptable parameters or is malfunctioning, proactively calling for repairs or spare parts. This data can be used for better negotiations with preventive maintenance vendors.

### Artificial intelligence

AI will be used heavily as a co-worker, augmenting work of a quality inspector by eliminating mundane tasks. Machine learning, on the other hand, can enable dynamic asset classification, production planning, inventory optimization and energy optimization.

**73%** companies surveyed plan to incorporate AI into the supply chain

Source: Creating Competitive Advantage Through a Digital Supply Chain – An Infosys Consulting research report, 2018

### Machine learning and big data analytics

Machine learning and big data analytics can be used for predicting product quality test results against variations in multiple parameters, reducing expensive product testing and trial cycle time.

### Augmented reality and virtual reality

Augmented reality tools such as smart glasses can be used for viewing new orders remotely or for virtual testing of parts and packaging.

### 3D printing and additive manufacturing

As CPG companies upturn customization by shifting to a made-to-order business model, 3D Printing is expected to be a game-changer in improving responsiveness in delivery capabilities by printing at the point of demand. Additive manufacturing can reduce energy emission by decentralizing production and creating flexibility in the production process.

### Digital talent

As manufacturing shifts from being labor-intensive to knowledge-intensive, companies must transform their talent pool by investing in hiring and training people in relevant technical skills to go digital.

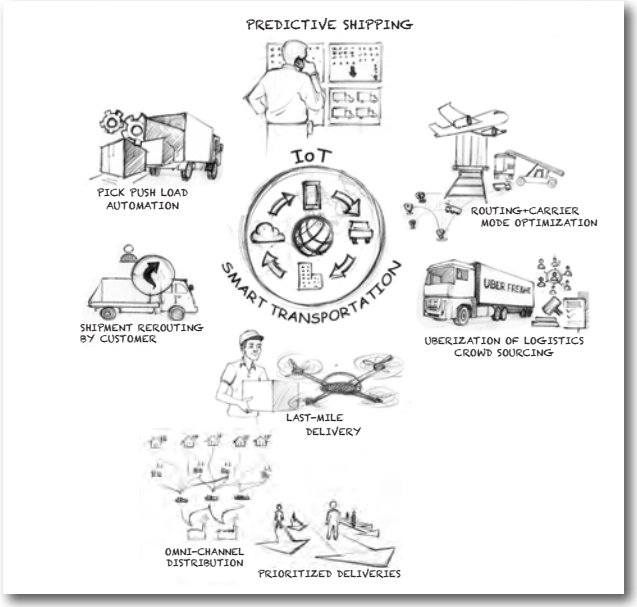
### Market intelligence solutions

Market intelligence solutions will enable companies to stay abreast of consumer trends and demands, and invest in green products using locally sourced organic ingredients, sustainable product packaging and labeling.

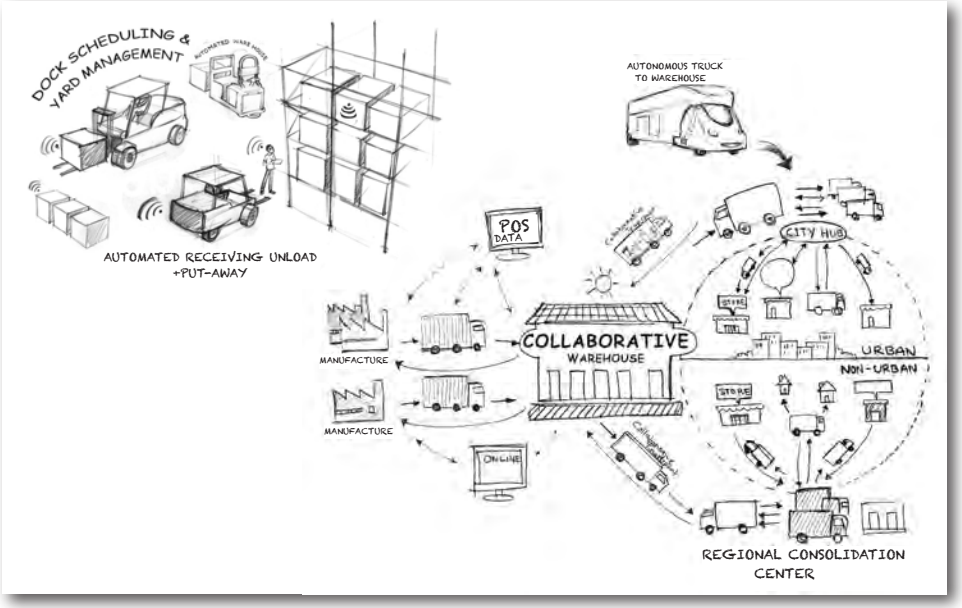
**62%** of businesses surveyed say ethical sourcing practices is a priority

Source: Creating Competitive Advantage Through a Digital Supply Chain – An Infosys Consulting research report, 2018

# 4. Smart and Collaborative Logistics




Source: Infosys Consulting




Source: Infosys Consulting

The need to break-down operational silos, reduce costs, accelerate cycles and deliver a perfect order, has ushered a seismic shift in the world of logistics. Information sharing and harmonization between supply chain partners and third-party logistics or 3PL providers, with end-to-end visibility, are essential to reduce inventory levels and handling costs. CPG companies must explore digital maturity across the entire logistics value chain to improve operational efficiency, safety and customer experience.

## Automated Warehouse

The role of warehousing is gradually veering from being a storage and movement function to a value-added service. Tasks such as packaging assembly and modifications, post-production quality testing, and returns goods management, are being assigned to warehouses. The emphasis on increasing inventory velocity through postponement strategies and the obligation to serve diverse channels are converting warehouses to cross-docking facilities.

With thousands of different types of goods being stored in the average warehouse today, every square inch of warehousing space must be optimally utilized to ensure specific goods can be retrieved, processed, and delivered as fast as possible. Digital technologies if harnessed correctly, can enable error-free and pro-active management of stock and asset lifecycles. Let's explore how:

### Cloud-based logistics platform

Smart logistics will be driven by a cloud-based logistics platform that will integrate the WMS TMS, LMS, and other digital applications to establish enterprise-wide visibility and excellence in fulfillment. Electronic data interchange (EDI) can be used extensively for end-to-end visibility from purchase orders to shipping orders to stock transfers and to advance shipping notices (ASNs).

### Telematics/IoT

All "dark assets" in warehouses can be connected to a central system through IoT based sensors, providing vital information on their capacity and condition. Adoption of item-level tagging using RFID or multi-sensors can be used to automatically count and update the status of inventory in real-time. Cameras attached to inbound and outbound gateways can scan pallets to identify damages or flaws. Alerts can be sent if capacity is being under-utilized or if any damages or pile-ups occur. This data will be invaluable for predictive maintenance analytics.

### Cross-docking

Supply chain velocity can be augmented by automated receipt and put-away or cross-docking solutions. The stock arriving at a cross-docking facility can be automatically unloaded from trailers or pallets; smart labels on products can send data to the WMS to record receipts automatically.

### On-demand warehousing

With increasing handling and logistics costs, collaborative warehousing agreements are underway where multiple manufacturers could share collaborative warehouses for storing finished goods. The goods could be transported to city hubs and regional consolidation centers based on the location, or cross-docked for last-mile delivery. Last-mile deliveries would be consolidated based on routes and priority. On-demand warehousing is an emerging concept to optimize warehouse footprints and reduce handling costs.

### Go-green

Optimization of distribution center footprint is essential to establish an energy efficient network. Recycling, reusing and repurposing principles should be enforced in facility construction, manufacturing and returns processing. Smart buildings can monitor energy efficiency along with "daylighting". Integrated daylight tubes and occupancy sensors are increasingly in vogue for achieving sustainability in lighting.

## Intelligent Logistics

Increasing customer demand for real-time order fulfillment, visibility into order status and on-time delivery at lower costs is transforming how companies operate their distribution networks. With direct-to-consumer and digital sales expected to increase exponentially, orders types are set to shift to on-demand, small-parcel and same-day shipments. The expected change in the distribution model necessitates high integration within the supply chain, converting logistics into an information hub. Let's examine how digital technologies can transform the logistics business models.

### Route optimization

Route optimization solutions will provide real-time traffic data and enable companies to dynamically calculate the cheapest, fastest and most efficient routes. A single cloud-based platform or portal can consolidate data from various embedded telematics and geo-location sensors fitted on carriers. By considering changes in categories and priorities of orders, re-routing and re-assignment can be done dynamically.

The system can also support what-if forecasting and simulation for tactical planning. This would create fleet efficiencies, improve fuel economy and reduce deadhead miles. A connected fleet will also enable predictive lifecycle management by forecasting failures, and automatically scheduling maintenance checks.

### Location and condition monitoring

Location and condition monitoring through IoT will provide a new level of transport visibility and security. Telematics sensors in trucks and multi-sensor tags on items can transmit data on location, physical condition and detect thefts.

### Spot-tendering & transportation marketplaces

The global resolve to manage climate change and regulate emissions is driving companies to reduce the size of shipments, deploy energy efficient carriers and move to shared collaborative transportation or spot-tendering.

Spot-tendering of trucks is set to disrupt the transportation industry through the introduction of transportation marketplace solutions. Seamless integration of transportation management systems with financial systems is imperative for transportation cost transparency, performance measurement and spend analytics.

**23%**

According to recent reports, 23% of greenhouse gas emissions in US can be attributed to heavy and medium trucks.

Source: United States Environmental Protection Agency



# 5. Digital Consumer Engagement

IoT and mobile technologies are steadily becoming the primary drivers of consumer loyalty today by rendering convenience, personalization and contextualized interactions. The emergence of connected homes, vehicles, wearables and mobile devices indicate how customer experiences will be orchestrated by the automation of tasks. Dynamic interaction with customers through digital UX will be a key differentiator. Below are some of the key strategies that retailers and CPG manufacturers should adopt, in our view, to directly influence the consumer journey:

### Direct-to-consumer

CPG brands must invest in new direct-to-consumer fulfillment models leveraging social media channels, mono-brand portals and exclusive storefronts on e-commerce websites. Exclusive and new SKUs and pack sizes must be offered online and products customized for niche customer segments – piggy-backing on the web's long tail.

Subscription services are increasingly becoming popular as on-demand services, allowing consumers to pay a fee for subscribed products that would get auto-replenished and home-delivered at regular intervals.

### Micro-listening and customization

Collaborating and co-investing with key accounts will help coordinate differentiated product assortments, pricing and promotions across channels, and increase digital shelf space. Big data and machine learning should be harnessed to analyze customer purchase patterns and create tailored promotions and geo-targeted deals, enabling 'anytime, anywhere' purchase. Social media monitoring and digital listening can deliver micro-consumer insights which can be invaluable in tailoring landing pages, automatic shopping lists and rich product content.

### Customer recognition and proximity marketing

Customer recognition through integrated and intuitive mobile apps and digital technologies such as iBeacons, facial recognition and digital displays, can be used to create a bespoke shopping experience. iBeacons integrated with shopping trolleys, baskets and smart shelves, can be used to track the shopper's journey through store aisles – recording the in-store dwell and decision-making times. This, in turn, can be shared upstream with CPG manufacturers.

IoT technologies will allow shoppers to respond to geo-location based mobile advertising and redeem digital coupons. Recognizing a shopper through video analytics and 3D imaging will allow marketers to push for hyper-relevance by tracking the shoppers' path-to-purchase and build the right product mixes, targeted messages, push alerts, recommendations, promotions and value-added services.

# 6. Seamless Value Chain Collaboration

Omni-channel business, focus on customer-centricity and new digital operating models will spur the need for collaboration between CPG manufacturers and their customers in multiple areas. In order to realize mutual benefits from the plethora of customer and operational data, it becomes imperative to implement the following:

### Standardization, integration and sharing

Companies must work with customers and partners to standardize their business processes, establish seamless integration of systems and adopt a common analytics framework. Big data insights must be shared between manufacturers and their customers to understand trends, sales patterns, macroeconomic factors, promotional effectiveness and brand health. Co-investment in advanced analytics and common technologies are required to build a 360-degree consumer genome.

### Collaborative operations

As new replenishment and fulfillment methods emerge, functional processes across the value chain have to be coordinated to ensure faster deliveries. Significant investments are required to build a cloud-based platform for collaborative planning, forecasting and replenishment.

Manufacturers can share market intelligence and insights from syndicated data mined, using machine learning and predictive analytics. These insights can then be embedded back into business processes to make more informed decisions.

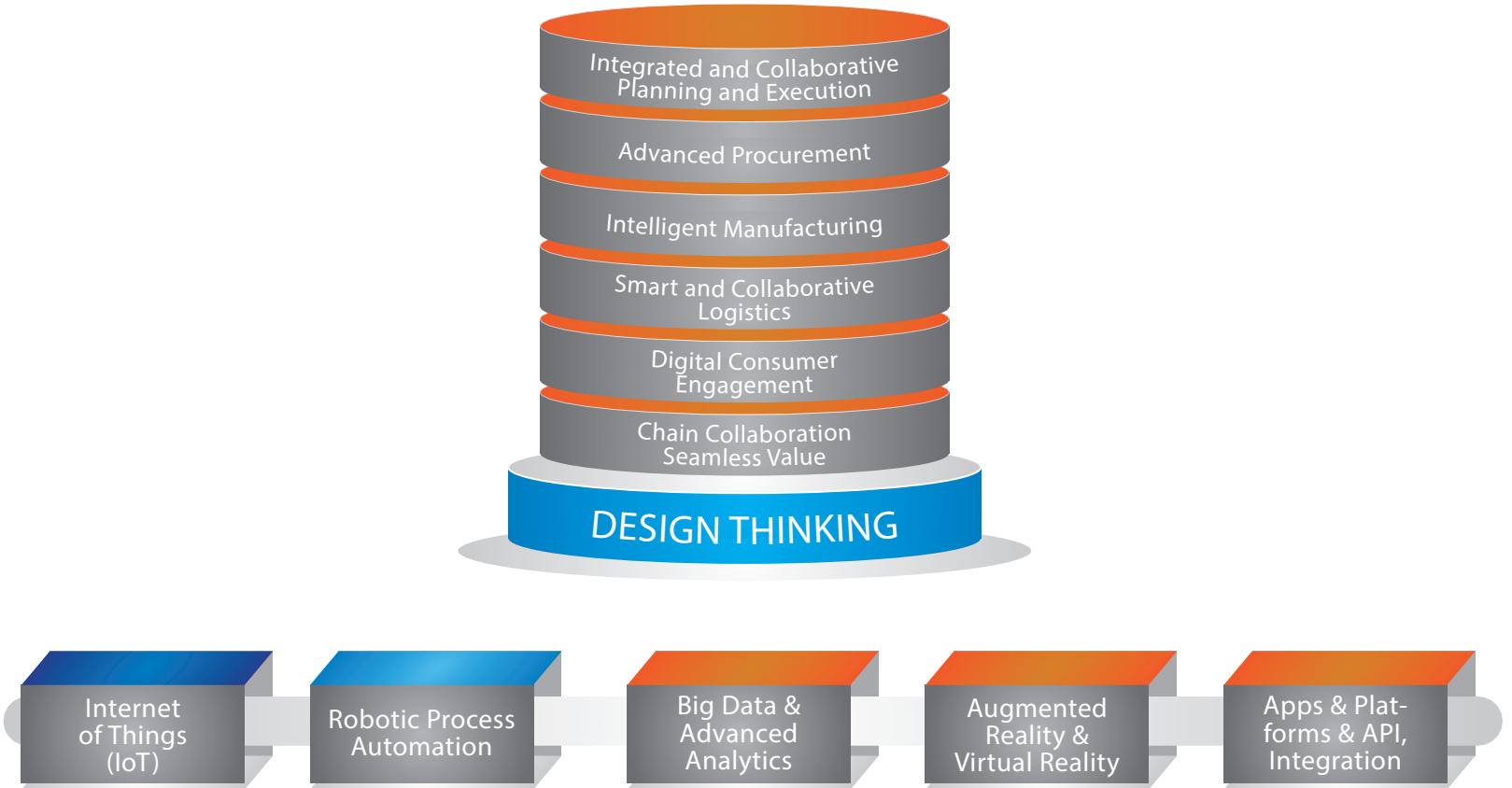
### Agility

'Anywhere, anytime' ordering and fulfillment lean on the ability of the integrated supply chain to re-adjust forecasts, manufacturing and distribution in an agile manner. This requires a single view of inventory across hubs and stores so that product availability, prices and promotions can be updated in real-time.

# 7. Design Thinking at the Heart of the Digitization Journey

Digital transformation of the supply chain into a customer-centric and demand-driven function requires cultural changes in the organizational set-up that encourages collaborative thinking and networking. Businesses must re-invent themselves by encouraging divergent ideas and address challenges through a human-centric lens. Design thinking will enable employees to brainstorm ideas as a team and deconstruct problems to envision innovative and disruptive solutions.

## Framework for Digital Supply Chain Optimization




Source: Infosys Consulting

# DNA of the Digital Organization

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## A Data-Driven Orchestration

There is an impending shift from traditional enterprise integration to application programming interface (API) systems and innovative application mash-ups. APIs implemented on native cloud-based micro-services architecture using open source, algorithms and self-learning techniques are feeding into a self-servicing supply chain loop. Over-reliance on standard operating procedures is giving way to process workflow automation.

Against the backdrop of perennial global uncertainty and hyper-competition, automation and process control are essential to managing zettabytes of data and complexity of operations. Businesses will increasingly rely on data-based algorithmic decision-making to receive real-time micro-customer insights, demand signals and market intelligence data. Real-time location and condition monitoring of smart products and assets, along with predictive analytics and investments in horizontal integration using digital platforms, will be fundamental to improve operational efficiency, collaboration and cost-effectiveness.

Digital disruption provides the ripe opportunity for CPG companies to apply design thinking to re-imagine their business model and create novel customer experiences and business value through the data-driven orchestration of the supply chain ecosystem. Machine learning, AI, IoT, and advanced analytics present limitless possibilities for dramatic transformations. The real challenge, however, lies in unlocking the value from the avalanche of data and harnessing it to uncover valuable insights for effective decision-making.

In the digital race, those organizations that can master the art of early adoption of emerging technologies and quick detection of threats will emerge as the clear winners. The rest risk becoming obsolete.

# About Infosys Consulting

We are a global advisor enabling organizations to reimagine their future and create sustainable value leveraging disruptive technologies. And as part of technology leader Infosys, we have access to a global network and delivery capability of 200,000 professionals that help our consultants implement at scale. To see our ideas in action, please visit **InfosysConsultingInsights.com.**

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Harish has been with the Infosys family for over 19 years in various roles in delivery leadership, CSG and consulting. He joined Infosys Consulting 6 years ago and heads our global delivery organization, managing top clients such as Adidas, Reckitt Benckiser, PepsiCo, Citibank and Syngenta. Before joining the firm, he spent a few years with a startup analytics company called Mu-Sigma.

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