The 2021 Supply Chain Technology Themes CSCOs Should Be Aware Of

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Having the expertise to deploy smart and innovative technologies is crucial for supply chain resiliency and competitiveness. This research arms CSCOs with fresh perspectives on emerging technology themes, to confidently articulate a supply chain's response for accelerated technology investments.

Overview

Key Findings

- The chief supply chain officer's (CSCO's) imperative will be to meet purpose-driven goals whereby supply chains move beyond transactional relationships, focusing more on coordinating ecosystem orchestration. In enabling those shifts, digital supply chain technologies are becoming more important than ever.

- Continuing volatile and disruptive business environments require CSCOs to embrace new approaches on how they position, resource and articulate the value of technologies.

- Being able to respond to spectrums of risk-based events is becoming more prevalent as part of supply chain leaders’ future responsibilities and leadership.

- Elevated customer expectations are shaping demands for new generations of immersive, automated and intelligent applications that must be both robust and agile for future experience demands, better predictability and more transparency.

Recommendations

CSCOs and heads of strategy realization responsible for strategic leadership of business transformation initiatives should:
Early adoption of nascent or emerging technologies can provide an organization with a competitive edge. New technologies should be leveraged to promote growth opportunities or drive internal efficiencies. At the same time, there are a multitude of mature technologies that should form the foundation of companies’ supply chain operations infrastructure. It should be selected based on organization values and in the right sequence — rather than simply following the latest hyped trend.

CSCOs are realizing that they need to formalize their technology evaluation and management activities. This will enable the adoption of only those technologies or other key innovations that will produce significant business impact while balancing investments between emerging and mainstream technologies. A new approach to assessing the value of clusters of innovative technologies as part of a technology theme can also be instrumental in equipping CSCOs with a broader portfolio that can align to specific use cases or unique business needs.

CSCOs can progressively influence change and cultural shifts in how groups or sequences of technologies are value-assessed and positioned in more robust roadmaps. The roadmaps interweave technologies placement alongside other best practices, such as data governance, maturity assessments, segmentation and cost to serve.

Analysis

This research has been adapted from The 2021 Supply Chain Technology Themes.

Ensure they have strong competency in process governance for business reviews of IT investment, strategy and decision making.

Leverage the current business disruption environment to pilot and evaluate combinations of technologies that can map, inform, automate and predict risk-based events.

Champion technologies that provide enhanced customer experiences, elevate brand recognition and establish more agile and safer working environments.

Use targeted clusters and/or combinations of technologies to accelerate technology deployments to solve near-term business objectives or high-risk tactical needs.
The New Imperative: Purpose-Driven Supply Chains

CSCOs must conduct continuous appraisals of their organizations’ responsibilities and business response during periods of global and industry change. Increased vigilance is paramount in wake of firsthand experiences of recent disruptive events, such as supply shortfalls, security attacks, human health and safety concerns, as well as gaps in visibility across critical phases of procurement and production or distribution. Figure 1 summarizes the 2021 strategic supply chain technology themes.

**Figure 1. 2021 Supply Chain Technology Themes**

New generations of innovative technologies are challenging CSCOs to assess broader digital implications on business planning, risk and future strategy as part of supply chain transformation roadmaps. Gartner’s 2020 Supply Chain User Wants and Needs Survey identified that digital supply chain transformation, decision-making enhancements and customer experience improvements rank as the top three investment priorities for supply chains.
The same study also identified that most organizations are now focusing on integration across core supply chain processes as well as the extended value chain. Historic deployments of technology applications or platforms deployed for functional or process-centric requirements may have delivered high service levels without foresight toward their strategic importance. This includes their interdependencies with other domains and the need for real-time connectivity in a digital and e-commerce age.

As a result of business disruptions, the time taken for discovery, planning and making investment decisions for valuable technologies is now at a premium. CSCOs must scrutinize traditional (and sometimes protracted) vendor review cycle times to identify methods to deliver accelerated innovation cycles that can deliver against business objectives. Vendors offering ranges or portfolios of technology solutions and services can help contribute to overall efficiencies in promoting and enabling innovation.

CSCOs and their designated supply chain leaders have an important role to play in promoting collaboration between supply chain and their IT organization in order to facilitate accelerated consensus and knowledge sharing. Gartner's 2020 Supply Chain User Wants and Needs study further confirmed that there is now a much stronger emphasis on strategic collaboration between supply chain leadership and the IT function.

As part of that collaboration, CSCOs also have an important role in spearheading new approaches to the value assessment, accelerated times to deployment, and the critical importance of more unified and digitally connected supply chains (or value chain) networks. This is not, however, without cultural and operational challenges, given the highly complex and extended nature of end-to-end supply chains. Here, too, a fresh approach in assessing the role of targeted combinations of technologies (themes) that can embrace functionally and toolsets to support real-time communication and collaboration can be pivotal for future resiliency and competitiveness.

Extending connectivity through digital mobile and edge applications to disparate partners can also elevate choices and opportunities for consensus-based decision making on trade-offs required to achieve efficiency, responsiveness, flexibility and agility. CSCOs can further augment their responsibilities in sponsoring the value of assessing technology themes, to help maintain and boost competitive advantage through differentiated customer services applications, interactions and experiences.
Creating fit-for-purpose supply chain segments primarily designed from customer needs, rather than commercial prioritizations, enables supply chain leadership and CSCOs to set and achieve profitable trade-offs (see Part 1 — Enable Competitive Advantage With End-to-End Supply Chain Segmentation: Segment Based on Customer Order Needs and Part 2 — Enable Competitive Advantage With End-to-End Supply Chain Segmentation: Align Operating Model to Customer Need Segments).

Supply chain leaders must also be cognizant of the need to redefine perspectives on their organization’s ability to deploy technologies that can be responsive to risk events and incidents across the full end-to-end supply chain. Risks can be broad, unforeseen and challenging to consolidate into defined objectives or metrics. Adopting a too restrictive focus on risk management can be counterproductive in opening up more opportunities for further unplanned risks to emerge. While risk is a multidisciplined business objective, CSCOs can leverage this report to help enhance their contribution to an organization’s ability to adopt new approaches to risk management. These approaches create major impacts on risk reduction, mitigation, identification and prediction (for example edge ecosystems, digital supply chain twin and supply chain security).

The increased relevance of risks should expand a CSCO’s vision on how combinations of technologies deployed across the supply chain can create positive impacts on people. It also helps to put them at the heart of decision making, including more remote, digitalized, safer and secure work environments (see Supply Chain Executive Report: Shaping Supply Chain Disruption in a Volatile Risk Environment).

Gartner surveys of supply chain leaders reveal that CSCOs will need to navigate six major shifts in the upcoming years. The CSCO’s imperative will be to meet purpose-driven goals whereby product sourcing, manufacturing and delivery processes serve a higher purpose and maintain economic viability. These shifts include:

- Increase digitalization: Functional, cross-functional, multienterprise and value stream mapping across the full end-to-end supply chain.
- Automate manual and resource-intensive tasks.
- Reimagine globalization and offshore manufacturing.
- Foster migration to greater levels of e-commerce (including e-fulfillment and e-services).
- Deliver a more-connected and proactive customer experience.
An appreciation and promotion of the key principles of the technology themes can support CSCOs in helping guide and influence their organization to make more-informed and responsive business decisions for technologies' value assessment and positioning. Groupings, clusters and combinations of technologies will have an increasingly valuable role to play in their flexibility to be incorporated across a formalized engagement plan that will factor in broader process and operational best practices. This includes legacy infrastructure, data governance, segmentation and digital maturity.

Technology Themes CSCOs Should Be Aware Of

CSCOs can explore a range of innovative technologies that can supplement existing infrastructure to elevate digital maturity. This includes their increased importance in how they work in combination or bundled together to deliver value on investment that aligns to a company’s specific business objectives and status.

Hyperautomation

The main premise of hyperautomation is to free up valuable resources and capacity and create efficiencies across zones of the supply chain that traditionally have observed large transactional or data processing workloads. These workloads require human interpretation or micromanagement of operational decision making; for example, warehousing, storage, logistics and distribution networks. Hyperautomation exploits existing deployed technologies (and data they have generated) alongside new spectrums of technologies to provide the configurations and governance needed to deliver automation at scale. In contrast to more direct automation solutions deployed predominantly in functional areas, hyperautomation embraces change management activities around strategy, planning and network configuration that extend across multiple functional areas and across multiple enterprises. Hyperautomation is best achieved by adopting a broad but targeted lens across combinations of technologies that include robotic process automation (RPA), Internet of Things (IoT), machine learning (ML), artificial intelligence (AI), edge computing, robotics and smart machines, and many others.

Digital Supply Chain Twin
A digital supply chain twin (DSCT) replicates a full digital representation of a real-world or physical entity, event or system. DCSTs stand out in their ability to deliver representations in real time (alongside planning and mapping tools) to real events associated with physical products or entities operations. This is accomplished across specific phases of the supply chain life cycle; for example, a scan, product handover, movement across a quality gate or time stamps. DSCTs are not just confined to physical products (or assets), but any physical device, machine, tools or human resource that contributes to overall business continuity of delivery of product to the end customer.

**Immersive Experience and Applications**

Immersive experiences fully exploit the breadth and depth in how combinations or clusters of technologies and services working together can create immediate and positive impact on people. Immersive experiences continue to evolve to set new standards by enabling users (including customers and employees) to perceive the virtual world using virtual reality (VR) and augmented reality (AR). With continuous refinement of services and aligned technologies, companies are able to deliver tailored blends that incorporate both VR and AR, delivering mixed reality (MR) applications. Immersive applications can enable users to interact with the virtual world using conversational systems, chatbots and interactive virtual assistants and 3D simulation models.

**Edge Ecosystems**

Edge ecosystems are remote but fully integrated and digitally connected ecosystems of machines, devices, things and people that allow data-intensive tasks, traditionally managed in more centralized databases or processing systems, to be more evenly distributed, streamlined and balanced. As with all key themes in 2021, edge ecosystems are supported by a host of new ranges of data capture, IT communications services (such as 5G and Wi-Fi), mobile applications, coding and spectrums of advanced IoT solutions. CSCOs can promote the values of edge ecosystems as supplementary and/or complementary, and not a replacement for all data processing activities and existing business networks.

**Supply Chain Security**

Supply chain security is the enforcement of security, spanning both physical levels (devices, machines, products, operations infrastructure and assets) as well as information and digital data (customer information, intellectual property, proprietary coding, transactions and personal data). CSCOs are well-placed to spearhead initiatives and collaboration for new approaches to supply chain security.

**Environmental Social Governance (ESG)**
Environmental, social and governance refers to a collection of corporate performance and evaluation measures that assess the robustness of a company’s governance mechanisms and its ability to effectively manage its environmental and social impact. Irrespective of ESG origins or objectives, the end-to-end supply chains of organizations will remain a central pivot point in which to capture information and business intelligence in supporting ongoing ESG requirements. These might include climate change and emissions, fair and ethical trade and labor conditions, and obligations for transparency and traceability to the general public, investors and stakeholders. End consumers increasingly demand companies and brands provide information and applications that take responsibility for ESG directives.

**Embedded AI and Analytics**

Across supply chains, the value of combining and reviewing the embedded value of both AI and analytics working in harmony (or sequenced as part of a structured roadmap) can realize significant value to supply chains. This is especially true across use cases where embedded AI and analytics are software capabilities that deliver real-time reporting, interactive data visualization and/or advanced analytics and intelligence — including ML, predictive and prescriptive analytics — directly into an enterprise business application. The data is managed by the supply chain application; the visualizations and reports are placed directly within the application user interface (UI) to improve the context and usability of the data for supply chain business users and analysts.

**Augmented Data Intelligence**

Augmented data intelligence is a tool consisting of existing and new technologies (such as graph technology, advanced analytics, AI/ML or modeling) combined with near-real-time data from the business ecosystem. It facilitates advanced data processing and further allows for the delivery of insightful information, predictions and suggestions that are contextually relevant and adaptive to user experiences toward more connected supply chain data.

**Evidence**

Results presented are based on the Gartner Supply Chain Technology User Wants and Needs Survey, 2020, which was conducted from 2 November 2020 to 17 December 2020. It explored the roles digital and technology play in supply chain, how supply chain organizations leverage digital and technology for competitive advantage, how supply chain organizations are organizing to support their digital initiatives and their changing views on how best to exploit emerging technology in their supply chain management (SCM) organizations.
A sample of 520 supply chain professionals, with their primary workplace located in North America (including the U.S., Canada, Mexico), Western Europe (including the U.K., Germany, France) and APAC (including Australia, New Zealand, China, Singapore, India) completed a web-based survey.

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Supply Chain Management Software Market Overview, 2021

Hype Cycle for Supply Chain Execution Technologies, 2021