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Continuous Design Outsmarts Disruption:

A Blueprint for Supply Chain Resiliency

Respond More Quickly to Change

How low-probability events can suddenly become reality

Fueled by digitization and global disruption, supply chains have changed in recent years at a pace and intensity that many organizations have never experienced. The need to source products from farther around the globe and move them faster while delivering at lower cost has increased complexity and risk while making it harder to manage and respond to sudden disruption.

The COVID-19 pandemic, Suez Canal blockage, and Texas winter storms causing a global plastics shortage are a few of the recent disruptions that have now led supply chain leaders to realize that even low-probability events can become a reality without warning and have a significant impact on their operations. As a result, many organizations are rethinking their agendas and making supply chain resiliency a critical component of business continuity.

By adopting new technologies and the practice of continuous design, organizations can reduce risk, improve resilience, and turn their supply chain challenges into a competitive advantage. With new data sources, a supply chain digital twin, and AI, companies can now test scenarios and evaluate the impacts of their decisions before they execute them.

A New Era of Disruption

Supply chains have been hit hard with multiple crises and disasters in recent years. From the dot-com bubble burst and the 9/11 terror attacks to U.S.-China trade wars and COVID-19, both global and regional events can have immediate and significant impacts on the entire supply chain.

China's entrance into the World Trade Organization in 2001 opened the world to a new level of globalism. Since then, multinational corporations' desire to capitalize on China's production prowess along with low-cost labor has shaken up sourcing, manufacturing, and distribution models. The movement of supply chains abroad helped drive global trade from 39% to 58% of global GDP between 1990 and 2019. The growth of e-commerce and AI has also put greater demands on supply chains, forcing manufacturers and distributors to source and move a wider assortment of products in a shorter period, just as supply chains became longer due to globalization.

While acclimating to the complexities of globalization and the demands of faster fulfillment, supply chains have also been pressured by the C-suite and corporate bottom lines to become increasingly lean, efficient, and just-in-time.

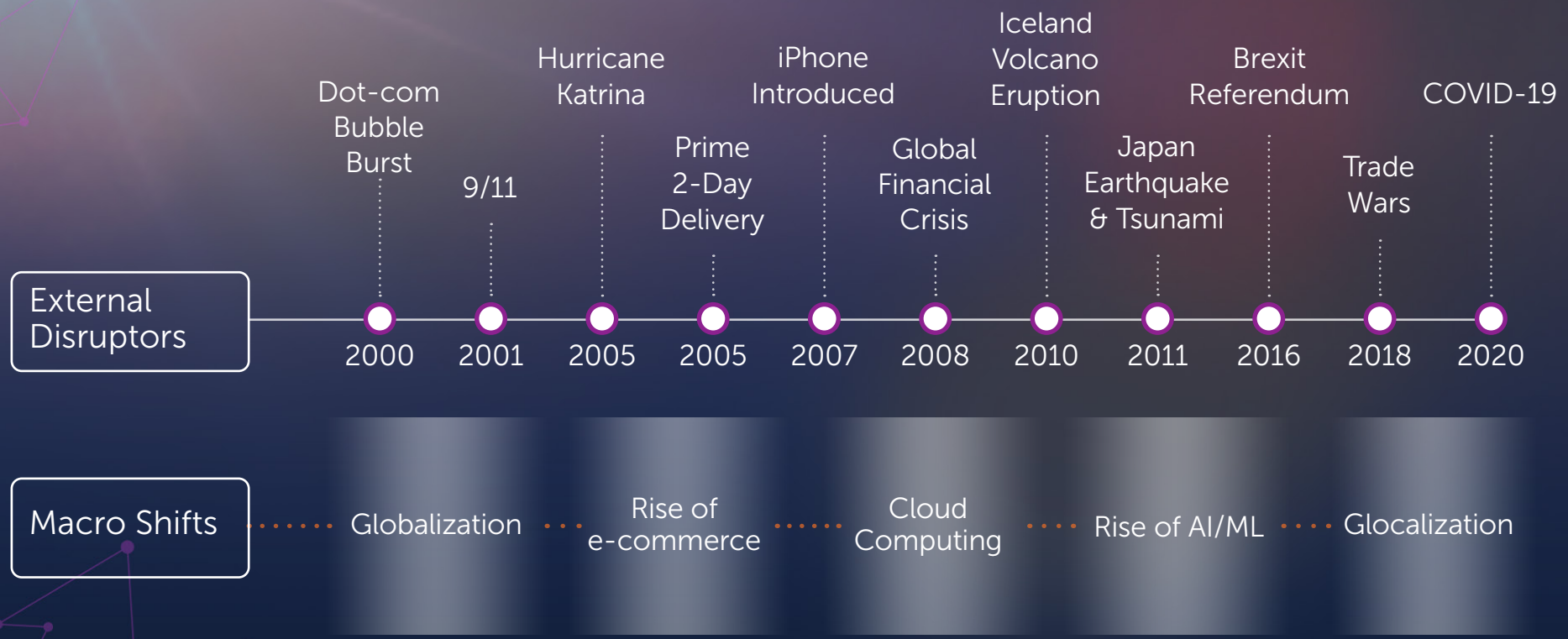
The latest trend, "glocalization," aims to balance the tradeoffs between efficiency and resilience in global supply chains.

Just as many organizations began adapting to this new reality, the pandemic of 2020 started to unravel globalization and accelerate the shift back to more regional supply chains. Even before 2020, many organizations took the U.S.-China trade wars as a cue to start diversifying out of China and into other parts of the globe. The latest trend, "glocalization," aims to balance the tradeoffs between efficiency and resilience in global supply chains by looking to a more distributed network with redundancies and less dependency on globally dominant hubs.[1]

1 How to build more secure, resilient, next-gen U.S. supply chains, Brookings Institute, December 3, 2020

Twenty Years of Supply Chain Disruption

Global Trade, Disruptive Technology, and Natural Events



Traditional Planning Technologies Can't Keep Pace

The pandemic's unprecedented disruption is a catalyst that may turn the tables for good in making long, globally connected supply chains a liability. 94% of Fortune 1000 companies experienced supply chain disruptions due to COVID-19, and three-quarters of companies said they experienced negative business impacts.[2]

The pandemic revealed that most supply chains aren't designed to manage the ripple effects of disruptions in the global nature of supply chains. Many organizations struggle to design a supply chain that is both resilient and efficient while addressing complex and nuanced markets.

While organizations focus on cost efficiency, there is also growing acknowledgment that it can often come at odds with resiliency, which requires the ability to respond by shifting production, sourcing, or distribution quickly. Over 50% of organizations[3] now say they have a goal of making supply chains support enterprise agility. While less than 25% of industry leaders say their supply chains are resilient, more than half believe they will become resilient within the next two or three years. As of March 2020, a third of these survey respondents said they had moved some sourcing or manufacturing out of China or planned to do so.

2 Supply Chain Disruption: Repurposed supply chains of the future must have resilient and responsibility at their heart, Accenture
3 55% of Supply Chains Expect to be Resilient in 2-3 years, Supply Chain Dive, June 26, 2020

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New Ways to Balance Resiliency and Intelligent Decision-Making

Organizations have typically managed their supply chains with relatively stable networks, policies, and modes of transportation. Still, this strategy no longer works in a world of such uncertainty. Old ways of planning driven by static assumptions around supply chain design simply can't keep pace. COVID-19 exposed weaknesses in most supply chains across industry verticals and revealed that most are not designed for resilience.

Most organizations now have C-suite alignment on the importance of resiliency. 87% of supply chain professionals[4] say they will invest in resiliency within the next two years. Business leaders realize they must now have a clear understanding of disruption impacts, potential consequences, and what tradeoffs they may need to make to restore operations as soon as possible to ensure business continuity.

4 Gartner survey finds 87% of supply chain professionals plan to invest in resilience within the next two years, Gartner, February 10, 2021

There is an increasing acknowledgment that resiliency necessitates building optionality in nodes, modes, and flows of the supply chain design. In this new environment, many are looking for a new way to balance resiliency, cost-efficiency, and fulfilling increasing customer demands.

Organizations now need a fast and data-driven means to determine risk exposure level, consider substitutions, evaluate inventory, enhance network resilience, and create a framework for more rapid, more intelligent decision making.

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A New Way of Thinking:

Continuous Design Outsmarts Disruption

Design is now moving beyond the practices of cost and efficiency focus towards value creation, ongoing reviews, and multi-sourcing resiliency. While this may be a challenging transition for many supply chain leaders, it's also an opportunity. Market leadership is often forged during times of disruption, and business leaders who drive successful supply chain transformation can outmaneuver their peers during times like these. The best decisions require the right balance of profitability, service, risk, and sustainability.

Supply chain design wherein nodes, modes, flows, and policies driving a supply chain are reviewed and realigned to business objectives can no longer be viewed as an episodic, project-based exercise. Continuous Design is the development and ongoing refinement of optimal supply chain structures, policies, and flows. This is achieved through analysis, scenario planning, and simulation with end-to-end digital models, fueled by AI and powerful algorithmic engines.

Organizations must now prioritize adopting capabilities aligned to their business priorities and eliminating functional and data silos, which are barriers to continuous design. By doing so, they can create an environment for constant learning, planning, and execution with the community of supply chain decision-makers.

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Continuous design is the Key to Supply Chain Resilience and Agility

Traditional Practice	Emerging Practice
Cost Minimization	Value Creation
Long-term, Periodic Design	Short-term, Continuous Design
Global Efficiency	Local, Regional Redundancy
Optimization Driven	Optimization Augmented by AI/ML
Supply Chain Centric	Interdisciplinary (Finance, Procurement, Marketing, etc)

The Building Blocks of Continuous Design

More global companies are digitizing supply chains, and at least half will be using AI, advanced analytics, and IoT in supply chain operations by 2023.[5] By applying advanced algorithms, organizations can continually revisit and adapt to make the best decisions balancing profitability, service, risk, and sustainability.

Adopting a continuous design philosophy helps your organization change with the times. While this requires commitment from the C-suite, it also requires processes and technology. Continuous design calls for components that can support a new generation of platforms to deploy applications in a scalable manner and address niche situations and decisions as they arise.

Fortunately, technology has come a long way in recent years, and it is now much easier and faster to design on demand. With an end-to-end, extensible data model, AI, and rich algorithms, supply chain leaders can use simulation to quickly learn how to best respond to changing conditions. They can also adjust scenarios and options in these models to identify which decisions best support agility and resilience.

The critical ingredients of an end-to-end design environment include:

A Decision Data Model to absorb data from internal and external resources, harmonize it, and then render the appropriate data model at an appropriate level of granularity to support the design decisions.

AI and Algorithms to provide the basis for simulation and optimization of each design decision required.

Personalized Experiences to deliver a tailored solution with the appropriate user experience for anyone in the organization to facilitate democratized, AI-powered decision making.

5 Gartner survey finds 87% of supply chain professionals plan to invest in resilience within the next two years, Gartner, February 10, 2021

The Digital Twin:

A Key Enabler of Continuous Design

While manufacturers have long used digital twins for product design and engineering to reduce costs and optimize performance, this concept also applies to model changes in the supply chain. Gartner refers to the digital supply chain twin as a digital, "dynamic, real-time and time-phased representation of the various associations between the data objects that ultimately make up how the physical supply chain operates."[6]

As a digital replica of the physical supply chain, it offers an always-on reference model to inform operational, tactical, and strategic plans, and to visualize all current state nodes, flows, and policies. These models can be built from the current period to years in the future to evaluate different decisions with complete tradeoff analysis.

The supply chain digital twin is a key component and enabler of continuous design. It allows organizations to recreate their supply chain in the virtual world and quickly test scenarios in a risk-free manner to learn how decisions will impact the network operations. Just as fighter pilots cannot fly real planes until they go through flight simulators, supply chain executives should not implement model changes in the supply chain without testing them first through a design process powered by a digital twin. In these times of rapid change and disruption, the imperative for supply chain agility and resiliency is more important than ever. Disruption has always been a challenge to traditional, fixed mindsets and supply chain planning measures. Leading organizations will need to embrace new approaches and technologies.

6 The 2019 Top Supply Chain Technology Trends You Can't Ignore, Gartner, March 11, 2019

A Supply Chain Digital Twin Offers:

- A visualization of the supply chain with nodes, modes, and flows
- Models of the future powered by advanced algorithms
- An open architecture
- The ability to democratize decision intelligence to users through apps
- The ability to augment data lake and planning investment

The Digital Twin:

A Key Enabler of Continuous Design

Continuous design powered by a digital twin enables smarter, faster supply chain decisions

Supply Chain Decision-Making Framework

Over the past few decades, supply chain decision-making systems have evolved from standardized to complex and intelligent AI-powered frameworks.

Generation 1

Prevailed until the 1990s, featured MRP as a planning foundation and was powered by data standardization, visibility, and a focus on efficiencies.

Generation 2

Integrated more functional optimization with advanced planning systems, algorithms, and time-phased visibility into the future, though confining to organizational silos partly due to computational limitations.

Generation 3

Featured connected, collaborative planning with cross-functional inputs, and basic what-if scenario planning.

Generation 4

Best suited for the "never normal" environment and features AI-powered decision-making with intelligent response and tailored solutions to drive timely, financially optimal decisions. It coexists with previous generation systems and augments the value created by advanced scenario planning and simulations.

Continuous Design in Action

Learn how organizations leveraged continuous design and the supply chain digital twin to respond to disruption.

A commodities manufacturer traditionally leveraged episodic design technology to position inventory ahead of the winter season until erratic weather patterns led to an unbalanced supply.

The company developed a single, easy-to-use web-based application powered by machine learning that delivers weather-driven demand forecasts. This enabled them to look at the network holistically and reposition decisions to support week-to-week needs.

Result: Planners spend less time investigating sourcing options and make decisions for the entire system based on weather-driven demand forecasts.

A global CPG company could no longer support its growing operations in China with rule-based planning approaches that lacked scenario planning. The company needed a means to improve analysis turnaround times to identify up to 24-month capacity plans.

The company used an existing network model to support strategic decision-making with bi-weekly data updates and what-if analysis to regularly determine the most optimal production plans.

Result: The company realized a significant reduction in logistics and production costs with a substantial efficiency improvement.

A large American retailer immediately closed brick-and-mortar stores at the start of the pandemic. However, inbound inventory continued to overwhelm distribution centers which were nearing capacity. The retailer applied continuous design principles and technology to determine how to move inventory to fulfill spike in e-commerce sales due to stay-at-home orders. It adopted complex inventory management rules which provided recommendations, promotions, off-site storage options, and liquidation of thousands of SKUs.

Result: The retailer could fulfill customer orders with agility and stay in business while competitors closed for an extended period of time.

One of the most significant benefits of adopting continuous supply chain design with platform technology is that it enables organizations to determine where to start and expand their focus. Some organizations may begin with a foundational network strategy then onboard additional use cases to activate and scale them across the organization. Continuous design and planning can support many different priorities, such as network strategy, more intelligent sourcing, optimizing production, streamlining logistics, and customer-centric fulfillment.

Adopt Supply Chain Capabilities Aligned to Your Business Priorities

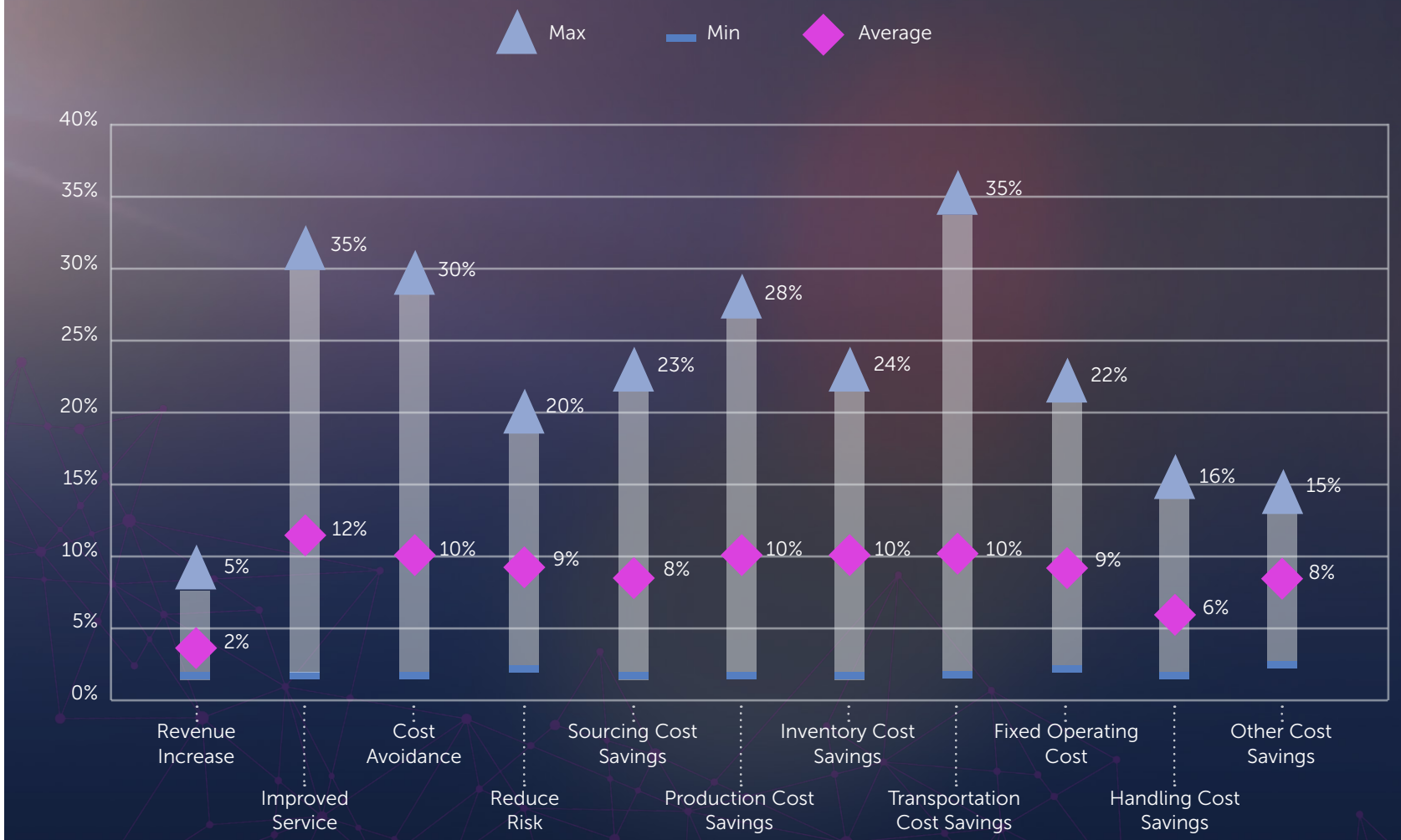
A Maturity Model to Progress to Continuous Design

The maturity progression for organizations on a continuous design journey is as follows. The model is based on the focus areas of People, Process, Technology, and Strategy.

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
	Adhoc Design	Episodic Design	Democratized Design	Synchronized Design & Planning	Dynamic Design
PEOPLE	Individual initiatives with no clear organizational mandate	A design organization exists, but the outcomes of their efforts are not broadly democratized	Democratization to the broader supply chain stakeholders with an executive	Regular participation in design and planning from the business	External partners participating in the end-to-end design, collaborating on win-win opportunities
PROCESS	Reactive analysis after a major disruption	Driven by requests from the organization with little scenario planning	Proactive and dynamic processes with scenarios accessible online	Driving supply chain policies with dynamic node, mode, and flow decisions with value	Closed loop with design changes triggered by deviation in KPIs
TECHNOLOGY	Offline, spreadsheet-driven analytics	Increased competence in optimization and AI, yet still largely offline	Defined governance & standards with an end-to-end data model and technology	Mature end-to-end digital twin in place	External value chain participation within the digital twin
STRATEGY	Retrospective view of the supply chain	Some adoption of the recommendations, mostly offline	Some integration into planning & execution systems	Executive decision-making based on design principles	Continuous design, fully integrating the strategic, tactical, and operational horizons

Value Delivered by Continuous Design

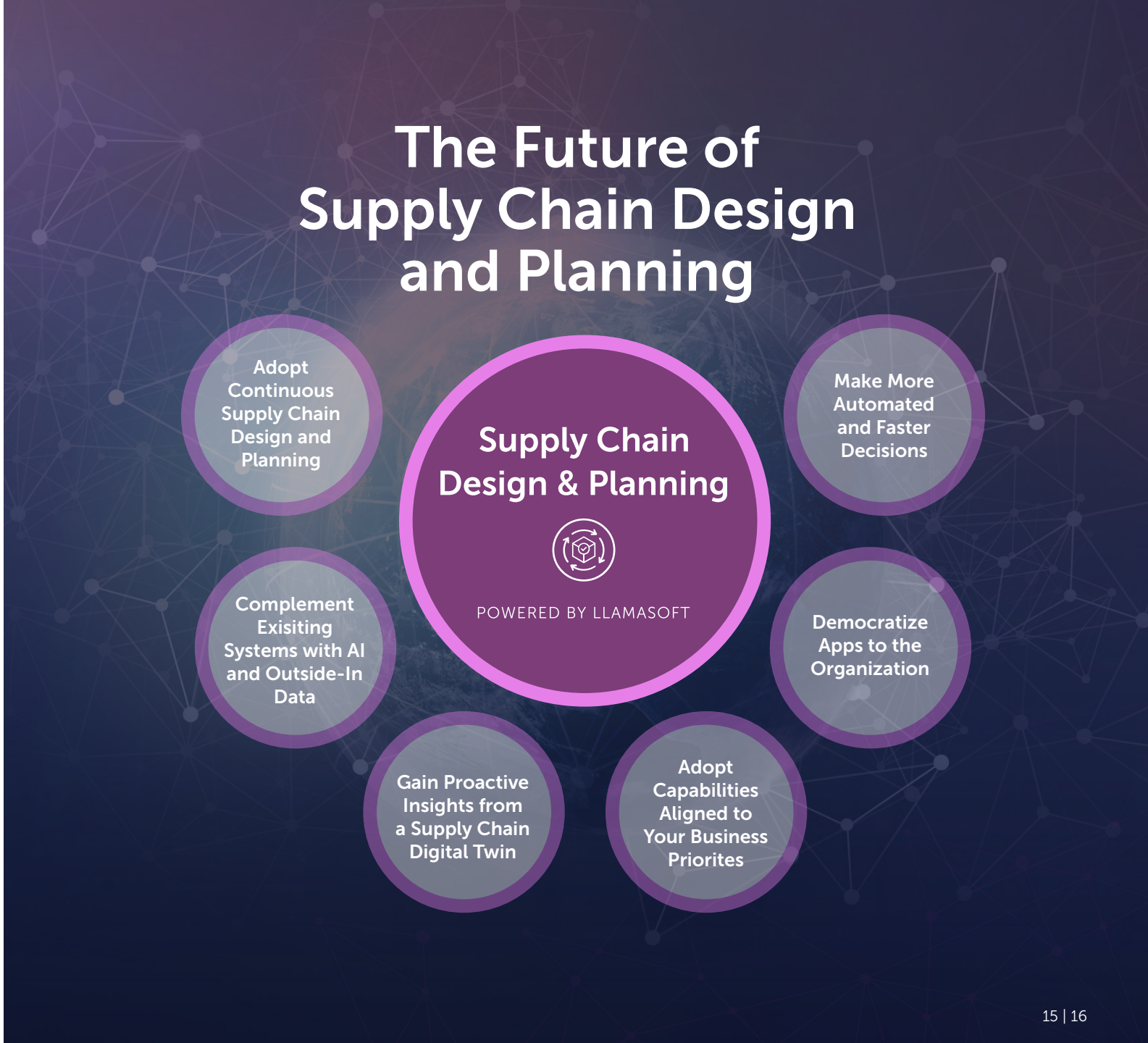
Organizations that embrace the vision of the continuous supply chain design paradigm enjoy outsized financial and operational benefits as measured across a large number of engagements. The minimum, average, and maximum value is captured in the below diagram.



There is clear evidence that companies that implement digital technologies, fueled with new data sources to test, learn, and adapt rapidly, can outpace their competitors. McKinsey notes resiliency[7] isn't just about dealing with the challenges and issues of the day; it's about using a culture of technology and digital tools that enable them to be ready for the challenges that are yet to come.

Adapting through continuous design is the new competitive advantage. By reducing functional and data silos, creating an environment for constant learning, and using a supply chain digital twin, organizations can move from episodic one-off design reviews to a state of continuous design. When supply chains are designed to adapt and evolve, organizations are prepared to make tradeoffs, optimize policies, simulate situations, and accelerate the time between making and executing decisions. This builds resiliency and enables the supply chain to respond to whatever disruption is on the horizon.

7 The Need for Resiliency, McKinsey, February 9, 2021



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