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From visibility to value

Applying a supply chain control tower to help enable resilient customer-centric supply networks

More than ever, companies today—especially with ongoing challenges from COVID-19—recognize how critical supply network visibility and resiliency are to managing through disruptions and balancing supply and demand.

In the quest for visibility and greater customer centricity, more companies have implemented or are considering rolling out a supply chain control tower (SCCT). Here's the problem: SCCTs, as many companies define them, often fall short of delivering the full value needed to win in today's environment. Yes, a control tower does provide visibility. But a true SCCT does so much more.

Take GE Appliances, for example. While dealing with global supply shortages and increasing customer demand due to the pandemic, the appliance maker capitalized on the opportunity to accelerate its digital supply chain capabilities. By taking advantage of control tower capabilities and new ways of working, GE Appliances was able to reduce order backlogs through real-time tracking of goods from manufacturing plants to distribution centers, and leveraging machine learning to improve allocations for products with limited supply. In GE Appliances case, value was not achieved through visibility alone, but through the orchestration of intelligent response and execution throughout the supply chain.[1]

The control tower GE Appliances implemented embodies the capabilities of true SCCTs. True SCCTs can provide improved visibility, scenario modeling, and intelligent execution that help make supply networks more customer-centric, sustainable, responsive, and agile. They can help companies continuously anticipate and predict market changes and associated risks across the supply network. They can help enable supply chains to deeply understand customers; anticipate and shape their short- and long-term needs; and engage each customer or customer segment with personalized service levels and experiences. They can help grow trust in the brand by providing supply network transparency and traceability all the way to the consumer. And they help companies continually drive toward more-autonomous operations. In fact, in a recent survey, 72% of supply chain "masters" believe such control tower capabilities will be critical to enable their customer experience-led growth.[2]

What is an SCCT?

An SCCT is far more than a traditional control tower. It includes people, processes, new ways of working, technology infrastructure, and data that, combined, can help enable a company to proactively orchestrate across their supply chain functions and broader supply networks to help increase enterprise value. For example, an SCCT uses a digital twin with intelligent agents to proactively identify disruptions within a near-term execution window. (Digital twins enable greater enterprise-wide agility, according to 87% of supply chain executives.)[3] An SCCT also employs advanced computing to intelligently prioritize and respond to exceptions across the company's operations. It incorporates cross-functional, continuously evolving capabilities and organizational structures that span the supply network to help deliver against key goals and metrics. And it can help provide a digital thread to connect data across the value chain to enable new ways of working and business outcomes.

The control tower evolution: From end-to-end visibility to autonomous execution, supporting new ways of working and driving new business outcomes across the supply network to help increase enterprise value.

An SCCT comprises four pillars

1 **Use Case-Driven Capabilities**

An SCCT isn't just a "plug-and-play" technology solution. It requires companies to identify specific use cases that will translate into business value. These use cases will be enabled by the control tower capabilities of visibility, predictive alerts, digital twin scenario modeling, and automated operational execution which, combined, allow the SCCT to predict and respond quickly while optimizing the execution of the supply network.

Visibility and performance management
- KPI dashboards
- Near real-time data
- Search and report

Predictive alerts
- Business rules-based logic
- Alerts with severity levels
- Key performance "predictors"

Rapid response
- Optimization analytics
- Simulations-"What if?" scenarios
- Root cause analysis

Optimization and E2E orchestration
- Deploying information and action plans
- Execution compliance
- Collaborative execution

2 **New Ways of Working**

An SCCT transforms the existing supply chain operation and broader supply network, which will drive changes to existing organizational processes and roles to run it. For example, an SCCT will require new roles that balance cross-functional and cross-entity tradeoffs, improve automation algorithms, and integrate predictive modeling with operational execution. And by driving greater collaboration, an SCCT also requires new customer-centric performance metrics and processes that can help create better benefits for the entire network.

AI/Robots   Human   Adaptive

Cross-functional ownership and KPIs
- Cost to serve
- Perfect order
- Net promoter score
- ESG performance (environmental, social, governance)
- Order cycle times

3 Flexible Technology Architecture

An SCCT is built on decoupled cloud-based system architectures, which are critical for the SCCT to expand to additional entities and functional use cases as business needs dictate and technology capability in the market matures.
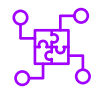
Collaboration platform
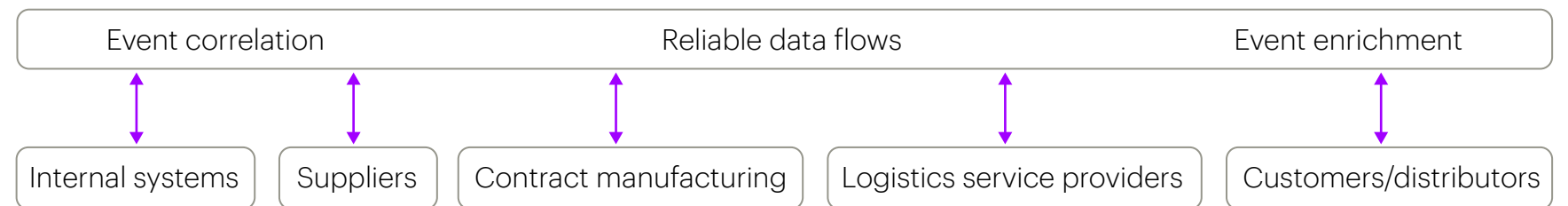
Robust data ingestion and integrity

Digital decoupling architecture

Real-time and high-throughput SCCT

4 Robust Data Strategy and Governance

Every organization needs timely and accurate data. That's especially true as more companies embrace automation, which requires extremely high-quality data to deliver equally high-quality operational results. One of the key advantages of an SCCT is its ability to harvest, ingest, and process a wide range of structured and non-structured data, from both within and outside a company.

Event correlation		Reliable data flows		Event enrichment
Internal systems	Suppliers	Contract manufacturing	Logistics service providers	Customers/distributors

Let's look at these four pillars in more detail.

1 **Use Case-Driven Capabilities**

A common starting point for companies when implementing an SCCT is to strive for visibility across the supply network. But that's where most companies stop, which is why they won't get the value they hoped for. Why? Because end-to-end visibility itself isn't enough. While visibility is certainly a key control tower capability, an SCCT's value comes from taking action based on that enhanced visibility. This could mean, for instance, using Artificial Intelligence/Machine Learning (AI/ML) capabilities to raise alerts and response actions, moving toward orchestrated remediation that streamlines manual tasks and automates wherever possible to more efficiently execute complex processes. Or it could mean going beyond providing real-time shipment visibility to proactively identify delays, prioritize shipments based on their customer or inventory impact, evaluate options like expediting or alternative sourcing, and automating the execution of the selected action.

Importantly, at the outset, a company should define a roadmap based on how the SCCT will use visibility, alerts, rapid response, and improved execution to solve cross-functional, use case-driven problems. In fact, we find the difference between a favorable outcome and a non-favorable one with a control tower implementation depends on the level

of upfront work to identify, define, and value the use cases and overall vision. These use cases should be driven by the business and clearly structured to help deliver a strategic business outcome. For example, one company may have a service issue due to raw material constraints and, hence, may want to start with a use case around supplier collaboration. Another company may struggle with on-time in-full (OTIF) performance and, therefore, may choose to begin with logistics visibility. Whatever the situation, the use cases should explicitly articulate:

- What visibility is needed (e.g., raw material purchase orders)
- Which predictive KPIs will be tracked (e.g., raw material OTIF)

- What leading indicators will be monitored to generate alerts (e.g., raw material inventory stockout risk)
- What response scenarios should be evaluated (e.g., alternate sourcing or production order push out)
- What actions those could trigger (e.g., purchase order changes in the ERP)

Having a full-scope roadmap defined by value-led use cases can allow companies to shift their focus from visibility, for the sake of visibility, to creating a new improved and autonomous supply chain operational capability. It also allows companies to consider applying the control tower across the entire value chain, not just certain functional areas—the latter of which has been the focus of most traditional control towers.

2 New Ways of Working

Traditionally, supply chains have been organized and operated in a linear model with roles such as planners, production schedulers, deployment planners, inventory managers, and logistics and manufacturing managers. It's only at leadership levels that roles look across the whole value chain to manage any trade-offs between functions to help deliver an excellent customer experience.

This leads to decision-making that emphasizes functional improvement at the expense of value chain excellence. For example, the manufacturing group might decide to freeze production batches to help enhance efficiency. But what if there's an urgent need to meet customer demands for a different product? No role exists that could evaluate the trade-off on a day-to-day basis and decide to do production changeovers to maximize customer service in favor of efficiency. This collaboration has historically been solved with S&OP processes, but these processes typically are too slow.

An SCCT breaks from this traditional model by bringing a new "network planner" role that spans functional siloes and focuses on customer, product, or market. On a day-to-day basis, the network planner has the visibility and authority to make trade-off decisions that can result in a superior customer

experience and sustainable business value—even if it negatively affects certain functional KPIs and performance drivers. In addition to potentially new roles, an SCCT often requires new skills. For example, the supply chain workforce has to be skilled in digital and analytics so their job can become more exception-driven and managed through a well-defined governance model. Supply chain professionals must be able to work effectively alongside AI, ML, and robotic process automation to help increase the SCCT's overall business impact, efficiencies, and speed. In fact, this combination of cross-functional knowledge plus advanced analytics skills to "tweak" the engines to solve segmented goals can be a key SCCT success factor.

Finally, the operational evolution needs to cohesively cover workforce, technology, and process. The right technologies must be directly embedded within the process. At the same time, the workforce, which includes both human and machine talent, must fully leverage that technology. Additionally, the full SCCT should be outcome-oriented, targeting adherence to and improvement of both Key Performance Indicators (KPIs) and Key Performance Predictors (KPPs), perhaps against benchmarks.

3 Flexible Technology Architecture

It's a fact of life: Just as businesses change, so do technology landscapes in the market. New capabilities will arise that can drive business value; unanticipated disruptions can upend operations; and competitor moves and challenges can create unforeseen opportunities. Because of this, an SCCT isn't a plug-and-play capability. It needs a dedicated technology framework, which is not a company's ERP or planning tool (Figure 1). To evolve over time with the business, an SCCT needs to be built on a flexible architecture of decoupled systems, which can help enable it to easily scale to additional entities and use cases, and shift as business needs change.

This flexible architecture is defined by a number of distinct components:
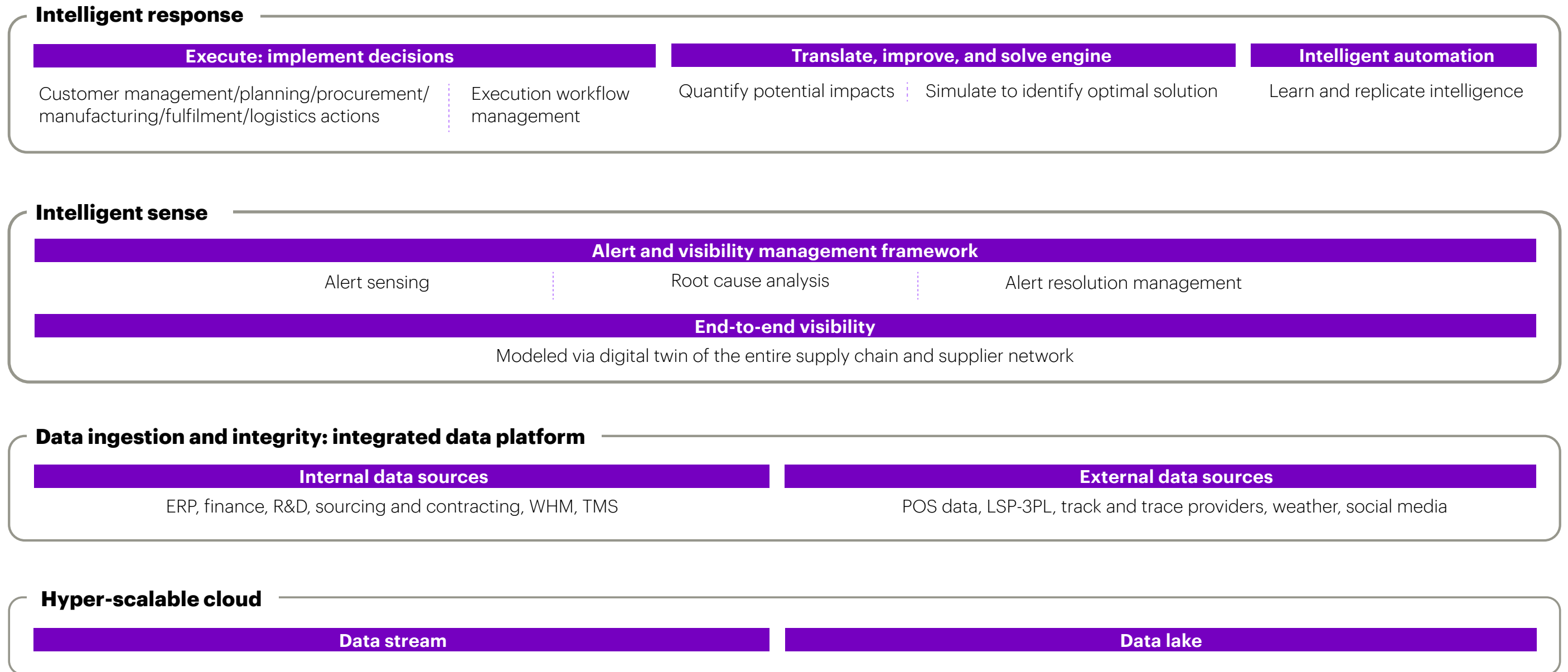
• **A data stream and data lake** to capture real-time data on a hyper-scalable cloud platform that provides the foundation for the control tower's agile evolution over time and reduces inter-dependencies.

• A **robust data ingestion and integrity layer**, which is a centralized platform that captures data from multiple sources and helps ensure data consistency.

• A framework that provides true **visibility and alerts** across internal and external supply networks to provide early warning and time to respond.

• Intelligent **rapid response engine** that analyzes changes, assesses impacts, and uses scenario modeling and advanced analytics to help create improved responses.

• Intelligent **automation** that coordinates execution of decisions across the operational landscape: Planning, Order Management, Manufacturing, Logistics and Distribution, Inventory Management, and Sourcing.

Because these capabilities will continue to evolve over time, a company must be able to continuously and quickly take advantage of fast-maturing solutions in the market. This is a very different model and mindset from the historical enterprise solution deployments of the past decades, which relied on long implementation timelines.

Figure 1: An SCCT's flexible, dedicated technical architecture

Intelligent response

Execute: implement decisions		Translate, improve, and solve engine		Intelligent automation
Customer management/planning/procurement/ manufacturing/fulfilment/logistics actions	Execution workflow management	Quantify potential impacts	Simulate to identify optimal solution	Learn and replicate intelligence

Intelligent sense

Alert and visibility management framework		
Alert sensing	Root cause analysis	Alert resolution management

End-to-end visibility
Modeled via digital twin of the entire supply chain and supplier network

Data ingestion and integrity: integrated data platform

Internal data sources	External data sources
ERP, finance, R&D, sourcing and contracting, WHM, TMS	POS data, LSP-3PL, track and trace providers, weather, social media

Hyper-scalable cloud

Data stream	Data lake

4 Robust Data Strategy and Governance

One reason companies often struggle to make progress on their control tower journeys is because they're obsessed with getting "perfect" data, which never comes. An SCCT is highly adept at ingesting, transforming, and working with less-than-perfect data while highlighting data quality issues and directing efforts to improve data integrity—with a focus on the critical data required for different decisions. For example, when setting up a logistics-focused control tower, a high-tech company quickly uncovered issues with carrier data and lead times. But the control tower also helped the company prioritize which carriers and lanes to focus on to enable the control tower's ongoing evolution. Thus, a robust data strategy is critical.

Data strategy helps to ensure that the architecture can serve the overall goals of the business. It should define what, where, and how data—both structured and unstructured, and internal and external—will be sourced, normalized, and integrated with downstream systems and into the SCCT. Data migration methods, data quality and governance, and data security are also key elements of an SCCT's data foundation.
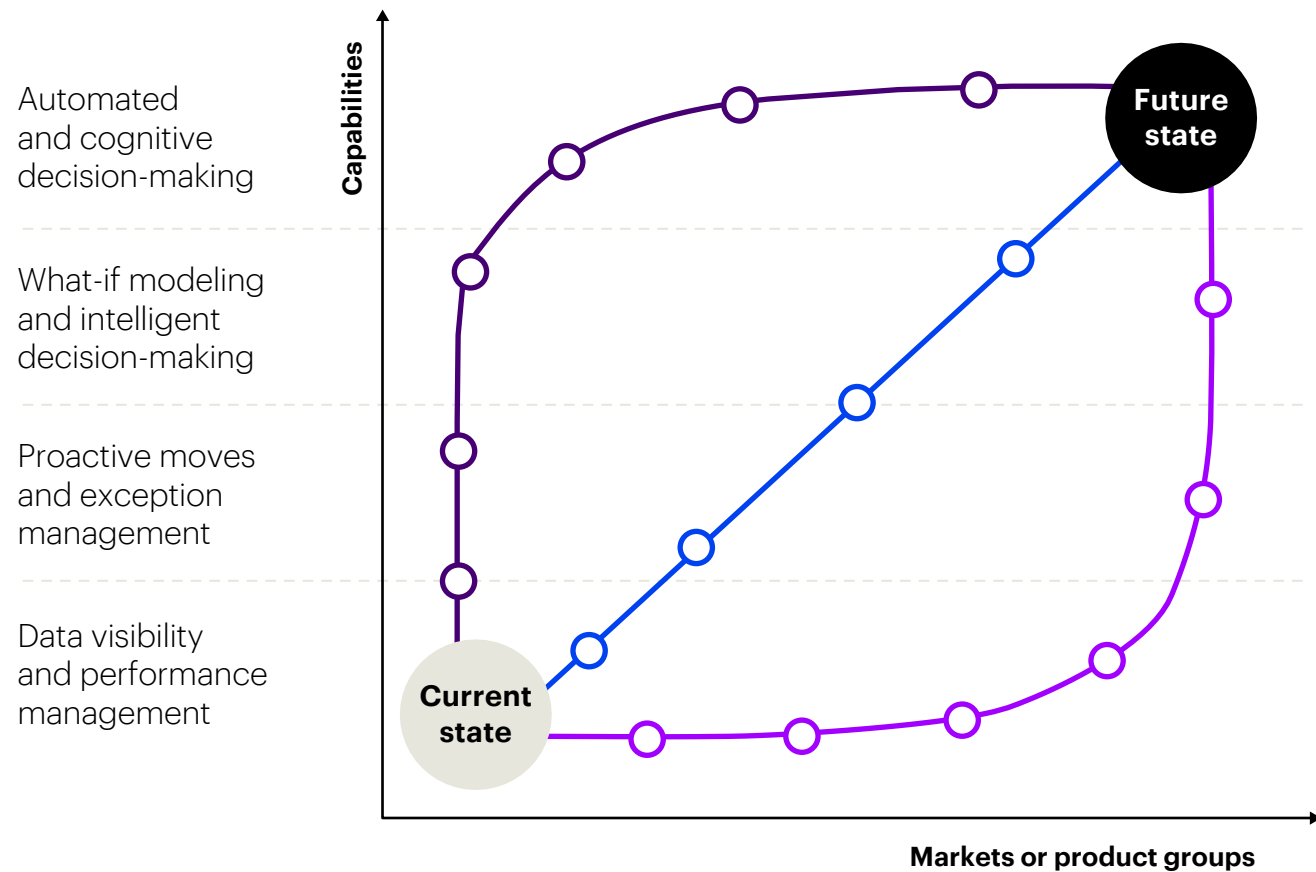
Rolling Out an SCCT

A Hybrid Approach

When implementing traditional control towers, companies often struggle to define an implementation approach that generates anticipated benefits or shows progress quickly. They spend too much time and money building a visibility-focused control tower that doesn't deliver actionable insights. That's usually because the visibility is too broad or high level to make a big impact, or there's too much visibility and it isn't filtered or prioritized for alerts and actions. In other cases, companies can get bogged down in the quest for perfect data. Often, they start by building a functional control tower, typically in logistics or planning. Doing so can improve the target function's performance, but it often comes at the expense of other functions' KPIs (for example, lower labor costs in warehousing versus lower trailer utilization and increased dwell time/detention).

Because an SCCT is use case-driven, it's highly modular and is typically implemented through agile sprints of use cases. However, multiple implementation options exist, depending on the goal. For example, is it to enable all SCCT capabilities for a specific use case (e.g., a functional control tower)? Or is it to build one capability across multiple use cases (e.g., a visibility control tower)? Leading companies often follow a hybrid approach based on business use cases and building capabilities over time (Figure 2). The hybrid approach builds scale (across markets and product groups) while adding depth (in terms of visibility, alerts, and response)—one release at a time. This approach, grounded in agile principles, can help generate value quickly while gradually strengthening and expanding the organization's capabilities.

Figure 2: A hybrid approach to an SCCT implementation

Automated and cognitive decision-making

What-if modeling and intelligent decision-making

Proactive moves and exception management

Data visibility and performance management

Capabilities

Future state

Current state

Markets or product groups

Option 1:

Build E2E SCCT for one market/product group. Once capabilities are completed, expand to additional markets and/or products

Option 2:

Build foundational data visibility across all markets/product groups. Once visibility is established, develop additional E2E SCCT capabilities

Option 3:   **Recommended**

Hybrid approach based on business use case to evolve capabilities

Process overview

Start with specific use cases and scale to other markets to build capabilities to generate value

Extend use case-driven capabilities to help develop fully mature capabilities

Roll out capabilities to all markets and products to help achieve future-state vision

Future-state vision

The Payoff

Lower costs, higher revenue, greater efficiency, and improved sustainability

A use case-driven, flexibly architected, and hybrid approach to an SCCT can deliver so much more value than the control tower concepts that have been rolled out or attempted for years.

In our experience, companies that have adopted SCCTs have realized significant quantitative and qualitative benefits (Figure 3). On the quantitative side, SCCTs can help reduce operating costs substantially, boost revenue, and increase operational efficiency—in some cases by up to 10 to 15 percent.

They also can help companies meet investors' growing sustainability and net-zero demands through financially material environmental, social and governance (ESG) improvements. SCCTs can help enable companies to quantitatively reduce their GHG footprint across the supply network by helping to boost top-selling product availability, reducing emergency orders, improving vehicle and modality utilization, and improving last-mile deliveries and fuel use.

On the qualitative side, one significant benefit of an SCCT is that it can quickly help align everyone to a single source of truth, helping enable all users to make decisions from the right, complete, up-to-date, cross-silo data. Integration of more real-time data points allows for in-the-moment and proactive decision-making and the ability to look at Key Performance Predictors (KPPs) rather than historical indicators.

Companies also can understand end-to-end supply network performance from both a financial and sustainability perspective, including ESG factors. And advanced scenario modeling and improvement capabilities can rapidly iterate potential mitigation actions to help improve financial and customer service decisions. This fundamentally breaks from the traditional weekly/monthly/quarterly cycles of historical S&OP processes in favor of a more real-time model which, in itself, can be a competitive differentiator.

The SCCT also supports a customer-centric supply network by facilitating enhanced collaboration with customers. Customers can gain advanced visibility into potential delays or collaborate with the company on unanticipated demand spikes. At the same time, companies can use the intelligence the SCCT gathers to proactively identify value-adding propositions that could benefit the customer—such as determining ways to better align production and shipments to the customer's warehouses to even out replenishment flows or hyper-personalizing the customer experience.

Finally, the SCCT's intelligence can help companies uncover opportunities for greater efficiency and lower costs, as well as ways to evolve supply based on learnings from past events and responses.

Become a data-driven enterprise

- Drives improvement in data quality, consistency and governance
- Better decisions
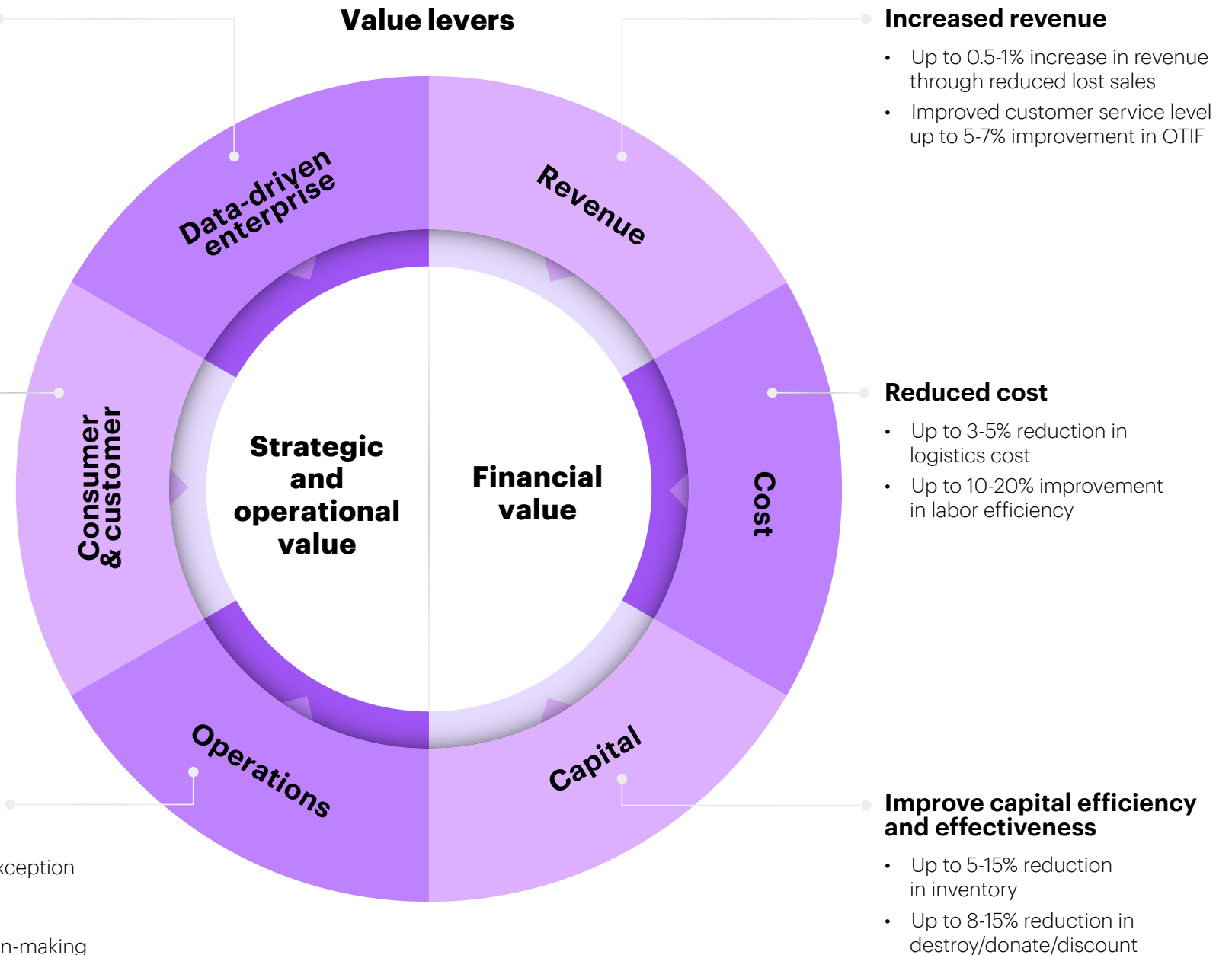- Establishes data science capability

Win over customers and consumers

- Improved service level and satisfaction
- Traceability of products and materials
- Visibility to environmental, health, safety and sustainability product information

Run efficient, scalable and agile operations

- Shift to management by exception
- Predictive risk mitigation
- Increased automation
- Improved speed of decision-making
- Enables cross-functional integration
- Improved asset utilization

Value levers

Data-driven enterprise

Revenue

Consumer & customer

Cost

Operations

Capital

Strategic and operational value

Financial value

Increased revenue

- Up to 0.5-1% increase in revenue through reduced lost sales
- Improved customer service level up to 5-7% improvement in OTIF

Reduced cost

- Up to 3-5% reduction in logistics cost
- Up to 10-20% improvement in labor efficiency

Improve capital efficiency and effectiveness

- Up to 5-15% reduction in inventory
- Up to 8-15% reduction in destroy/donate/discount

Conclusion

Supply chain control towers are rapidly changing how supply chains are managed. They certainly can help provide visibility into a company's operations. But they also can enable a company to act on what it's seeing. The company can use the SCCT's insights to help drive strategic business outcomes for each micro-segment of the market while gradually moving toward an improved and autonomous supply chain.

As companies find themselves increasingly relying on their supply networks to become a more customer-centric growth engine, an SCCT has become a fundamental, "must-have" capability. It's what companies need to thrive and survive in an era of evolving consumer expectations, availability of new disruptive technologies, and the growth of new business models.
It's a new way to manage the supply network to orchestrate change, deliver outstanding customer experiences, and positively impact business, society, and the planet. And it's long overdue.

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2. Blog - A control tower that delivers both insight and action

3. The New Essential for Supply Chains: Intelligent Execution Control Tower Part I - Supply Chain Management Review (scmr.com)

4. The New Essential for Supply Chains: Intelligent Execution Control Tower Part II - Supply Chain Management Review (scmr.com)

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