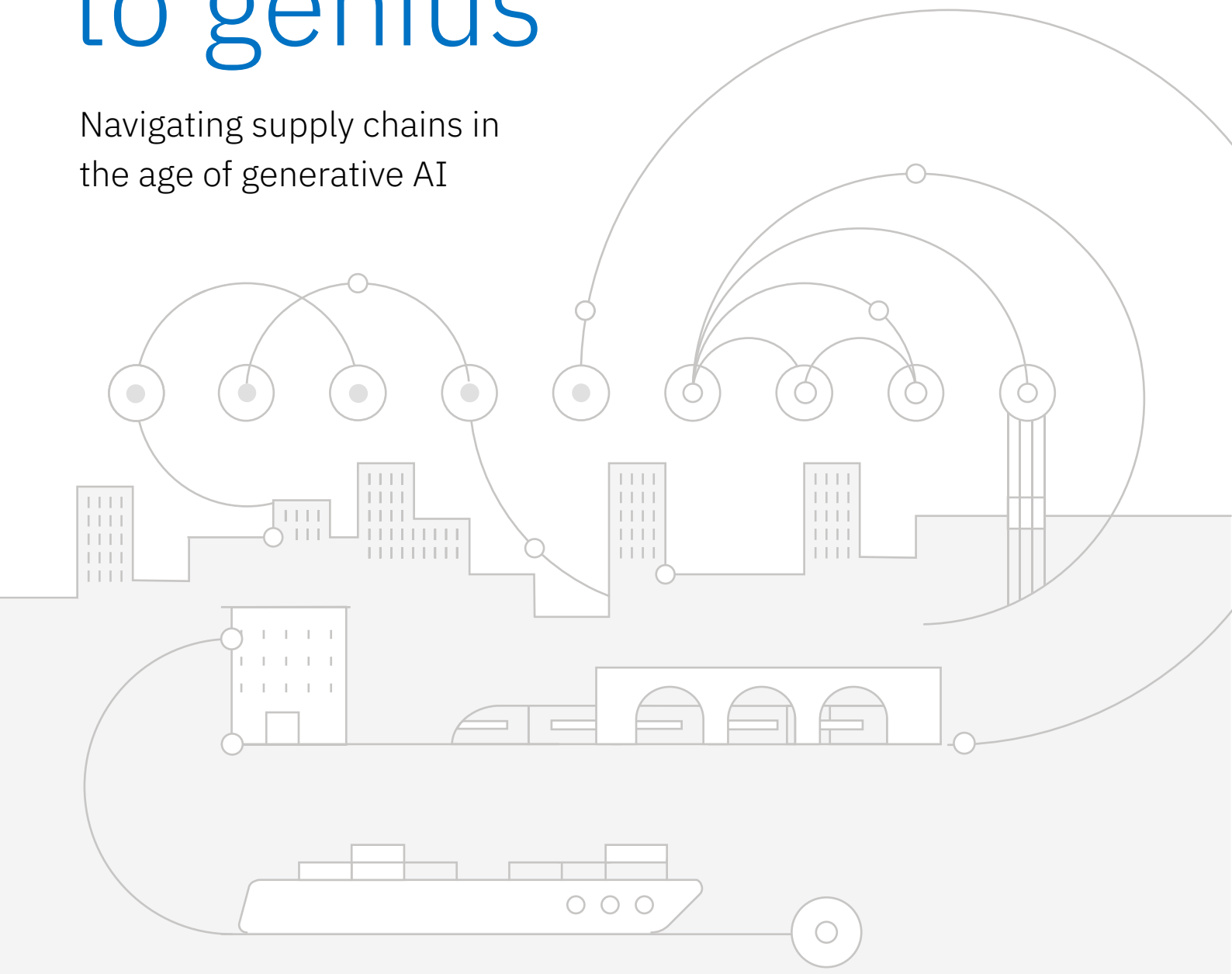
IBM Think Circle for Supply Chain Compendium

From smart to genius

Navigating supply chains in the age of generative AI



IBM **Institute for Business Value**

About Think Circles

The IBM Institute for Business Value has been convening a coalition of changemakers—C-suite executives—to engage in active sharing and collaboration to solve their biggest global challenges.

Foreword

In late 2020, the IBM Think Circle for Supply Chains launched, virtually congregating an elite and innovative group of the most senior supply chain executives across industries and geos, and from Fortune 500 companies. The mission was set. Meeting quarterly for the past three years, these forward thinkers come together to discuss the world's most pressing supply chain disruptions and develop strategies and solutions to best address the issues and opportunities.

Their discussion topics have evolved as time has produced more challenges that were perhaps not even imaginable in the early days of the global pandemic. Over the same period, the very rapid advancement of technologies such as generative artificial intelligence (AI), intelligent automation, and quantum computing have opened up vast opportunities to become more agile and resilient. More specifically: resiliency and agility in operating models, productivity of the digital and physical workforce, advancements in automation, and now generative AI impact every supply chain touchpoint, query, and experience. All of these have been top of mind and the focus of dialogues during the meetings.

The Think Circle has networked, collaborated, shared concerns, and expressed optimism for the future. But maybe even more importantly, they have collectively developed and shared solutions and innovations—drawing upon the uniqueness of each industry and a wealth of years of supply chain executive experience.

In this collection of discernments from Think Circles for Supply Chain—with direct quotes from the Thinkers—we proudly share with you these incredible insights and a future outlook into the supply chains of tomorrow.

Jonathan Wright
Global Managing Partner,
Finance and Supply Chain
Transformation
IBM Consulting

Rob Cushman
Worldwide Leader,
Supply Chain Operations
IBM Consulting

Cindy Anderson
Global Executive,
Thought Leadership
Engagement & Eminence,
IBM Institute for Business Value
IBM Consulting

Karen Butner
Global Research Leader,
Supply Chain, AI & Automation,
IBM Institute for Business Value
IBM Consulting

Contents

The wake-up call

This decade has changed everything for global supply chains. COVID-19, ever-evolving technology, geopolitics, global warming, and conflict zones, to name a few, have all converged, pressuring supply chains to an unprecedented extent.

These headwinds have certainly created challenges, but they have also opened up opportunities for supply chain leaders to play a more strategic role in their organizations. And these headwinds have created new tailwinds—solutions and opportunities such as nationalization, reshoring, and localization. Additionally, extreme advancements in technology, such as automation, cloud, and generative AI, as well as consumers and employees with high expectations, have all had an impact.

“COVID was a punch in the mouth”

“The perfect storm created the perfect wake-up call.”

Thinkers pondered how to orchestrate a great supply chain experience—one that will be adaptable enough for a disruptive future and still meet the most immediate needs of customers, employees, shareholders, and society.

“In the past, we’ve been motivated to play defense. AI and data now push us to play offense, move out of our comfort zones, and see signals that look ahead and are surgical in their precision.”

“The pandemic and subsequent events also opened a ‘seat at the table’ in the executive suite for supply chain leaders, creating an opportunity to support greater customer, workforce, and ecosystem partner experiences—and with that, contribute directly to enterprise value and success.”

“Supply chain management has moved from just-in-time to just-in-case.”

“We must shift our scale and balance—data can help.”

Embracing the virtualization mandate 4

Making supply chain work “cool” to attract next-gen talent 4

Managing the present while investing in the future 5

Embracing the virtualization mandate

Supply chains used to be measured by perfection. Great ones will now be measured by their resilience and agility as they adapt and overcome. They will be powered by new technologies and data that capture market share through end-to-end visibility, which can be accessed from the factory floor, a delivery truck, or an AI-enabled platform dashboard. A recent benchmarking study revealed that 71% of organizations provide visibility to actual supply and demand data in real time—to a significant extent.

To enable this complete visibility, supply chains will need to be virtualized as a key ingredient of an organization's digital transformation.

Making supply chain work "cool" to attract next-gen talent

"We're shifting work from low value—moving data around—to high value—using data to make decisions."

Great supply chains require great people, ready to be measured on outcomes, with skills and talent primed for the digital future. *"Establish a goal and allow everyone to be a decision-maker."*

Tech-driven data gives us visibility and enables resilience, but the CSCO Thinkers predict that many organizations may have underestimated the people component. Having diverse teams and empowering them with the right mindset is essential.

Given that almost 40% of jobs in the US alone are supply chain related, there is voracious demand for talent—diverse talent.

"You can have the best tools on the planet but if you don't have the right people to operate or interpret them, you'll have a hard time."

"If you don't have a diverse workforce, it's impossible to manage the complexity of supply chain disruption. No one person can connect all of the dots."

"Our biggest challenge is keeping our people motivated and running."

"Leaders will tell you they don't have enough people, but when you look across the organization in specific roles, there are plenty of people, but they're in the wrong spot or in the wrong role. We have to reevaluate our org structure and create different models."

"If we can give people the ability to make quick decisions and look at coming out of this crisis, we can all be stronger to set up the future. We need to make sure our strategy is in place to know where we're going."

The CSCO Thinkers agreed that speed and flexibility are critical components to enabling quick reaction and response as well as facilitating fast innovation for the future. But they debated how to define and measure agility in a way that matters most to their organizations.

"It's important to apply agility and speed to the places in your supply chain where it matters. We can't do everything fast, so we focus on the things that matter to our brand to do those things well at speed and scale."

"I think we've spent 100% of calories on better decision-making cycles .... But we also need to focus on ability to act ... the flexibility to act quickly is difficult."

"We need to empower decision-making and help ensure that people feel a connection to what we are doing. Through that connection to purpose and empowerment, we can drive decisions outside of the hierarchy."

"We're not only aligning the culture to decisions and sensing and responding but also spending time to improve the organization's ability to act."

Data-driven workflows create value by reimagining the way work is done, adding AI and automation to everyday tasks, insights, responses, and actions.

"Digital happens between the ears."

Managing the present while investing in the future

With years of pandemic pressures behind them, Thinkers are considering the role of technology as they envision a supply chain model that can operate efficiently while withstanding the strain of future global stressors.

"The technology infrastructure components are a big barrier when you look at all the data that we need to manage in the future. Edge computing will be important, but the infrastructure will need to shift to manage that."

"We believe that integration will give way to federation because the broader supply chain will not be under our control. What does that mean for the future? Is there technology that makes that easier?"

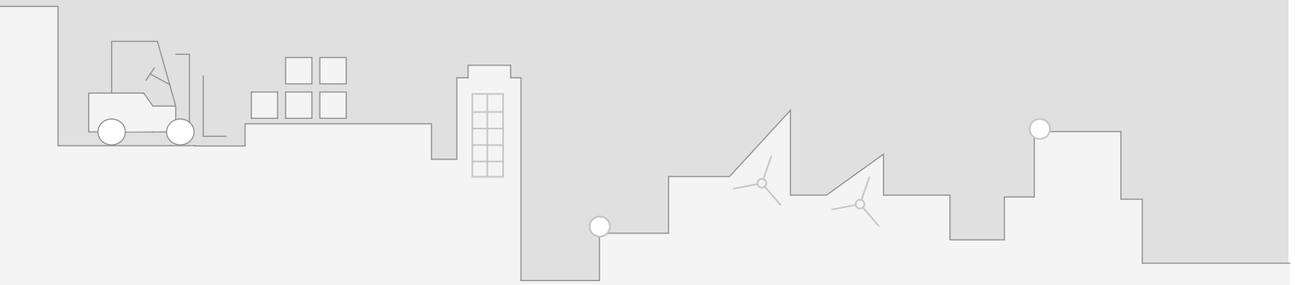
"Technologies coming—edge, cloud, quantum— how do they fit in?"

A closing word:

“Next”

What’s next? Supply chain has emerged from the shadows, and these new CSCO celebrities know the world is looking to them to lead us to what’s next.

“Manage the present; shape the future. We live in both camps. Digital transformation will ignite and will help.”



The pursuit of resiliency

“This is just a day in the life: disruptions across the world. We must know this is our world and plan and operate within it.”

“Will we have an ability to be agile and fast enough to address the many pressures we are under? I think we will, and I see hope, but it is long and slow.”

At one IBM CSCO Think Circle, supply chain executives discussed how they are rethinking, rebalancing, and reinventing their supply chain operations with new agile models for their workforces, alternate supplier bases, risk management models and approaches, segmentation strategies, and the expansion of real-time demand and supply signals.

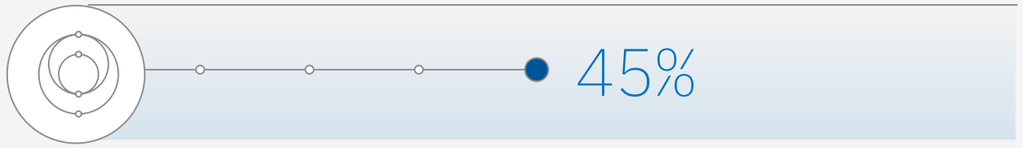
Some organizations are trying to get ahead of the curve with a two-pronged approach to running their supply chains, both driven by deeper data insights. The first prong follows a predictive model, exploiting efficiencies by using advanced analytics, data modeling, and automation to drive reliability and a frictionless customer experience. The second prong is more proactive, addressing high variability and unexpected disruption while embracing exponential technologies including AI, edge computing, digital twins, data process mining, and even initial thoughts around quantum.

With one foot in the present and the other foot in the future, CSCOs tell us that these bimodal capabilities help simultaneously provide continuity in dynamic markets while preparing for an unknown future, and they are implementing them across their entire supply chain, including tier 2, 3, and 4 suppliers to last-mile customer deliveries.

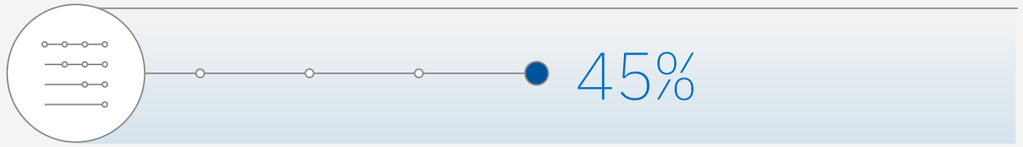
In a recent IBM IBV study, we confirmed that ongoing disruption has led to data-driven, long-term strategies for modernizing supply chains. Of the 500 CSCOs who responded to the survey, almost half are developing agile and resilient workflows and accelerating the use of automation (see Figure 1).

Figure 1

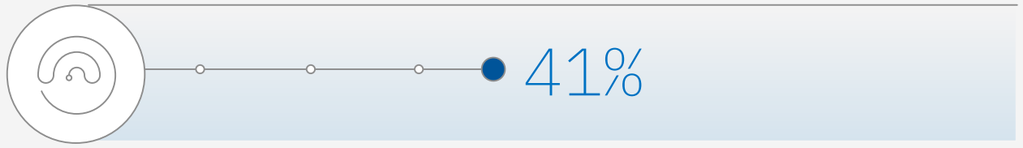
Disruption leads to modernization



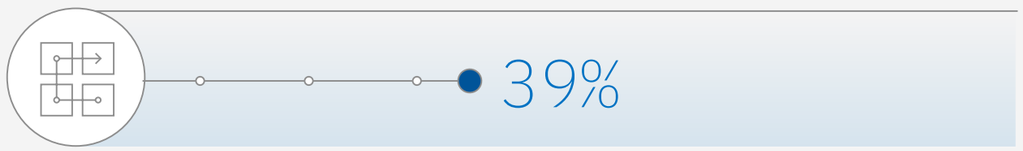
Developing agile and resilient workflows to react to escalating situations



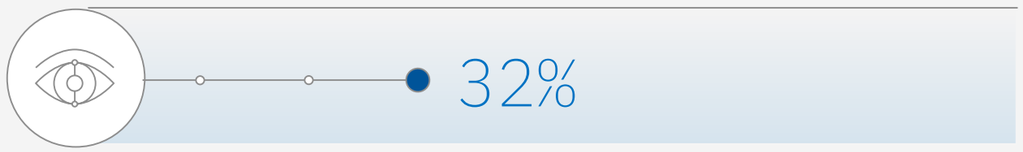
Accelerating the use of automation



Accelerating AI adoption to improve data utilization and insights



Implementing AI-enabled scenario simulation models



Increasing visibility in end-to-end supply chain workflows across their ecosystems

Q: What longer-term supply chain strategies is your organization undertaking as a result of disruptions? From a long pick list, these ranked as the highest priorities.

Getting back to reliability

Many of the Thinkers share the ongoing challenge of building more agility and flexibility into the system. However, making agility a reality by building a system, culture, mindset, and skills is difficult. CSCO Thinkers also noted that economic pressures and balancing costs are impacting their ability to re-establish reliability in the system.

"Our outputs are at an all-time high, but our service levels are at all-time lows. We have to get back to reliability. Agility means more resilience and speed to respond to disruption."

"The entire concept of agility is challenging. A major cyber-incident requires a different flex than a capacity weakness. We need to have playbooks available that if something happens, you are ready to go. Otherwise, you are just flexing existing capacity."

Many CSCOs are integrating segmentation principles across their suppliers to control risk. Parsing the supply chain by segment allows tighter collaboration with suppliers and service providers who boast differentiated skills and capabilities. Most of the supply chain Thinkers expressed a focus on often playing catch-up in capacity, and the importance of segmentation to deliver service levels where they are most needed. Thinkers discussed the active segmentation strategies they are putting in place to help ensure those needing service are getting the inventory first.

"When supply chains flex, it is important to know capacity without impacting service level. We decide who to service and who to ignore. Not every customer is a good one."

"We are constantly missing the regional limitations as algorithms and demand signals are often not aware of regionality."

Automated, intelligent workflows can help CSCOs not only meet customer demands but distinguish their organizations from the competition. 70% of CSCOs agree that customers expect full transparency from the first to the last mile of the supply chain. When embedded with predictive intelligence, intelligent workflows make this visibility possible. AI-enabled automation facilitates data-supported decisions so organizations can rapidly identify, prioritize, and recommend Next Best Actions for response, action, and reaction.

This increased knowledge also offers greater insight into risks, supporting the resilience of the supply chain. In anticipation of realizing the benefits of intelligent workflows, 53% of CSCOs anticipate their digital supply chain transformation initiatives will be the most significant area of competitive advantage during this time.

As we continued discussions, the group shared different approaches to addressing supply chain stability, resilience, and visibility. One Thinker described using a control tower platform across critical product areas, data modeling in the supporting functions, as well as digital twins and gamification. Others wondered when to use digital twins.

Modeling with visualization and digital twins

The Thinkers identified visualization as one common approach to building more flexible "just-in-case" operations. Visualization can give a deeper understanding of what is occurring physically in the supply chain. Many are using digital twins as another tool for gaining the visibility they need. Digital twins offer a way to conceptualize the extended supply chain and uncover hidden bottlenecks and risks.

"Pivoting from just-in-time supply chain design to just-in-case."

"We have to get to a point where we can model scenarios to get to clarity. Digital twins and visualization are about moving toward an ability to process and model data."

"Unified Logistics Interface Platform (ULIP) is an Indian multimodal platform that will be one of the largest national digital twins in the public domain. In the next three to four years, this may revolutionize the way logistics and supply chains work in India."

"The sheer number of variables it takes to run a supply chain and the interdependence of those variables requires visualization and modeling … digital twins may surface areas that are vulnerable."

Many Thinkers use digital twins for longer-term scenario planning and "what if" analysis with the caveat that the cost of building and using digital twins may lend itself best to very specific, high-value use cases.

"Building digital twins can be very expensive. We only use this approach to solve complex problems and deliver the highest value. Our organization starts by visualizing and navigating through scenarios and gamifying the scenarios."

Others suggested using digital twins as a foundational layer to model the physical situation and simulate various assets in operation. This virtual representation of a physical object or system across its lifecycle typically uses real-time data and algorithmic techniques to enable learning and reasoning, while predictively and dynamically recalibrating the virtual and the physical to visualize complex scenarios or simulations.

AI-enabled predictability platforms

Control tower platforms, a form of large language models, create a framework for better multi-enterprise collaboration. More importantly, they provide an accessible, secure, AI-enabled hybrid cloud-based environment that unifies huge amounts of data from disparate internal and external sources.

Platforms that function as control towers give CSCOs greater visibility across the supply chain to:

- Make better, data-driven decisions to understand risk and opportunity
- Uncover opportunities to reduce costs and improve margins
- Automate workflows and increase efficiency
- Create supplier and service provider network resiliency against risk and uncertainty.

"The value of using a control tower platform is that it is more straightforward and more predictable for those areas that operate in a manner of status quo. We can manage the lifecycle of high-value materials very effectively with a control tower platform and now, with generative AI, use it to predict."

As organizations seek to achieve a faster, more predictable approach to modeling, some are turning to technologies and automation to help augment the skills of their employees.

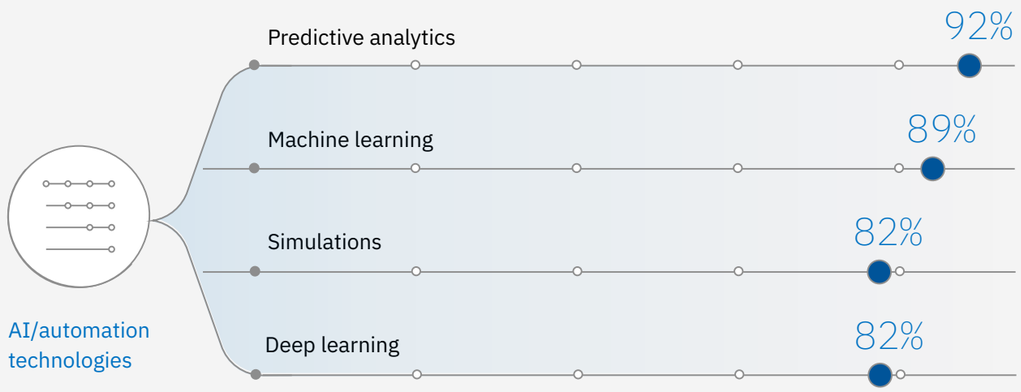
"As we assess, there is less need for traditional planners. We can automate a lot of that with AI. We need a small group of data scientists and analytics experts."

To achieve more dynamic, responsive, insight-driven supply chains, CSCOs are focused on building resilient workflows powered by automation and intelligence. A recent IBM IBV study of 500 CSCOs revealed that new technologies are accelerating and powering intelligent workflows (see Figure 2).

Figure 2

High priority

Resilient workflows powered by automation and intelligence



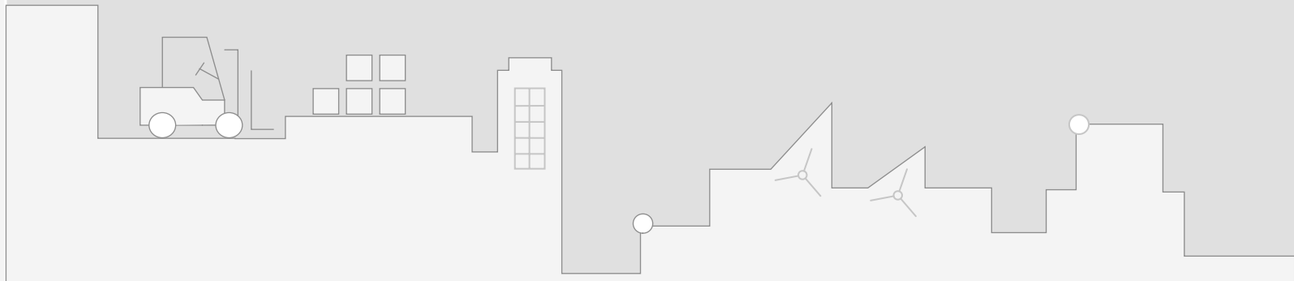
Q: On a 1-5 scale (5=to a very large extent), to what extent is your organization implementing the following technologies? Percent responding 3, 4, or 5.

A closing word:

"Options"

Moving forward, having options is essential for CSCO Thinkers. They continue to be challenged both by new threats and known issues. They are looking at various models to help them predict and prepare—including control tower platforms and digital twins—and to build reliability and resilience. And while doing so, they are incorporating sustainability and circularity practices across extended ecosystem workflows.

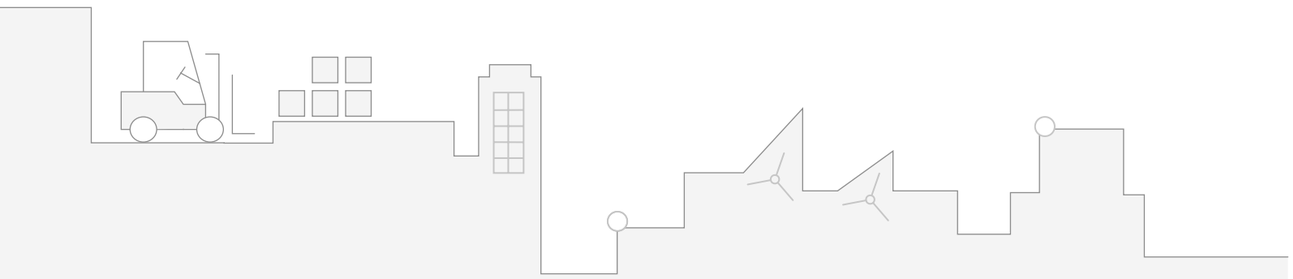
These Thinkers will continue to explore using leading technologies to support whatever happens next.



The focus on sustainability

CSCOs and executives from 12 leading organizations joined a virtual IBM Think Circle to discuss assessing social and environmental concerns against economic and financial pressures and consider the right balance of risk and reward. Thinkers heard from World Economic Forum guests who shared highlights from Davos Dialogues. This led to debate around three key topics:

- Calculating the cost equation for sustainability
- Using the circular economy as the path of impact measurement
- The cost of risk avoidance.



Calculating the cost equation for sustainability

Based on an urgent need to rebalance risks and opportunities, many organizations are adjusting their strategic approach, moving from cost competitiveness to risk competitiveness. The resulting impact for supply chains is diversified sourcing models, including localization and reshoring, combining to build risk resilience.

As sustainability initiatives are built into this equation, measurement and reporting need to align with the trade-offs of corporate and stakeholder profitability objectives.

“We are trying to balance something that isn’t sustainable. Profitable growth is in direct conflict with what we are trying to achieve … if you believe there’s a finite amount of time to fix this, the odds are you’re not going to make it.”

“The challenge is the measurement but also the money. Greener solutions are often significantly more expensive. We try to do what is possible, but we have shareholders, and we need to meet profit milestones. There is an interesting playing field unfolding.”

Many Thinkers are starting to consider operations and supply chains as the foundations of competitiveness, charged with driving growth and delivering value, rather than as cost centers. Adding sustainable practices to operational excellence and building intelligence into workflows is driving increased customer value and loyalty, along with improved employee satisfaction and retention.

As sustainability and stakeholder capitalism become C-suite imperatives, new technology-enabled business models have a critical role to play. In a recent IBM IBV research study of CSCOs and other C-suite executives, 32% of organizations cite increasing sustainable operations among their most important business priorities, and half of the organizations report they will move toward carbon neutrality within the next three years.

“Governments are not taking a strong stand mandating sustainability, so people are looking to corporations for leadership.”

This tension between cost and value combined with the acceleration of digital has forced supply chain leaders to become serial innovators—those who can link social and environmental issues with business solutions and use purpose as the great connector.

“Ambitious goals can push people to innovate. Net energy, net water, net carbon.”

“Thousands of organizations have made net-zero commitments, but not one of them has a clear pathway to achieving it. It’s not just a technology challenge; it has to be profitable, and this is a major challenge.”

“How do we find the right balance between saying and doing? Are we more interested in the ‘claim’ than the real impact? Where is the tipping point in this (sustainability) journey?”

Using the circular economy to measure impact

To the question of impact, several Thinkers are using a circular economy approach to remove the financial debate and focus on value to the customer.

"We fought a battle around sustainability versus financial objectives or customer satisfaction. Trade-offs are difficult, so we adopted circular economy principles where business value and success are tied to objectives and they're not in conflict with each other."

Customers are ready to participate in sustainability efforts, and some may even pay for it

"We are trying to do some elasticity testing around what customers are willing to pay for. We are trying build in returns process (recycling) into the offer to let our customers know we are serious about this."

"There's a long runway to decarbonization, and we think our customers' willingness to pay will move at least as fast as our ability to scale what we can offer them. Sustainably produced products are seen by customers as better and more valuable than the usual carbon emitting product. We are quite confident that a good portion of (the cost to move toward sustainable practices) will be shouldered by the customers."

Even with broad support, transitioning from a traditional linear way of working to a circular economy requires supply chain leaders to embrace a new mindset and develop an appetite for business un-usual. Embedding intelligence along the value chain requires trust, transparency, and traceability to form the building blocks for a holistic, collaborative approach to sustainability and stewardship.

"We are using a complementary environmental impact indicator that measures the environmental value retained through reuse, remanufacturing, repairing, or recycling. This extends the focus from end-of-life to the entire lifecycle."

"Our circularity program works in three ways: 1) We design products through the lens of circularity/product lifecycles. 2) We consider the customer experience and how we enable consumers for repair or recycle. 3) We define our role in creating systemic solutions, platforms, and systems that will enable circularity."

Balancing cost and risk

Balancing cost and risk in complex global supply chains with thousands of ecosystem partners would be hard enough, but these Thinkers are also incorporating environmental, social, and governance (ESG) goals to enable sustainability and circularity, even as consumers say one thing about sustainability and often do another. In some ways, the Thinkers say, the cost of risk avoidance has become more important than the cost of product development.

"The sourcing decision is no longer to decide whether to pay more or less. We've switched to considering how long it's going to take to recover the cost versus considering the cost alone."

"Total cost of ownership is not good enough anymore. We have to integrate more variables from other sides of the business into our supply chain decision-making. Even something like diversity [which] studies show impacts procurement … we should be able to model that and put it into our cost considerations."

"It's not that we don't want to invest in sustainability strategies … but when we have unprecedented cost increases on top of unprecedented cost increases, things get squeezed."

We know that convenience and pricing often drive consumer purchasing decisions, yet among Gen Z consumers, 43% say they have stopped buying certain brands due to sustainability concerns. The IBM IBV Global Consumer Study reported that 40% of consumers describe themselves as purpose-driven, seeking products and services that align with their values. Clearly, to win in this kind of market, organizations have to connect themselves and consumers to something bigger than the product itself.

"The connection between brand and sustainable supply chains is strong and growing stronger every day."

"Consumers are willing to pay a premium for ethically and sustainably created and delivered products."

"One reason why we're doing digital transformation is sustainability."

Imagining a sustainable supply chain

Looking ahead, addressing climate risk and carbon reduction targets across the supply chain ecosystem will continue to influence initiatives for these Thinkers. While they agree that preparing for a more sustainable future is the goal, they debate the value of net-zero pledges, especially when there is a significant "say-do" gap in consumer behavior. That is, consumers say they want sustainability, but few have changed their single-use consumption habits. For example, half of consumers surveyed by the IBM IBV last year said they would pay a premium for sustainability, but fewer than one in three said that sustainable products made up more than half of their last purchase.

"If you look at the whole carbon footprint of the product through its lifecycle, most of the opportunity is on the consumer side and that requires behavior change."

"We're trying to have fewer products and ingredients, use less water, energy, less waste with concentration and dilution—it takes millions of miles off the road."

"We've got to design for the environment and to reduce emissions and improve efficiency in logistics. It does come back to visualization, and understanding the carbon overlay on top of the costs and risks gives a different perspective."

"I think it comes back to purpose. If sustainability works at odds with the business, then it is a hindrance. As we've approached this, we've asked how does sustainability tie in with what we want to be. The more that we can make the supply chain goals and ambitions the same as the overall business, the better."

A closing word:

"Act"

The Thinkers called on each other to move this discussion to action. As one pointed out, the United Nations Sustainable Development Goals (SDGs) provide a roadmap that removes the tension between shareholder expectations and sustainability goals.[1]

This is a place to start.

"Sustainability is about the 17 initiatives of the United Nations, and one is eradicating poverty and hunger and building green affordable energy. These need to be worked on jointly—it isn't about sustainability versus making a living."

They agreed it is critical for this group and its peers to continue to push on educating and elevating the dialogue internally and externally to find the right balance of immediate actions that will address sustainability–and get inspired to act now.

"When it comes to sustainability and resilience, there's no time left. Organizations need to act now, with new levels of collaboration, even among competitors."

"It's insane to define targets for 40 or 50 years in the future. We can do the math; Mother Nature is going to win this fight ..."

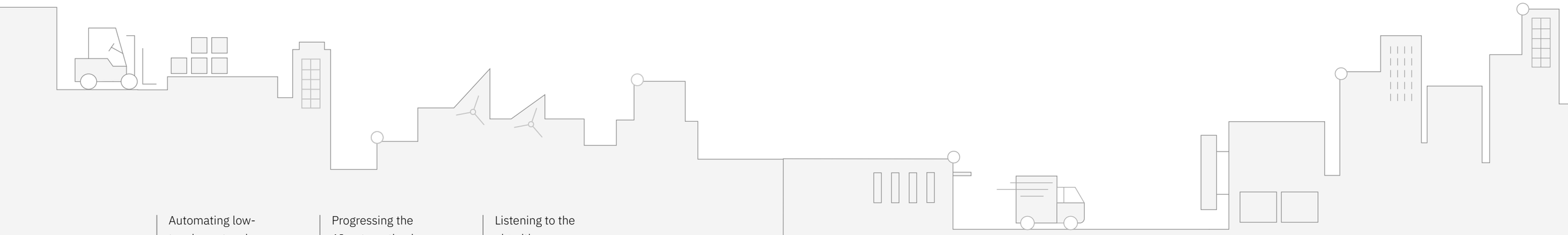
"Sustainability can be an enormous motivator to anchor the next generation of staff around a purpose—this is a different approach from our historical focus on 'greatness' that comes from shareholder value."

"A great combo is end-to-end visibility and sustainability—they go well together."

"If we get agility right, sustainability will follow, and technology is the enabler."

The span of digital intelligence

CSCOs and executives met to discuss automation and the role of robotics and workflow automation in the supply chain. The discussion underscored the importance of getting the process right first, building clear value cases, improving human experiences, driving closed-loop continuous improvement, and using AI to drive touchless intelligent workflows.



Automating low-touch, no-touch workflows

The difficulty of defining digital supply chains emerged early in the discussion. For many, the goal of moving toward low- or no-touch environments that deliver speed and efficiency should shape the definition. For example, balancing the continuity of operations—operational effectiveness—in response to a surge in customer demand.

Digital supply chains should be streamlined and optimized, using secured data for seamless any-to-any and end-to-end frictionless connectivity. They can be built to scale with embedded intelligence to predict, for example, preventative maintenance, inventory status, and dynamic logistics. Digital decisions can support rapid identification, prioritization, and recommendations for next-best actions.

When the physical meets the digital, robotics (drones, robots), robotic process automation, and intelligent workflows can drive operational velocity with low- or no-touch operations in manufacturing, distribution, transportation, and field service asset maintenance. 79% of executives whose organizations are scaling intelligent automation expect their organization to outperform the competition in revenue growth within the next three years.

“We are a very efficient ‘brick and mortar’ supply chain that requires five-to-six touch times. We want to be a no-touch, no-paper supply chain. How do I integrate robotics and AI automation into this supply chain to get to better data? Few have done this well—it is all manual intervention to get to different channels.”

Progressing the AI-automation journey

Automation for many CSCOs is a given but building a commercial operating model that demonstrates the value and upside of automation investments remains elusive to some. In many cases, hard dollar returns on automation investments are difficult to define, and because of process- and project-based approaches, the ROI is often difficult to measure in meaningful terms.

In recent IBM IBV research, we learned that CSCOs are anticipating value beyond efficiency gains when they apply intelligent automation. The top expected benefit of automation: improved customer experience. Following very closely were reduced operational costs and speed-to-response with data-driven insights. With an increased need to respond quickly to a fast-changing market, these second and third benefits will remain crucial. Improved reliability and reduced risks are important benefits that may have been undervalued in the past. But they will come to the forefront as companies address workforce dislocation, supply chain challenges, and customer service disruptions. 78% of executives agree that intelligent machines will evolve from performing just routine tasks and will render complex or even mission-critical decisions in the next three years (see Figure 3).

"Ultimately, we need to connect physical machines and devices to the decision-making process. The next generation of robots and AI assistants will do work with humans and have the ability to do work by connecting the physical world to digital tools. This will unlock insights."

"We've seen a move toward automation but also a challenge on where and how to invest. The challenge is the commercial model for the end market. Commercialization will come when we are able to turn data into information—data from the physical to inform decision-making—then we will be able to scale to receive the market benefits."

Unprecedented advances in sensor technology, computing power, and edge processing can provide robots and devices with robust AI capabilities, but this is predicated on having secure—yet flexible—connectivity and interoperability. Robots must be able to connect readily to other robots, and also with a full range of IoT, edge, cloud, and advanced analytical tools and other devices. Helpfully, AI algorithms have become more efficient, making it easier to program robots, devise innovative use cases, and reduce energy requirements.

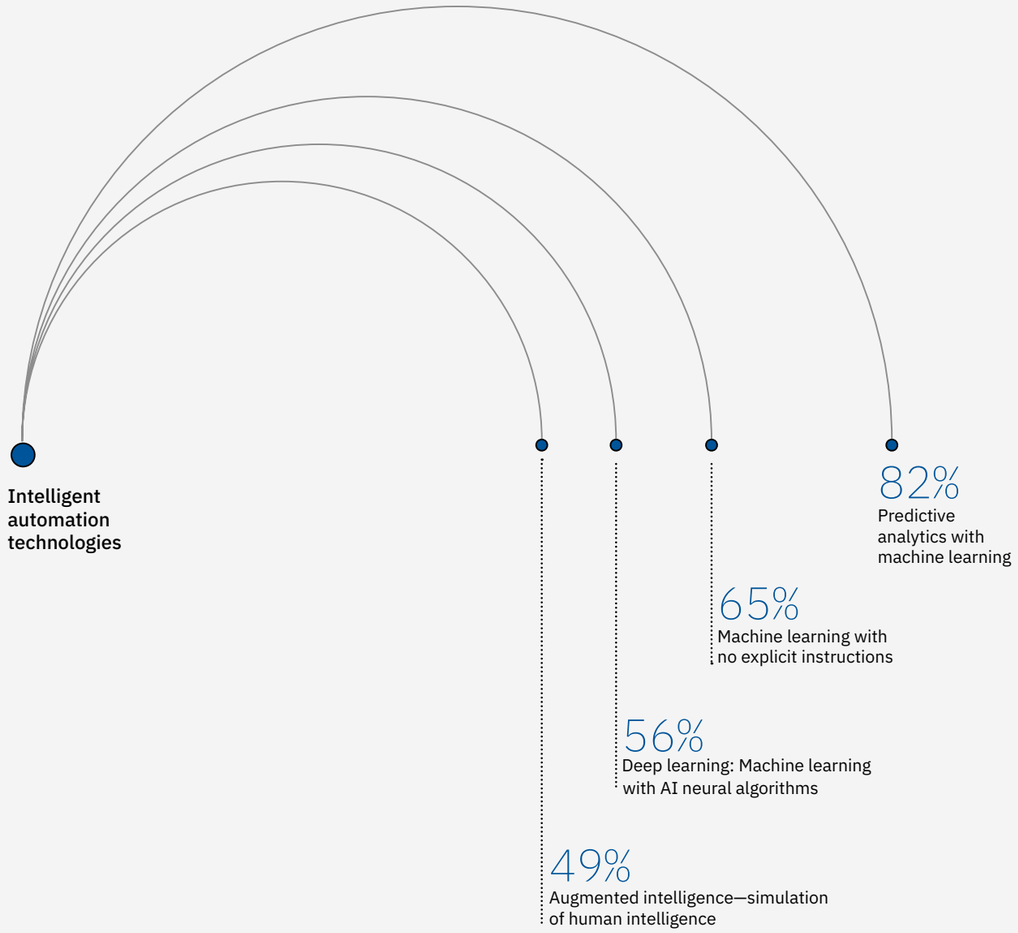
"The ability for robotics to do more than one thing is evolving and they are able to sense and adjust and adapt. We need to get to the next stage of the supply chain automation."

"We are experimenting with several models with robots and human beings, and as robots and machine learning advance with sense, comprehend, act, learn, and experience capabilities, we will need to build more fully integrated approaches."

Figure 3

Intelligent machines

From routine tasks to complex, mission-critical decisions



Q. To what extent has your organization implemented the above automation technologies?

Some Thinkers pondered how AI techniques could help identify the places within their operations where automation would have the most success. Improving visibility and transparency through the use of robots, machine learning, and increased data gathering was also an area of interest to the group.

Data-led innovation can occur at the base level of insights derived from a particular analysis of data—customer data, for example—that prompts the reshaping of a service proposition. It can be within the context of a workflow, where the continual monitoring and mining of the activities and performance within a process can highlight areas for improvement and prompt automated or human intervention. As AI is applied to these huge new universes of input, the potential for pattern recognition and workflow optimization becomes clearer.

But as data and information are the raw material of these advanced automated workflows, the value of that data is hugely dependent upon the transparency, trust, and security of the sources (enterprise internal, supply chain partner ecosystem, customer insights).

"We are using AI and translating it to shape the automation in an environment. We are letting the deep learning work on the data to tell us where it makes the most sense to insert automation and/or robotics."

"We find that AI with robotics can be used to drive more intelligent track-and-trace and visibility by having machines that are able to pull data to help improve supply chain visibility. The more intelligence and sensory capability, the more you can start to make rules and understanding."

"We are employing a lot of machine learning. The work process and steps are improving as the machine learning gets smarter and improves over time. For example, we use gamification so the machine learning tool can come out with a better schedule based on inputs. We use gamification to get it to improve every time."

Listening to the algorithms

Discussions also covered the barriers that challenge wider scaling and adoption of automation and robotics. The group agreed that to be successful, automation first needs to be shaped by desired outcome.

In addition to the advancement of robotics capabilities, other challenges reported by the research of global CSCOs included:

- Refinement of internal strategies with clear objectives and outcomes
- The need to re-engineer the misalignment of workflows to support automated decision-making
- The increased complexity of IT architecture to implement and scale.

The power of overcoming these misalignments may be in looking at workflows within the enterprise and using them to straddle the historic process siloes. The more we extend the scope of a workflow and the more end-to-end the connectivity among the workflow's customers and all contributing supply chain ecosystem players, the greater the business outcomes may be. The combination of operational automation, renewable outputs, and human/machine interactions are being modeled by some industries to simulate and analyze digital automation as applied to the concrete world. They expect improved efficiencies and better business outcomes.

"Let's challenge the process before we bring in automation. Let's not automate a dumb process. What is the opportunity and the impact to unlock that will lead to the right decisions around automation?"

"Let's start with a problem. New processes will also be created by technology, so this is the right starting point. Technology has to serve a purpose and we look at digitization through a lens that will help solve a problem."

Even when supply chains achieve their goals and metrics such as through-rate, it can come at a huge cost to overcome the variance, nuance, and noise in the chain. Investments in generative AI, modeling, and algorithmic decision-making are allowing supply chain systems to do what no human could have done: create forecasts through statistical models to dynamically control millions of stock items.

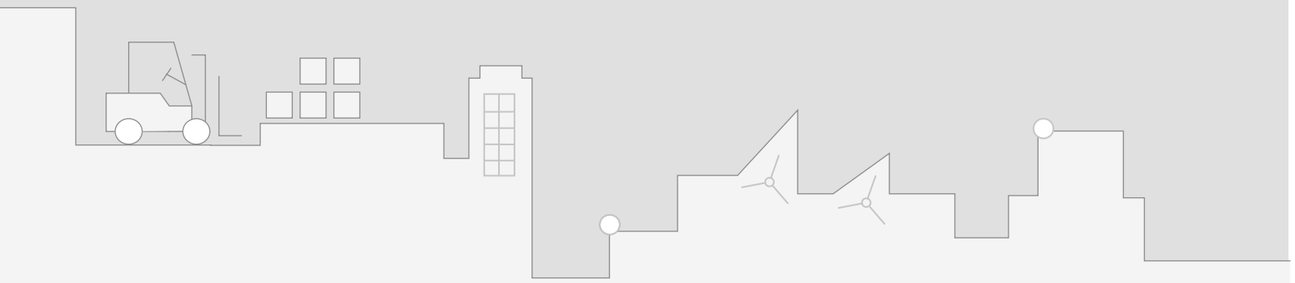
"The way forward for us is to let the system—rather than human planners—define the rules for us. Then we can define exceptions for the high-value, high-volatility items that need special (human) attention."

"The algorithms are working because the underlying stuff is stable … and they can quickly distinguish between what's stable and what's much ado about nothing."

A closing word:

“Explore”

Thinkers are anxious to explore, discover, and investigate new ways to improve supply chain operations using AI, automation, and generative AI. This includes exploring new data sources, new algorithms, and optimization techniques. As they pilot, implement, and scale digital intelligence across their processes, workflows, and with their partners’ systems and platforms, it can encourage them to think outside the box, challenge conventional methods, and seek new and innovative ways to improve their operations and outcomes.



The road from *smart to genius*

Optimizing models with quantum computing

“Make no mistake. The impact is coming —and it’s not a question of if, but how soon and how disruptive.”

Quantum computing is a powerful technology that will exponentially increase compute power, improving the way we analyze data. Based on the principles of quantum mechanics (ask your favorite digital assistant to define quantum entanglement, superposition, and teleportation for more detail), engineers have increasingly been perfecting quantum computing capabilities.

For example, according to the IBM Quantum Roadmap, by 2027, IBM expects to scale qubits, electronics, infrastructure, and software to reduce footprint, cost, and energy usage. The quality of quantum circuits could improve to allow running 10,000 gates. Scaled quantum systems will allow users to run larger computations. Multiple computing resources are expected to be seamlessly combined to optimally handle workflows and extend the computational reach of quantum systems.[2]

“I’m not sure how, but we have to take the entanglement and teleportation of quantum computing to a practical level.”

Yet, that compute power comes with a downside. There is an increased risk of security issues from bad actors who could use quantum approaches to invade and overpower our current data encryption methods. This could lead to compromising the most critical data and systems, such as those that run governments and businesses, and could severely compromise our personal data and identity transactions.

The latest in the long line of disruptions and threats to supply chains—and all business operations—may be imminent, yet only 12% of supply chain executives predict that quantum computing capability will be incorporated into supply chain operations in the next year. Members of the CSCO Think Circle voiced their thoughts and plans—and we're sharing their insights.

"All organizations are being forced to be in the business of transparency and visibility to the consumer. How do I provide that transparency and protect the vulnerabilities at the same time?"

Vulnerabilities increase significantly as we move from the cloud to distributed applications and edge technologies. This is further amplified by the undocumented and unknown, rogue, or noncompliant tools, processes, and workflows that proliferate unnoticed in many organizations. There are two types of challenges: 1) access to current encrypted transactions and "crown jewel" business-critical information and 2) already harvested files that bad actors are poised to access when cryptographically relevant quantum computers come online. Fortunately, help is available. For example, IBM Quantum Safe™ technology is a comprehensive set of tools, capabilities, and approaches for helping secure enterprises for the quantum future.[3]

Some organizations are already experimenting with quantum to test modeling and optimization, which can lead to greater opportunities for efficiency, productivity, resilience, and agility. In essence, despite potential security challenges, supply chain Thinkers are optimistic that quantum can help them find new ways of solving old problems. The Thinkers also noted that in addressing risk mitigation/threat analysis, there would be added business benefits of rationalized workflows, applications, and business control.

The longer-term business opportunity

Thinkers agreed that perhaps the greatest near-term opportunity to use quantum computing in supply chain operations is modeling. The benefit of better managing the sheer complexity of these models is enormous. Imagine optimizing transportation and logistics, simplifying the variability of planning, safely sharing protected data through a convoluted network of ecosystem partners, and capturing all the value of digital twin simulations.

"I think we're getting a good understanding of how complex the model is in supply chain, with the multiple variables. Trying to get to automation of a model with infinite variables is impossible. The opportunity for quantum is to simplify the model."

The game-changer just might be the marriage of quantum computing, edge computing robotics, and other devices. The amount of raw data that sensors can collect is now impossible to analyze in real time with classical compute capabilities. But it's possible with quantum computing and the large language models of generative AI. More to come on that subject, for sure.

To best plan for the kind of infrastructure that will be needed, Thinkers highlighted the "rubber band" challenge: operations technology (OT) pulls to the edge and information technology (IT) pulls to the cloud. CIOs are pushing ERPs and other strategic applications to the cloud as rapidly as possible to build the sacred "one version of the truth." Meanwhile supply chain operations execs are automating at the edge for real-time machine learning and end-to-end visualization at the device level. With quantum computing, the possibilities and innovations are virtually endless, and perhaps the OT/IT "rubber band" will not need to stretch so thin.

"If you could get a quantum computer at the edge that could analyze data in real time, that would be game changing."

While the Thinkers believe their organizations are not yet ready to fully address both the challenges and opportunities of quantum computing, they are game to do more. Here's where they suggest starting:

- *Make an explicit decision about building two teams to address quantum—an advantage team and a security team.* Empower the security team to take immediate action, while the strategic team should be positioned to take a longer-term approach to building quantum advantage. Include people from technology, security, and operations, both within your organization and across your business ecosystem.
- *Your advantage team plays here.* Run strategic garage sessions to innovate, ideate, and incubate longer-term opportunities that fundamentally challenge the business orthodoxies of the past and build new models for the future.
- *And your security team plays here.* Identify where data may already have been harvested. Use process mining and forensic modeling to understand possible vulnerabilities in your business workflows.

"This discussion forced me to think about this more than I had been. I'm now going to force some next steps internally by talking with my COO, CIO. I think I need to have a frank discussion about where are we now and where we need to be, so we feel more comfortable."

"This has to be a network conversation—it can't be a single company conversation. Everything to do with quantum, we all have to move together and collaborate in our industries for the benefit of the whole."

"This conversation has opened up my mind on several topics. I'm (planning to) connect with my CSO on the security side and CIO. I'm not sure how much we are thinking about this from an opportunity and vulnerability standpoint, but it needs to be on our radar if not top of mind."

The road from *smart to genius*

Accelerating the role and impact of generative AI

Members of the IBM CSCO Think Circle recently focused discussion on generative AI, the latest technology which is impacting business and society with unprecedented speed, scope, and scale.

This technology is transforming the way work gets done across the business community. With so much chatter, the Thinkers shared sentiments, potential use cases, and possible business benefits that generative AI might deliver to supply chain operations.

As expected with a broad set of industries and geographies, leaders are taking different approaches based on their organization's appetite for this unique innovative opportunity. Some said they will not use gen AI because it could undermine core differentiating processes. Some are open to trialing AI in an open manner, while others are tightly restricting the use of gen AI behind firewalls.

Overall, the group was extremely optimistic about the potential, while also recommending the guardrails they would like to see in place to take full advantage of this now inescapable technology.

"The ultimate utopia is to put generative AI in front of our data lake and let people just ask questions and get all these amazing answers. Someone who understands the data can ask informed questions."

Generative AI is at a significant inflection point. In a recent study on AI and automation from the IBM IBV, 85% of executives reported that a key ingredient for their investments in automation will be the implementation of generative AI capabilities. 20% of them said that gen AI is critically important to their automation futures.

CSCOs see potential for generative AI, automation, foundation models, and large language models to boost enterprise productivity, augment employee performance, and improve service levels, efficiency, and profitability. The Thinkers see three main areas where generative AI can deliver results, and most are already testing, piloting, and experimenting with the technology.

Supply chain workflow enhancement

In the area of supply chain support and productivity, some organizations are experimenting with gen AI tools and are seeing uptake in areas such as:

- Developing market research, opinion papers, trend analyses, and story narratives
- Automating tasks in areas such as human resources and customer, field, and employee call centers
- Using generative AI to accelerate basic coding.

"Data engineering and programming are huge accelerators. We have seen 90% improvement in speed of coding. With AI, we could take something that can take three months down to a few hours and get real-time analytics."

"We made the decision not to constrain the use of generative AI. We wanted to see organically how it would progress and get visibility into how it would be used. Presentation creation, programming, and other modes of content creation are the natural areas of experimentation."

"External research is low-hanging fruit in our organization—it is a time-saving activity for investor relations."

The Thinkers identified several potential benefits, such as leveraging ERP tools to drive end-to-end decision support and issue management. They are also exploring support for sourcing and optimization, including:

- Next Best Action analysis based on large internal and external data sets of similar processes
- Natural language (and multilanguage) communication across global supply chains
- Complex decision-support optimization on topics such as service levels, cost, working capital, security, and sustainability
- Integrated business planning modeling, virtualization, and digital twins.

"With our platforms, we can pinpoint where issues are—generative AI will help drive decision-making faster by augmenting our digital twins to understand what is happening in supply chain in three areas—manufacturing, transportation, and pipeline. What took three months should happen much faster."

"Although optimization right now is a bit of a joke because planners are just unable to make consistent, reliable decisions, generative AI can deliver a new model of sales and operations planning so planners can use more complex data to make better decisions."

"My dream is that generative AI becomes a digital advisor for supply chain professionals—a better personal assistant."

Some of the most significant future generative AI value may likely come from global sharing of AI-generated intelligence across ecosystem collaboration models and industries. One Thinker offered an example from the aviation industry and the International Air Transport Association (IATA), which develops global commercial standards, simplifies processes, reduces costs, and improves efficiency across a large and diverse ecosystem. Generative AI can help supply chain leaders find a similar way of sharing data for an overall positive impact on the industry.

"No one is looking at disruption across the whole supply chain to assess physical and financial impact. This way we could test scenarios and interdependencies across the supply chain, not just within one node. Could we look at data in a 'steady state' and then model what happens when you get a blip?"

"How can we look at a global incident—like a shipping crisis—and see if there is industry-wide data that we could use to improve the way that we respond to these challenges?"

"Each of us creating our own large language model would be very costly. It also perpetuates millions of errors because it reflects past bad decisions. The beauty is bringing ecosystem data together to cancel out the errors that remain in one data set."

"Generative AI technology could play a very interesting role in sustainability if it becomes the platform for collaboration rather than competition."

Staying real and grounded with multiple types of AI

As they experiment and test, they also acknowledge the need for guardrails and governance. All Thinkers believe their organizations will use multiple types of AI—machine learning, automation, generative intelligence, and others—across disparate systems.

"We are putting a cross-functional task force across the organization, including legal and consumer divisions, to ensure we are considering internal guardrails as well as regulatory ones."

"It's important to determine how to converge the intel available on regulations and connect those to the aspirations of the data and analytics team."

"We're trying not to stifle innovation—our interns are wanting to use generative AI at work like they do at home—what guidelines can we give them?"

"But we've got to go step by step."

Managing the now, the new, and the next

We must adopt generative AI in a responsible, considered manner to enhance the human experience—to make employees better versions of themselves and help drive better, faster, and lower cost outcomes.

We must also focus on the increased risks associated with data privacy, data provenance, and data integration. Building policies and controls into data usage will be important to protect the individual and the integrity of the operation.

"Turn your thinking around. Instead of adding AI, start with AI."

Here are some actions that can help CSCOs embrace the opportunities, while minimizing the risks. First, change the enterprise mindset from "adding AI" to "starting with AI." Next, reinvent processes, workflows, and job roles to deliver productivity improvements by:

- Making sure use cases are easily explainable, that AI-generated artifacts are clearly identified, and that AI training is transparent and open to continual critique.
- Managing risks by helping ensure AI-generated assets can be traced back to the foundation model, data set, or other inputs, and be prepared to adjust according to regulatory changes.
- Re-skilling the workforce to understand AI and its proper—and improper—use. Build AI ethics and bias identification training programs for employees and partners to comply with AI ethics regulations.

In a recent IBM IBV AI and Automation study, we asked C-suite executives how they planned to invest in generative AI and what outcomes they anticipated. Here is what they said:

- 83% say they are investing in generative AI in support of automation strategies and initiatives
- 81% say that the benefits of using generative AI are worth the potential risks
- 81% say that generative AI will fundamentally change how people do their jobs
- 80% say that generative AI will fundamentally transform their organization's workflows.

The road from *smart to genius*

Realizing the untold possibilities of generative AI

There's nothing more inspirational than a Think Circle meeting of CSCOs who shared real-time use cases of how generative AI is already improving productivity and delivering value for their organizations across industries and geographies.

"I literally can't sleep thinking about the opportunities that are ahead of us."

"Gen AI is driving me crazy—it's very disruptive to my thinking. I'm leveraging it as much as I can."

"I've gone from generative AI enthusiast to skeptic to now, hopefully realist."

Using text and code prompts in generative AI tools, one Thinker's organization fast-tracked the creation of process models, decision trees, and visualizations across the organization using AI. They then shared them with business owners to assess their accuracy before widespread implementation. The business owners tuned and tweaked the AI-generated process models to confirm with their specific needs.

"The results were absolutely insane; in the sense that we got about 90% accuracy just out of the generative AI process models—and we dealt with exceptions from there. But the craziest thing was it normally would have taken a project team a few months to understand the errors, then do interviews with overcommitted stakeholders and produce a lengthy deck, so a four-to-five-month project. Instead, we did it from scratch with one person in three weeks."

And building on that, another Thinker highlighted the staying power of lessons learned, which might turn out to be the most lasting benefit of self-learning AI built on persistent large language models:

"It's not only creating the best practice, but now you don't lose it. Many times, you go through some study or project, find a best practice, and then two years later, it's not being used. With generative AI tools, you don't lose it. It's going to be in the model for good—until your process changes. So, it really stops that 'yoyo' of fixing the foundation and fundamentals, and then practices changing over time—then two years later, you're doing it all over again. Now we can store the process and improve it continuously."

"The traditional control tower is dead—now we can use a natural language query to request anything, anytime and apply machine learning to predict and recommend appropriate actions. It is now a control tower LLM platform."

The Thinkers agreed that the era of generative AI is enabling a very different relationship between technology and the workforce. They said the ability to use natural language to query anything at any time is now open to anyone. One example of this productivity benefit comes from using natural language queries instead of building hard-coded personas to find the right report, set of tasks, or operational processes. One Thinker described a world where they use generative AI to create composable models that can deconstruct processes into their smallest microtasks and recompose them on the fly. All it takes is just asking a normal question (for example, "find and summarize the anomalies in this document") and then taking the input from one process and using the outputs for an entirely different purpose.

Another example of this useful composability came from a Thinker whose interns used generative AI to create a report catalog that turned into a digital "co-pilot" for users looking for the right documents and processes after an ERP implementation. The tool made workers more efficient in their day-to-day tasks because they could ask a digital assistant to find the best report based on a natural language question, rather than spending way too much time searching through folders or spreadsheets.

Bye-bye spreadsheets.

In supply chain, we have hundreds of roles and thousands of tasks. We must focus on where AI can add the most value. Here are four possible steps:

1. *Assess* and eliminate unnecessary tasks.

2. *Automate* dumb tasks (to quote a Thinker from earlier conversations).

3. *Assist* in core tasks.

4. *Accelerate* or orchestrate high-value workflows.

But how to start?

Jump into a playground.

Thinkers who haven't yet formally implemented generative AI tools are starting with a playground. They have squads of people who are experimenting with different use cases while finding the ways to make meaningful impact and deliver quantifiable benefit.

They are starting multiple pilots to achieve some quick wins in very tactical areas. For their organizations, this approach builds confidence in the tools, the large language models, the data used, and the benefits delivered.

"We have a responsibility to our shareholders and to regulators—the outcomes have to be more than 100%. You've got to be super confident. So, the data s ource, the models that we use, and the governance that we're putting in place is absolutely critical."

One Thinker shared their organization's move toward combining traditional AI-based optimization algorithms with generative AI to enable predictive modeling—a hybrid AI approach.

"This may get us to a kind of 'golden process'—traditional AI and machine learning interacting with generative AI, enhancing forecasting, and providing proactive alerts."

To successfully implement generative AI solutions and achieve quick wins, the Thinkers recommend the following:

- *Start with a clear problem statement or use case.* Define the specific challenges or opportunities where generative AI can have a meaningful impact, focusing on areas with a high potential for ROI.
- *Assemble a diverse team.* Create a squad of people with diverse skills and backgrounds, including data scientists, engineers, domain experts, and business stakeholders, to collaborate on generative AI projects.
- *Leverage existing data.* Use available data sources to train and refine generative AI models, helping ensure data quality and governance are maintained throughout the process.
- *Prototype and iterate.* Develop and test prototypes of generative AI solutions—iterating and refining—based on user feedback and performance metrics.
- *Scale and integrate.* After achieving initial success with a generative AI pilot solution, plan for scaling and integrating the solution into broader organizational processes and ecosystem partners' systems.

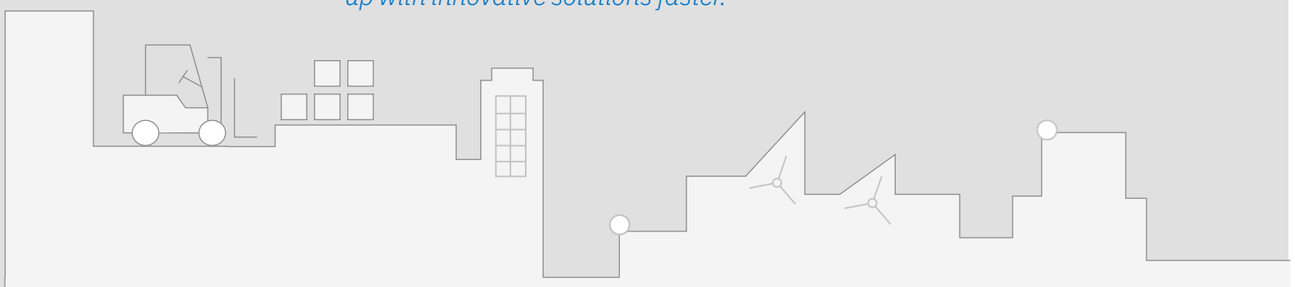
A closing word:

“Amplify”

Generative AI has the ability to amplify certain aspects of data—such as patterns, trends, and relationships—that may not be immediately apparent to humans. By processing large amounts of data and identifying these patterns, generative AI can create new content that is an amplification or extension of the original data.

Additionally, generative AI can also amplify human creativity and productivity by assisting in tasks such as idea generation, brainstorming, and prototyping. By augmenting human capabilities with AI-generated suggestions and ideas, generative AI can help humans to explore new possibilities and create innovative solutions that may not have been possible otherwise.

“This discussion has enlightened me. I think that generative AI can amplify our workforce productivity and creativity by generating new ideas and exploring unconventional approaches. It can help us think outside the box and come up with innovative solutions faster.”



The buoyant leader

Unlocking human-tech potential

Generative AI is ushering in the age of the augmented workforce—when human-machine partnerships amplify their collective productivity and innovation.

AI and automation are creating a new division of labor between humans and machines. The World Economic Forum (WEF) predicts this evolution will disrupt 85 million jobs globally between 2020 and 2025—and create 97 million new job roles. This radical shift is ushering in new harmony and unlocking human-tech potential. The gen AI-augmented workforce supports human-machine collaborations to boost productivity and deliver exponential business value. This is an especially critical point—it means reimagining the human-technology relationship through automation.

“The place I see the power of the AI approach is in the tools that can proactively show us where potential problems are and recommend actions to improve the sizing of resources and assure workforce performance.”

“I agree that while AI and automation can make workflows more intelligent, to truly improve supply chain performance requires a further step: supporting the intelligence of employees in their everyday activities.

As technology becomes more user-friendly, employees are also able to do more with less advanced technical skills. No-code software development platforms, for instance, let people without a programming background create business-critical prototypes and applications. Plus, as machines take over mundane tasks, people can spend more time on the problem-solving and collaborative work that require stronger people skills.

Those that get it right have a lot to gain. Tech adopters that succeed at reskilling to accommodate technology-driven job changes report a revenue growth rate premium of 15% on average compared to other tech adopters, according to IBM IBV research. And the value added is even greater for those that emphasize AI: they see a 36% higher rate of revenue growth than their peers.

"You can't run the enterprise of tomorrow with yesterday's talent. In the same vein, you can't plug tomorrow's talent into yesterday's operating model."

In the era of the augmented workforce, generative AI promises to open the door to new opportunities—if leaders are willing to question the assumptions their business models are built upon. In fact, recent IBM IBV research found that 83% of executives say generative AI will reinvent the way their organization works. The human-machine partnerships that will drive advantage tomorrow are being developed today. That means workers need to be willing to experiment with new approaches to understand what works—and tech-savvy enough to troubleshoot along the way.

"We are working on initiatives to transform the operating model in strategic areas with our partners that can support our growth and efficiency goals. We have a gen AI expertise squad to help the workforce adapt to new processes and new practices."

Automation and AI promise to change the nature of work—and make both people and technology more valuable than they were before. But driving growth with the augmented workforce requires more than just clear business goals. Leaders must understand what people really want from their work—and use technology to help improve their experience.

As organizations develop higher-value human-machine partnerships, job role confusion becomes pervasive. Which tasks require a human touch? What is an acceptable margin of error? And where does responsibility fall if machines—or humans—don't live up to expectations? Leaders can foster a culture of experimentation and innovation by communicating that they're willing to accept a few missteps along the way.

"We need to measure behavior to predict behavior."

Overall, generative AI will augment far more employees than it will replace—87% of executives believe job roles are more likely to be augmented than automated. In this environment, AI has the potential to transform the employee experience. It can automate mundane tasks, letting people focus on what they are passionate about, and create exciting new job roles and career paths.

"The digital assistant becomes the people's co-pilot—steering you to the report or information you are seeking—much faster."

"Human experts still decide how to act upon the information, now they just get to the key information much faster."

Embracing the trust factor

"Uncertainty is the new norm. But if it was the other way around—if our norm was certainty—would it be boring? Can we turn pressure into energy?"

Trust. Easy to say, hard to earn,

and getting even more difficult as generative AI technologies bring the importance of data—trustworthy data—to the fore. As with everything in life, there is no magic wand, but the CSCO Thinkers agree on a few things:

- Decide what problem you want to solve.
- Collect only the data you need to solve it (don't get distracted by the rest).
- Be sure the data is believable (and assign a Chief Advocate to be sure there are no "data deniers" lurking around).
- Solve the problem, and thereby demonstrate the value of trusted data.
- Repeat.

Trustworthy data, which powers generative AI systems and tools, is only possible with data transparency, reliability, accountability, and security.

These are critical considerations as supply chain leaders are building more agile and responsive supply chains.

"'The data is wrong' is becoming an accepted excuse. As leaders we have to stop nodding to that and start challenging that way of thinking."

"I'm afraid we will get a lot of data but not a lot of information. We need to go from big data to microdata that allows us to think big but start small."

"The human in the chain will be responsible for gaining trust while most of the information can come from AI."

CSCO Thinkers pondered a move away from data perfection to directional decision-making, based on data that is "accurate enough" to drive good decision-making.

In some organizations, it has become sport to derail meetings by nothing more than questioning the data. Does it have to be 100% right, or is 80% good enough? 70%?

By segmenting processes into those where AI is accurate and decisions are binary, and those where the data is not going to be perfect (and may never be perfect)—especially as unstructured data is increasingly used—professionals need to be comfortable with directional decision-making, as they rely on humans to make the final decision and use generative AI as an input to inform that decision.

"It is a great 'check and balance' to ensure that we use gen AI as an 'assistant' to help make the professional better, making faster and more accurate decisions, but not replacing them. It keeps the human in the driving seat and in control."

Balancing AI-generated data decisions and recommendations against the risk of being wrong starts with defining the goal. Without an understanding of how the outcome will be measured, no amount of data, at whatever level of accuracy, will ever be sufficient.

"Setting the clear goals is important—consider the Odysseus moon mission. If the goal was going to the moon and collecting data for seven-to-ten days, the mission failed (because the spacecraft tipped over on landing and had to shut itself off after only five days). If the goal was just getting to the moon, it was a success. We need clear goals and expected outcomes for AI."

"As long as you define the value and define the risks, you can see if the value is worth the risk. That's where some of the data fidelity questions come in—that is where the decision process has to dictate what you are going to go after, and then try to mitigate those risks however you can—with eyes wide open."

"In our organization, there's a lot of emotion around data. That emerged even in something as simple as badge swipes. It's a binary thing, you've either badged in or you haven't. It's pretty easy to record that data, but because of the emotion, people still question what the reports show. To short-circuit this distraction, we assign ownership of the data. When there is an issue, a leader—who is pretty high up in the organization—comes to address it. We don't make it a digital conversation. We don't make it a process, decision, discussion. Instead of debating data that we know is correct, we are able to address the root cause which is that some don't like the fact that we have a badge report."

Many CSCOs are exploring the use of generative AI through pilots, checking the value metrics, and then scaling—or not—accordingly. The most common first-up use cases include use of intelligent assistants, supplier risk assessments, inventory optimization, and cyberthreats among others.

"We have invested a lot into our digital infrastructure. We've stitched numerous data sources together. It looks good, but what is the value to the bottom line?"

"There's some value in building trust to help with implementation. One use case that doesn't scale may help build confidence, while another may be more complex but deliver value. Can those sit next to each other? I think yes."

"Sometimes I feel like we're going through a journey that looks less like a road and more like a pendulum. How far do I want to swing?"

Demonstrating AI value to users that solidifies trust and accelerates adoption emerged as a growing area of focus. One CSCO Thinker reflected that *"this is good old change management."* One way some are speeding the change process is to actively enable intergenerational engagement—embedding digital pioneers in the organization working alongside "self-aware antibodies."

"If we don't speed up change management, I'm afraid that the antibodies will continue to persist. Leaders must become a self-aware antibody and acknowledge we can only disrupt so much."

"How do we start driving to intergenerational collaborations and get insights into new ways of working from people entering the workforce? Gen Z is the future."

"We have a bias against what we don't know. Breaking down barriers leads to pushing against checks and balances. Challenge the cultural norms and let the digital natives help drive change."

Becoming a mindful alchemist leader

One Think Circle meeting found CSCOs fretting about the chaos that may emerge from increasingly volatile geopolitical headwinds. Navigating around four major conflict zones in the Middle East, Korea, China, and Russia/Ukraine and with more than 76 national elections happening in 2024—paired with ongoing economic uncertainty—these headwinds are nontrivial.

And yet, CSCOs are also encouraged by some "tailwind" developments. Optimism in technology advancements, excitement in some regions of the world and some industries, and opportunity from some government initiatives, like the Inflation Reduction Act and CHIPS Act in the US, are generating enthusiasm as organizations and industries stabilize their global supply chains.

What has remained consistent over the last decade (and will persist into the next) is that CSCOs play multiple roles—many that have nothing to do with moving things from place to place. These Thinkers tell us they are coaches, therapists, technologists, and data security guards, among other things.

"We are being asked to do things we haven't before to manage the uncertainty and the environment of work culture and psychology as well. The supply chain leader of the future may be that of a therapist … no longer a transactional leader."

"This year is poised to bring lots of change. Geopolitical instability (elections, wars, and hot zones all over the world). We must navigate and overcome uncertainty with a progress mindset."

Confronting the surge of employee anxiety

"We are being asked now to model the uncertainty. Supply chain employee anxiety is worse than during the pandemic—then we knew the root cause—now we are modeling things we cannot see, and it is causing real job and career anxiety."

In a shift from the earlier session where CSCOs couldn't sleep at night for the opportunities that generative AI sparked, they are now up at night wondering how to help stabilize their employee base.

Developing the capabilities necessary so that the workforce is re-skilled to prosper alongside AI requires investing in education and training programs to help teams use AI for enhanced decision-making. Open communication, trust, and transparency are essential when introducing enhanced digital technologies into supply chains across their workforce and partner ecosystem.

Overall, achieving a balance between employing AI and alleviating workplace anxiety requires mindfulness and planning. Building a culture of trust and transparency can ease employee anxiety during times of uncertainty by encouraging innovation, providing access to reliable information and resources, and promoting a positive outlook toward future opportunities.

"We are doing our end-of-year review with my teams, and never has positivity been more important."

"There are clear tasks and activities where AI outstrips everything else. Lines in the middle are more nuanced than AI can handle, and the human can outperform AI. It will be interesting to see how we start integrating AI further into our work."

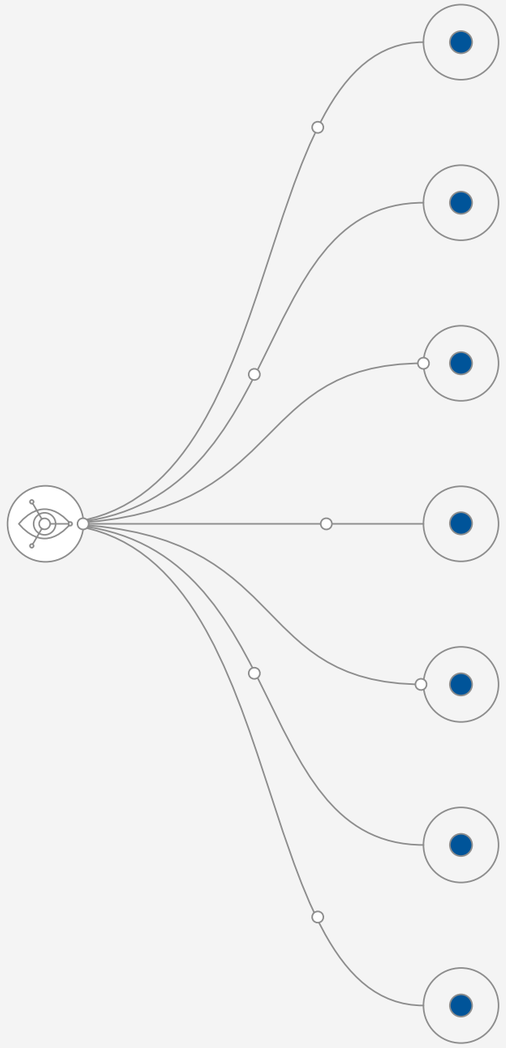
A new role for CSCOs

Given the importance of managing employee anxiety, there is immense power CSCOs can build through self-awareness, adaptability, and communication skills as the driving forces behind impactful leadership. We invited Simon (Mac) McKenzie, CEO of the Bridge Institute, to share his wisdom on leadership and humanity.

Mac took us through his perspective on "The Seven Transformations of Leadership,"[4] a leadership framework that emphasizes the value of fostering personal development and growth to tackle complicated global challenges effectively. These are the seven ways adults make sense of the world (see Figure 4).

Figure 4

From Opportunist to Alchemist—A leadership framework



The Opportunist
operates in a self-centered frame. Time horizons are short. Nearly all of us move through this stage as teenagers; some never move beyond it.

The Diplomat
is all about fitting in, how to not rock the boat. Being a diplomat doesn't mean this leader is diplomatic, however.

The Expert
is a high-performing individual contributor, typical of a professional with about a decade of experience. Experts have knowledge and skills in a particular area, but may lack a broader perspective.

The Achiever
is inquisitive. Mac says about 50% of the world's leaders fit into this category. Achievers lead teams across multiple levels and cultures.

The Individualist
is making the shift to question everything. This leader can embrace plurality of thought and is good at speculation and new ventures.

The Strategist
considers multiple perspectives to arrive at an informed opinion. This leader can inspire global teams and transform organizations.

The Alchemist
leads societal transformation. By definition, an alchemist is a leader who creates something through a seemingly magical process. Few global leaders understand the world this way, but perhaps CSCOs are well positioned to move into these roles.

Being a good leader and a good human

As CSCOs build their own skills as well as shore up their team's capabilities, anxiety can make both life and work feel overwhelming. To cope, leaders are looking for tools they can use. For example, here is one framework called emotion, truth, and choice.[5]

Emotion
Assess what you are feeling, physically, and emotionally.

What is your mind saying about you, others, the situation, and the consequences? Acknowledge (without judgment) your "in the box" state.

Truth
Take a deep breath, then tell the truth.

What is really true in this situation, not what you think or feel, but what is true if you were looking from outside your box?

Choice
Take another deep breath, then choose.

From a position of truth, evaluate your options and then make a conscious choice about what you intend to do or not do.

Perhaps CSCOs are poised to be the new alchemists. As scientist and writer Arthur C. Clarke once said: *"Any sufficiently advanced technology is indistinguishable from magic."*[6]

A closing word:

"Still"

Technology has the potential to play a huge role in our shared journey, even as we are still working out what our new/next/never normal looks like. To succeed today, everything has to be on the table, whether it's standing up a brand-new supply chain, finding new ways to attract and retain talent, moving to new supply networks, localizing manufacturing, embedding technology and generative AI, or taking on new leadership personas.

Most Thinkers' organizations challenged themselves to lay every option on the table—they need everyone thinking about all the options if they are to succeed at pace in today's dynamics. In fact, they agreed they'd need to break the boundaries of where supply chains have traditionally operated.

Today, every option is on the table.

Navigating in the age of generative AI

Supply chain automation just got an upgrade

If you could see the future, would you run your business differently? This is the question CSCOs and their CEOs face in the era of generative AI—and supply chain automation has taken it out of the abstract. As real-time data fuels faster simulation and more accurate predictive analysis, it's become easier for businesses to plan for tomorrow.

That's why CSCOs are rapidly investing in generative AI to automate and streamline their supply chains. In fact, 89% of executives report that key investments in automation will include generative AI capabilities—and 19% say generative AI will be critically important to their supply chain automation futures.

For six out of 10 executives, the business case for investing in automation centers around boosting workforce productivity and agility—and generative AI amplifies these effects for both human employees and AI assistants. Clean and trusted data will be central to getting the intended value from these investments.

Organizations are seizing the generative AI moment to capture opportunities to increase responsiveness, build deeper human-tech partnerships, and innovate at clock speed. Those that don't will be stuck in the old-school dashboard, wondering why they've fallen behind.

Real-time data is finally for real

As disruption continues to rock the global supply chain, executives are hungry for a single source of truth. In fact, being able to respond to real-time demand volatility is a top operational priority (51%) over the next three years.

With generative AI, they'll finally be able to feast. Gen AI can help leaders collect data from across the supply chain in real time and avoid the confusion that comes from competing views. Rather than debating whose numbers are right, teams can look through the same pane of glass to make faster decisions—and elevate their ability to innovate.

Nearly two-thirds (62%) of executives expect generative AI to accelerate the pace of discovery, leading to new sources of product and service innovation. And companies that get it right can gain a crucial advantage: Generative AI leaders outperform in innovation 53% more frequently than their peers.

Of course, real-time data won't just appear on the dashboard overnight. To tap into this invaluable asset, CSCOs need to address a host of practical and pragmatic data issues, from segmenting and cleaning data to determining how structured and unstructured data should be used across the organization.

- *Stop fighting fires and start rethinking your supply chain.* Enable innovation with real-time, data-driven insights. Pair these findings with business know-how to deliver differentiated outcomes. Determine which data should be centralized and what should be left at the edge or with third parties to add the most value.
- *Modernize your supply chain with advanced modeling.* Take advantage of generative AI's uniqueness to modernize your supply chain applications and architecture. Engage with quantum computing tools and methods to capitalize on expanded modeling and optimization capabilities.
- *Identify hidden pain points that are candidates for targeted innovation.* Encourage end-to-end experimentation in demand volatility, sourcing, production, and distribution. Sponsor the integration of supply chain communities that rely on predictive and prospective analysis fueled by generative AI and huge amounts of data.
- *Deploy your AI assistants into your supply chain ecosystem.* Insert your digital technology capabilities into your massive ecosystem of supply chain partners. Bring a new level of synergy and efficiency by exchanging those capabilities with your ecosystem partners. This enables quicker access to data that complies with your standards and accelerators.

Seamless collaboration spurs productivity gains

Identifying issues that foreshadow future disruption is essential to keeping supply chains up and running. But that's only the first step. Acting on that information fast enough to fill the gaps takes coordinated effort on a global scale.

That's where generative AI comes in. It enables faster, more effective collaboration between people, AI assistants, and partners that can proactively identify supply chain anomalies and correct them in real time.

Executives report that generative AI will increase the volume of decision-making by digital assistants by 21% in the next two years. While this does introduce new opportunities for error, 82% of executives agree that the benefits they expect from generative AI exceed the potential risks.

Of course, human workers still have a critical role to play. The creativity, empathy, and critical thinking skills they bring to the table are needed to rethink operations and solve complex problems. How they apply those skills is evolving rapidly, however, with 71% of supply chain executives saying generative AI completely changes how their people do their jobs.

Nine in 10 executives now say their organization's workflows will be digitized with intelligent automation and AI assistants by 2026. This expansive digitization promises to deliver benefits across the supply chain, with 80% of executives expecting generative AI to enable better management by analyzing all relevant supplier performance metrics.

Navigating in the age of generative AI

Increased visibility and transparency help leaders respond to risks immediately, rather than waiting for partners to report problems at their own pace. Integrating clean and trusted data from across the supply chain also makes it possible to power a large language model that people across the industry can tap for accurate, real-time information.

- *Feed generative AI data that supports supply chain productivity.* Map the full range of preemptive data initiatives needed to connect people and technology across the supply chain ecosystem. Upskill employees and train tools to speed decisions and actions. Progress a large language model specific to supply chain for your industry.
- *Cultivate human-tech chemistry to uncover real-time insights.* Make this chemistry a commodity that touches every point of the supply chain: planning, sourcing, manufacturing, and distribution and transportation. Increase productivity of both humans and AI assistants with generative AI.
- *Crank up the dial on process improvement.* Look for leaders in each key supply chain function to suggest and execute supply chain process improvements. Augment technology with people and people with technology to deliver superior process outcomes and transform the employee experience. Find ways to free supply chain professionals from transactional work so they can focus on solving real business problems.
- *Replace traditional dashboards with real-time supply chain large language model queries.* Feed comprehensive supply chain metrics and transactional data into generative AI models. Take the latency out of decision-making with large language models that enable immediate insights. Conceptualize new practices based on gap analysis and points of interrelation. Use the recommendations for predictive and preemptive decisions and actions.

Generative AI is a mirror that lets you see around corners

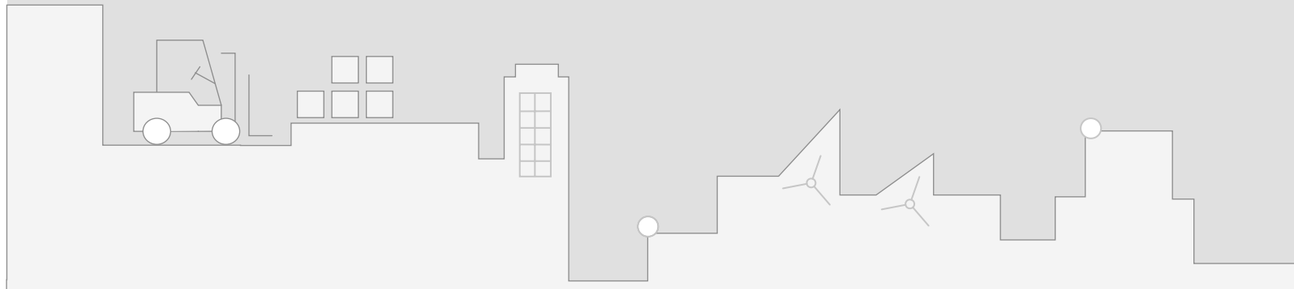
Predicting the future isn't just for fortune tellers. Generative AI serves as a counterweight to global complexity, letting leaders detect approaching threats and suggest evasive maneuvers based on more than premonition.

More than four in five (81%) executives agree: predictive capabilities with generative AI detect problems earlier, and 77% say generative AI models successfully identify geopolitical and climate risks, enabling proactive mitigation. More tactically, 79% of executives say generative AI will optimize inventory management by predicting future demand patterns.

In response, 80% of executives say generative AI models with visualization and simulation, such as digital twins, will uncover supply chain bottlenecks in real time. But applications will be limited. By 2025, they say only 19% of supply chain use cases will incorporate generative AI, including simulation and modeling of complex systems, transportation optimization, product lifecycle management, and customer service and real-time response.

- *Supercharge supply chain operating models with generative AI platforms.* Create self-learning simulations that let you identify, visualize, and proactively correct critical operating exceptions. Hyper automate transactional work to create next-level operational efficiencies.
- *Preempt the next shock. Predict and embrace disruptions.* Deploy analytics, data visualization, and simulation models, along with generative AI capabilities for pattern recognition. Act calmly and resolutely to keep your supply chain afloat while the competition takes on water.
- *Put mission-critical touchpoints front and center.* Align the most crucial and differentiating supply chain workflows with your early predictive generative AI use cases. Involve key partners for improved collaborative foresight. Help ensure generative AI-driven artifacts are clearly identifiable and auditable.
- *Measure the positive impact of premodeling.* Regularly assess the performance and ROI of generative AI-driven predictive analysis. Set clear goals to help ensure these efforts are delivering the desired results and adjust as needed for continuous improvement.

"The CSCO of the future will be a technologist."



Related IBM IBV reports and resources

Building supply chain resiliency with AI-driven workflows
https://ibm.co/supply-chain-resilience

Smarter supply chains for an unpredictable world
https://ibm.co/smarter-supply-chains

The rise of the sustainable enterprise
https://ibm.co/sustainable-enterprise

Automation and the future of work: Creating intelligent workflows across the enterprise
https://ibm.co/automation-workflows

Digital technology and the environment
https://ibm.co/digital-technology-sustainability

Sustainability as a business strategy
https://ibm.co/sustainability-strategy

Why organizations are betting on edge computing
https://ibm.co/edge-computing

Automation and the future of work
https://ibm.co/automation-workflows

Smart manufacturing
https://ibm.co/smart-manufacturing

Empowering autoworkers through AI-Digital tech for enhanced skills and productivity
https://ibm.co/empowering-autoworkers-ai

AR and VR in the workplace
https://ibm.co/ar-vr-workplace

IBV Global Consumer Study: "The last call for sustainability"
https://ibm.co/sustainability-consumer-products-retail

The Global C-suite Study Series
https://www.ibm.com/thought-leadership/institute-business-value/c-suite-study

IBV Virtual Enterprise Study
https://ibm.co/virtual-enterprise-platforms-ecosystems

The Quantum Decade
https://ibm.co/quantum-decade

Forging the future of supply chains: A playbook of 5 essential strategies
https://www.ibm.com/thought-leadership/institute-business-value/en-us/report/supply-chain-of-the-future

Consumers want it all: Hybrid shopping, sustainability, and purpose-driven brands
https://ibm.co/2022-consumer-study

Sustainability as a transformation catalyst
https://ibm.co/sustainability-transformation

Chief Supply Chain Officer Study: Own your transformation: Data-led innovation for the modern supply chain
https://www.ibm.com/thought-leadership/institute-business-value/en-us/report/2022-csco

Smart Procurement made smarter
https://ibm.co/smart-procurement

Security in the quantum computing era
https://ibm.co/quantum-safe-encryption

Exploring quantum computing use cases for logistics
https://ibm.co/quantum-logistics

Seven bets: It's time to bet on the future
https://ibm.co/seven-bets

AI-powered process mining: Automate to elevate
https://ibm.co/automate-business-processes

Generating ROI with AI
https://ibm.co/ai-capabilities

CEO's guide to generative AI: Supply Chain Chapter 9
https://ibm.co/ceo-generative-ai

Endnotes

1 "#Envision2030: 17 Goals to transform the World for Persons with Disabilities." United Nations Department of Economic and Social Affairs. Accessed September 27, 2024. https://social.desa.un.org/issues/disability/envision-2030/17goals-pwds

2 "The future of computing is quantum-centric." IBM Technology Atlas. Accessed April 23, 2024. https://www.ibm.com/roadmaps/quantum/

3 "Making the world quantum safe." IBM Quantum. Accessed April 27, 2024. https://www.ibm.com/quantum/quantum-safe

4 "The Seven Transformations of Leadership: A Simple Summary." World of Work Project. Accessed April 23, 2024. https://worldofwork.io/2019/07/the-7-transformations-of-leadership/

5 "The ETC Self-coaching Model: A Simple Summary." World of Work Project. Accessed April 27, 2024. https://worldofwork.io/2019/07/the-etc-self-coaching-model/

6 "Any sufficiently advanced technology is indistinguishable from magic." CCCBLab. November 8, 2018. https://lab.cccb.org/en/arthur-c-clarke-any-sufficiently-advanced-technology-is-indistinguishable-from-magic/

IBM Corporation
New Orchard Road
Armonk, NY 10504

Produced in the United States of America | May 2024

This document is printed on chlorine-free 100% post-consumer paper meeting Forest Stewardship Council (FSC) responsible forestry certification. The energy used to manufacture this paper was generated through renewable green energy. Please recycle.

V1P4GKDD-USEN-01

ibm.co/think-circle-compendium

IBM