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# Business Network:

## The Circular Economy

CEO White Paper

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## Contents

## Introduction

With every epoch of society comes new ways to work, live, consume and create. For most of humanity's existence, we had a negligible impact on the earth that sustains us. The hunter-gatherer way of life lasted millions of years without leaving a footprint. Then, agriculture began in the fertile crescent roughly 10,000 years ago, leading to permanent settlements, population growth, technological innovation and new economic systems.[1] Still, we did not use more resources than the earth could comfortably provide.

It was not until the first industrial revolution—only about 250 years ago—that things changed drastically. It was a major turning point for society and our relationship with the environment. With factories, machines and steam power, we could produce far more goods than ever before. We could extract more resources from the earth. The pace of technological innovation sped up. Standards of living increased. But, so did pollution, waste and the need to process more and more materials to support rapidly evolving ways of life.

Since then, these trends have only accelerated. We are now in the fourth industrial revolution, and it is exponential.

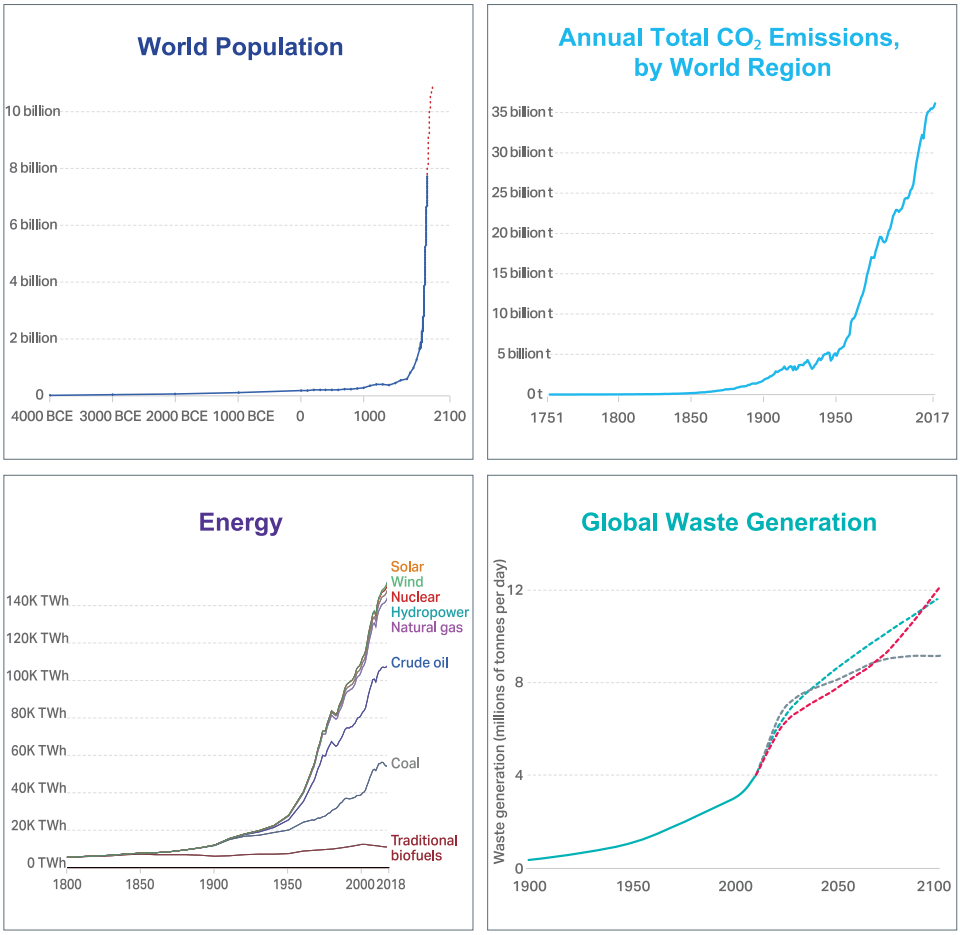



**Figure 1:**

Exponential Growth[2 3]

At the rate we are going, we will need *five* planet earths by 2050 to sustain us.[4] We do not have five planet earths.

It is time for another evolution. In Industry 4.0, our economic model needs to transition from a destructive linear system to a restorative circular economy. Fortunately, while the industrial revolutions have created this problem, they have also given us incredible new ways to find solutions. The movement toward circular economy is about to transform society, realized through fourth industrial revolution technologies like the Internet of Things, artificial intelligence, cloud and big data analytics.

Industry 4.0 is the information age. And in the *information* age, disruptive digital technologies will use *information* to solve the biggest challenges facing humanity today. Companies must transform into information companies to lay the necessary digital foundation of data connectivity, exchange, integration and visibility across the extended business ecosystem to achieve circular economy. This is the business opportunity of our generation. More importantly, it is the crisis of our time, which must be resolved to ensure a habitable earth for tomorrow.

There is a new agenda: sustainability.

## Sustainability: A Global, Individual and Business Imperative

We live on a finite planet.

Already, global resource consumption has surpassed 100 billion tonnes per year in a world that is only 8.6% circular.[5] Eighty percent of waste from consumer goods (food, beverages, packaging, clothes, etc.) winds up in incinerators, landfills and wastewater.[6] By 2025 the world will have over eight billion people living in it, using even more resources and producing even more waste.[7] Ten billion people by 2055; 11 billion by 2088.[8] That is a lot of people using a lot of materials, unless we clean up our act.

When linear consumption patterns come up against the very real physical constraints of the planet, one or the other has to give—and we need to ensure it is not the planet. How do we sustain a finite planet with a growing population that is using an increasing amount of resources?

The answer is sustainability.

The model used to create products for hundreds of years is broken. The approach, often described as "take, make, use and dispose," is a waste economy. Waste is an accepted part of the process.

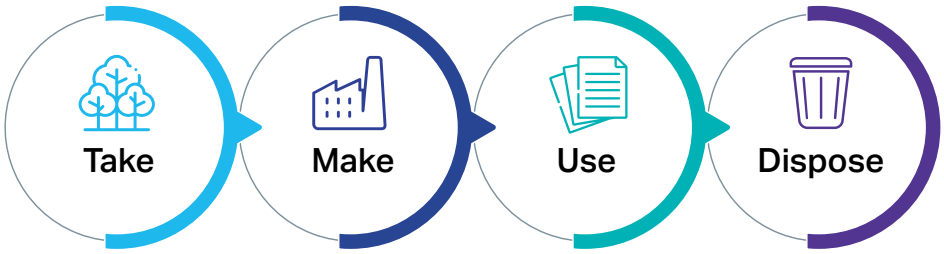



**Figure 2:**
The Linear Economy

In some instances, waste has been deliberately baked into the business model. In the 1920s, the Phoebus Cartel of U.S. and European lighting manufacturers colluded to limit the lifetime of bulbs—to ensure a steady flow of new sales.[9] Recently, Apple and Samsung were both fined for deliberately slowing down the performance of existing phones to drive the purchase of newer versions.[10]

When resources were considered infinite, unconsciously (or deliberately) building waste into the system seemed consequence-free. However, as waste grows and resources shrink, the scale of the issue has become too large to ignore. The world's natural resources are becoming scarce. Shockingly, even fresh water—used in most production processes and needed to sustain life—is running out.[11]

Today, the vast quantities of solid waste we are producing means more landfills. When taken together with increasing urbanization, this means more landfills closer to more people. Living near a landfill has been shown to endanger human health.[12] And what happens when all the landfills are full?

Air pollution is killing us. This is not hyperbole. According to the World Health Organization, air pollution kills seven million people every year.[13] It has been associated with higher risk of cancer, stroke, heart disease and respiratory disease. New evidence suggests it pollutes our minds too, with links to impaired judgement, mental health problems, poor school performance and increased crime.[14]

The equivalent of one truckload of plastic enters the ocean every single minute.[15] From the 1950s when plastic was introduced until 2018, 8.3 billion tonnes of plastic has been produced and at least 91% is not recycled.[16] Plastic does not biodegrade or significantly break down over time, so this literal mountain of plastic waste will still be around in hundreds, or even thousands of years—unless we can find a way to use it.

Over 600 million people live in extreme poverty.[17] Many more go to bed hungry every night. Yet a staggering one-third of all food produced globally is lost or wasted.[18] That is enough to raise every human being out of poverty, with plenty to go around.

Climate change will make our planet unlivable without drastic intervention. Carbon dioxide emissions, mostly from burning fossil fuels, are warming the planet. It is already 1 degree Celsius (or 1.8 F) warmer than pre-industrial times, and this increase is having a major economic impact.[19] Over the last 10 years, extreme weather has caused $129 billion in economic losses—an increase of 86%.[20] Flood damages for the world's 136 largest coastal cities could cost $1 trillion annually over the next 20 to 30 years.[21] Warming beyond 2 degrees Celsius (1.8 F) will accelerate catastrophic effects like lethal heat waves, droughts, severe storms and rising sea levels. Scientists have given us a "point of no return." Based on current projections of energy use, the world needs to transition to clean energy sources by 2035.[22] The clock is ticking.

We need a circular economy to confront the mounting crises caused by industrialization, globalization and the growing population. And we need it now.

We know it is possible. Consider how rapidly the world responded to COVID-19, and the impact those sweeping changes had on the environment. Pollution was down 50% in New York. The proportion of days with good air quality went up 11.4% in China.[23] Global carbon emissions fell by an estimated 5.5%, the largest annual decrease ever seen.[24]

We *can* do this.

This challenge already has its champions; Millennials and Gen Z are leading the charge. The generations whose futures and children's futures will be most impacted by climate change and the misuse of the finite planet are taking up arms. They are mobilizing, online and at global activism events like Zero Waste Youth.[25] They are demanding change from world leaders. Building disruptive businesses. Reimagining applications of technology. Holding governments and industry accountable. And rejecting the very concept of obsolescence.

These generations are the world's current and future consumers, employees and entrepreneurs—and they are demanding change. We are in the midst of a massive shift in consumer behavior, from an economy of ownership to an economy of subscription, sharing and reusing. Sustainability is becoming a central concern in purchasing decisions. In fact, Gartner reports that 81% of consumers already believe it is "very" or "extremely" important for businesses to contribute to a sustainable economy, forecasting that by 2029, wasteful supply chains will be viewed by consumers and governments as "unacceptable."[26]


**Figure 3:**

Consumer Demand for Sustainability[27]

The momentum is reaching a tipping point. Just look at the impact of a single BBC program in 2017, *Blue Planet II*. It brought the effect of plastic pollution on our oceans and sea-based food chains to the world's attention. The influence of this television series was remarkable.

The broadcast resulted in public outcry, and within months governments across the globe began to legislate to address the problem. In 2018, the EU voted to ban single-use plastics by 2021—plastic straws, cotton swabs, disposable plastic plates and cutlery are among the banned—while setting stringent targets for recycling plastic bottles.[28] To date, 127 countries have now passed laws to prevent plastic products from entering seas and oceans.[29]

This response was so extraordinary that Professor Richard Thompson, the person who discovered microplastic ocean pollution, describes it as the "Blue Planet II effect."[30]

And while the response has been far more immediate than anyone could have expected, the role of business is most instructive. Not only have organizations been quick to move away from single-use plastics, some have turned waste plastics into business opportunities.

Adidas is an excellent example. The company partnered with nonprofit Parley for the Oceans to produce shoes from marine plastic waste. Its first run of 7,000 sneakers sold out instantly. Adidas anticipates a revenue of more than $1 billion from these products and has a strategy to make all its products from recycled materials by 2024.[31] [32]

The circular economy equals good business.

New regulations based on sustainability concerns are expanding rapidly, impacting energy costs and establishing limitations or bans on specific materials and practices. Meanwhile, investors are increasingly examining environmental, social and governance issues when evaluating corporate behavior. Organizations must adapt.

But businesses can do more than simply adapt—they can thrive. Those who are able to solve the challenge of cultivating prosperity in a world of finite resources will achieve significant long-term benefits. They will realize substantial material savings, mitigate price volatility and supply risks, meet regulatory requirements and appeal to the new wave of consumers and investors.

Some companies, like Adidas, are already reaping the rewards of their forward-thinking business models. Renault, a leader in automotive engineering, was the first carmaker to invest in the circular economy. Their remanufacturing operations, which reduce their use of raw materials and transform end-of-life parts and vehicles into resources, are a 200-million-euro business.[33] [34] Similarly, construction machinery company Caterpillar reuses more than 150 million pounds of materials per year as part of a sustainability portfolio that produces almost one-fifth of the company's total revenues.[35]

Resource scarcity, stringent guidelines and consumer demand are here to stay. Businesses that become circular will be rewarded while linear businesses turn out to be as unsustainable as their system of economy.

It is time to embrace the zero waste economy.

## A Zero Waste Economy

> The World Economic Forum describes the circular economy as ***"the most profitable business model of the 21st century."*** [36]

We need to rethink the economic system. In the past, business has focused on minimizing waste where possible, using lean methods within specific parts of production and supply chain processes. This is no longer good enough.

We must reconcile our inability to fully remove waste from production processes with the reality that waste will no longer be an acceptable byproduct of doing business. This seems incongruous, but the solution is simple: the circular economy.

Zero waste is not simply "reduce, reuse, recycle." It is starting from scratch to reinvent the production, distribution and disassembly systems that usher materials through society. Business leaders must reconceptualize resources and waste, turning the (abysmally inefficient) linear system into an infinite cycle. And in so doing, develop new business models where waste is not the cost of doing business, but a revenue driver.

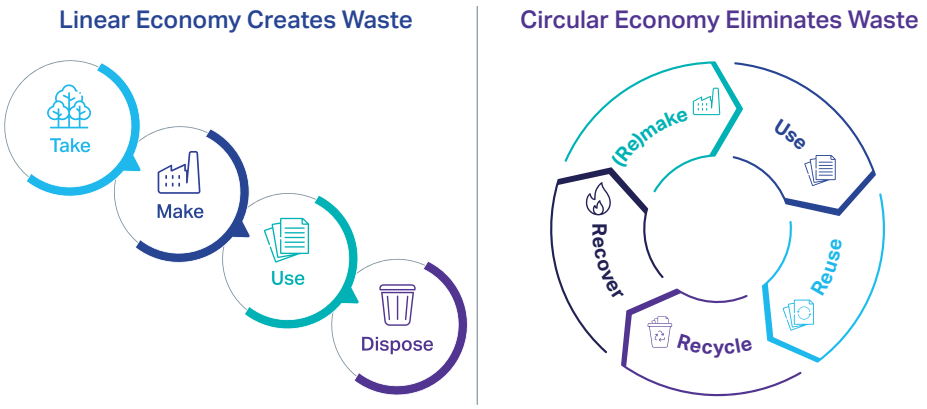



**Figure 4:**
Rethinking the Linear Economy

The key difference is a shift from waste management to resource management. The circular economy decouples economic value from the use of natural resources and transforms "waste" into a valued resource. Through this system, everyone wins. The economy wins, as new business models are introduced and resource management becomes more predictable. The environment wins, as human activity becomes more sustainable. And the individual organization wins, as it can now extract maximum and repeating value from resources while cutting costs associated with waste.

Unilever is widely seen as an exemplar of what can be achieved by adopting a circular supply chain. The company had previously sent 140,000 tonnes of waste to landfills each year. In 2015, it announced that 240 of its factories were to operate on a zero waste to landfill model. By 2016, Unilever had 600 zero waste facilities around the world.[37] The company reports that it has realized cost benefits of $227 million thanks to its zero waste program.[38]

Unilever's results came from a circular strategy based around what it termed the four "Rs":[39]

- **Reduce:** The easiest place to start is to reduce the resources used, thereby reducing the waste created. Unilever employed a strategy that recorded and reported all waste against usage. Piece by piece, the company could then reduce the waste going to landfill.
- **Reuse:** View waste as a resource and identify how waste resources can be reused or redeployed.
- **Recover:** Determine how previous waste products can re-enter the loop and be recovered. For example, use the original items for parts or reconditioning.
- **Recycle:** Where it is not possible to reduce, reuse or recover waste, look at how waste can be recycled into another useful material or product.

The circular economy means that, perhaps for the first time, organizations must consider the complete lifecycle of a product—including product use and end-of-life processes. And it means asking unprecedented questions of supply chains and production processes.

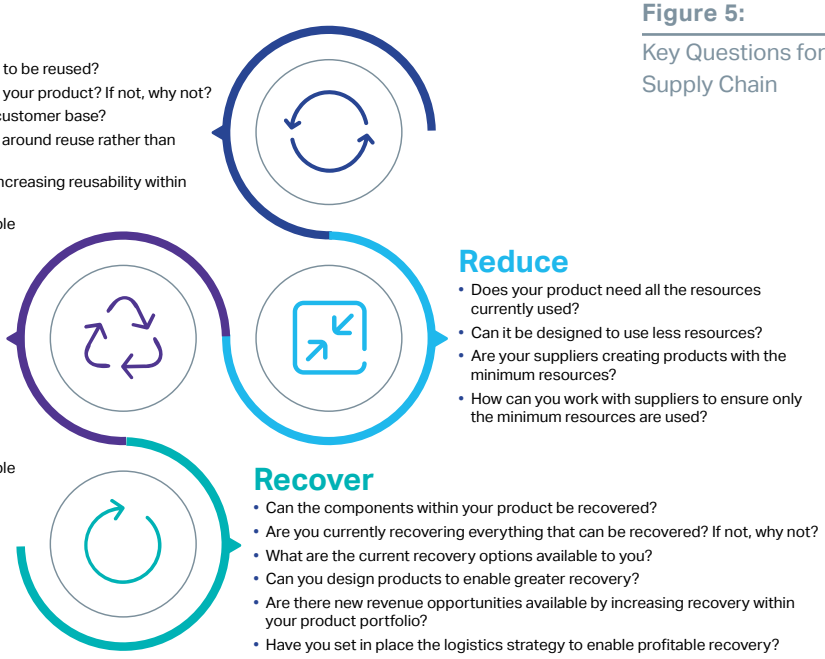



**Figure 5:**
Key Questions for the Circular Supply Chain

Many sustainability programs have focused on recycling, often limited to products at the end-of-life. The four Rs deployed by Unilever are looped and iterative.

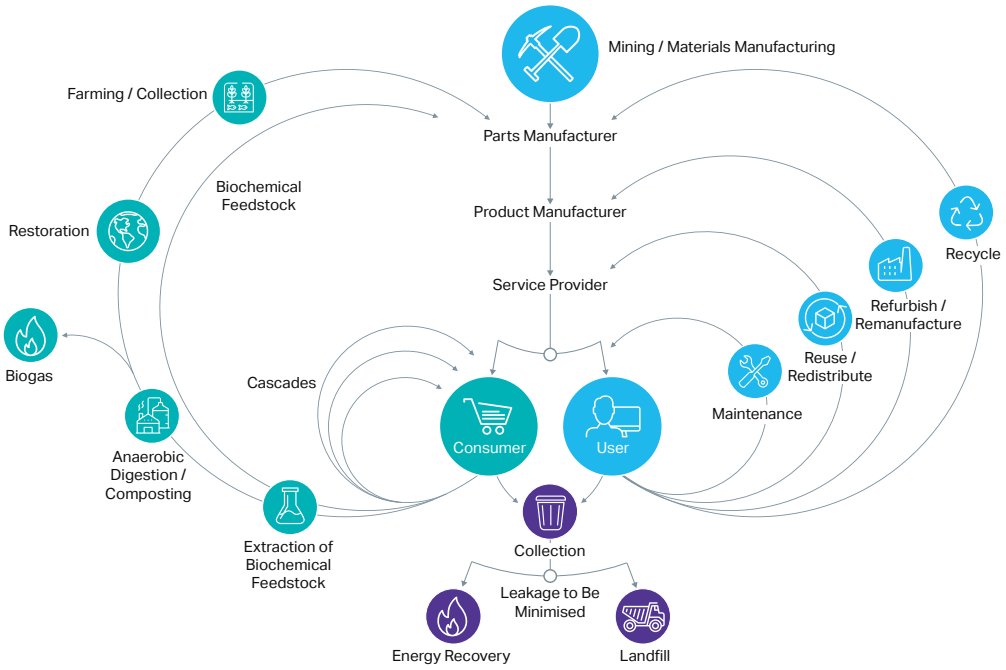



**Figure 6:**
Iterative Loops for Circular Economy[40]

## Top Benefits of a Circular Approach

Zero waste can be thought of as 100% yield. It brings maximum value from resources while reducing inefficiencies and risks.


**Figure 7:**
Benefits of Circular Economy

## Environmental Impact

The circular supply chain ensures minimal resources are deployed for any specific product and any waste created is turned back into a resource. Imagine a world in which our garbage joins other eco-friendly renewable resources in the revolution to save the planet. Zero waste is how humanity will sustainably coexist with the environment.

## Regulatory Compliance

Worldwide, government regulations around sustainability are growing and will increasingly push organizations toward a circular supply chain. Legislation is particularly active in areas like recycling and waste management.

Examples of current legislation include the EU Packaging Directive, the Japanese Recycling Laws and California's Recycled Content Laws—and more are coming into force all the time.[41] [42] Adopting a circular approach is the best way to meet evolving compliance requirements anywhere in the world.

It can also bring financial rewards, as organizations benefit from industry and government incentives.

### Brand Reputation

Sustainability is becoming a vital part of the buying decision for many customers. Trading partners of all sizes increasingly demand that companies align with their sustainability strategies and goals. Value chain partners, such as banks and financial institutions, are developing new products and seeking to engage with clients in new ways based around circular business practices.[43] Creating a circular supply chain is one of the most effective ways to boost an organization's reputation in its market.

### New Revenue Streams

As regulations around recycling and disposal become tighter, there is a greater emphasis on using the byproducts of manufacturing processes. This is leading to innovations and new revenue streams. It may be as simple as converting byproducts into green energy or as complex as creating entirely new products.

For example, global brewery AB InBev is turning the protein content from its grain byproducts into a "co-product" nutrition drink. Through its brewing process, the company generates enough of this protein to satisfy the needs of 25 million people each year.[44]

Circular strategies add new dimensions to the supply chain that in turn create additional value for businesses. It is not surprising, then, that the supply chain is transforming.

## From Linear to Circular: Technology for Transformation

The traditional linear supply chain model is evolving as companies invest in multidimensional partner ecosystems that encourage innovation and new ways of managing production and supply chain operations.

We are at the beginning of the journey to close the circularity gap.

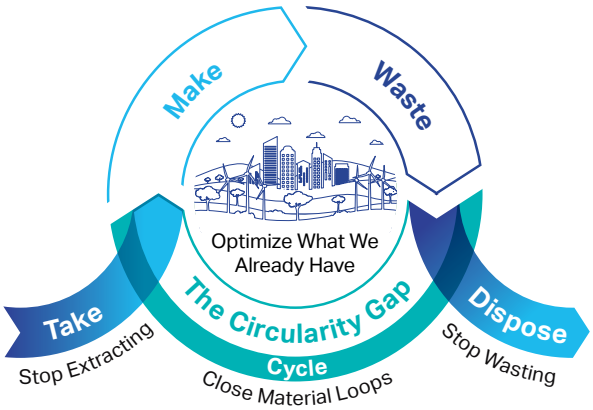



**Figure 8:**

Closing the Circularity Gap

Organizations that already have global trading partner ecosystems are ahead of the curve when it comes to rethinking the business models, product design and the supply chain processes necessary to close the circularity gap. Because these ecosystems require new process flows and formats, new service networks, many more touchpoints and frictionless information flows, overlaying circular capabilities can become an extension of activities already underway. For example, organizations can build new types of business partners into their ecosystem, such as specialist repair and remanufacturing providers.

According to senior executives surveyed in a Newsweek Vantage report, the scientific and R&D communities are the most important group for driving the transition to the circular economy. In other words, there is work to be done to develop the processes and technologies that will enable widespread recycling and reuse of manufacturing byproducts. And with 95% of executives agreeing that the circular economy poses an opportunity for their organization, we will no doubt see more businesses collaborate with partners in these fields to take advantage of technology and scientific breakthroughs as they happen.[45]

The survey also discovered that although people from within sustainability or Corporate Social Responsibility (CSR) functions tended to lead the shift toward circular economy, supply chain and procurement professionals played an extremely important role in implementing the strategies.[46]

Two further developments in supply chain management are helping facilitate the circular economy. First, new technologies are giving companies a far greater and more granular understanding of their products in use. It is now possible to gather data on how customers actually consume products and services, which features are most important, and how people deal with products at the end-of-life. Thoroughly understanding use and disposal is essential for designing better and more resource-efficient products, as well as determining how end-of-life products can be most effectively and profitably reintroduced into the production lifecycle or redeployed for new products or revenue streams.

Second, organizations are moving toward what has become known as the "bimodal supply chain"—a two-tier supply chain where one tier is managed for predictability to maintain and manage existing, predictable operations and the other is designed for innovation by encouraging experimentation and exploration.[47] The second tier is also built for dealing with uncertainty, which can be created by circular strategies or by unanticipated disruptions. Employing small collaborative teams that can fail fast and evolve models quickly, an organization can test different operational approaches to identify those that best suit the business. In terms of a circular supply chain, this may involve looking at new ways to engage and reward suppliers beyond cost and price concessions or performance KPIs.

### The Technical Foundation of the Circular Supply Chain: An Information Management Platform

Building a circular supply chain involves rethinking packaging, shifting sourcing strategies, restructuring production processes, transforming distribution systems and developing closed-loop supply chain methods. It must be based around a scalable and flexible digital ecosystem of partners.

Job one, therefore, is to ensure all parties in the digital ecosystem can smoothly and securely access and share the data they need. This includes integrating new sources of data related to the expanded supply chain scope, such as product use and disposal information. Organizations need an end-to-end view of both the supply chain and the product or service lifecycle.

### Solenis

Solenis is a leading global supplier of water treatment and process chemicals that also supports customers with application insights and practical expertise. They produce chemicals that go into process manufacturing for primarily heavy industries. Solenis' global supply chain previously relied on manual processes using legacy systems that made the company's B2B process and supply chain management complicated and cumbersome. They were seeking a solution to help build a digitized conversation, where systems can be managed from beginning to end, so they could focus their attention on top line growth, innovation and sales.

Solenis turned to OpenText's cloud-based B2B Managed Services to simplify the management of their global supply chain and automate internal processes such as the flow of transactions with suppliers and customers. With this platform, the company can quickly onboard new customers and suppliers. Further, Solenis is able to leverage OpenText experts to lead the implementation and help manage everyday operations of the solution, freeing up Solenis staff to focus on their core business and new opportunities.

The World Economic Forum states: *"Supply chain managers need to extend the focus of data analysis to the whole value chain. Only then they will get the right information to help both themselves and their supply chain partners harvesting the multiple benefits of a circular economy."*[48]

This means taking a fresh approach to application and data integration—one that not only encompasses all departments within the organization but extends to partners and external data sources. Holistic integration ensures correct and accurate data is always available within the supply chain.


**Figure 9:**

End-to-end Data and Application Integration

A unified information management platform is essential for seamless data flow through the digital ecosystem. Such a platform provides a central foundation that delivers performance, scalability and security to meet the key requirements for a circular supply chain, including enabling an organization to connect with its entire trading partner community, regardless of location or technical ability.

## Trust

Trust lies at the heart of circular strategies. Organizations must be able to trust their partners. A major part of building trust lies in the ability to trust the information that is being shared. Partners must be assured that the data flowing between systems, facilitating elements such as product redesign and closed loop production, is current, accurate and secure.

Consider how Mastercard is partnering with OpenText to build one such network of trust:


Mastercard, a technology leader in the global payment industry, has partnered with OpenText to help companies increase financial efficiencies across global supply chains, starting in the automotive industry. Given that B2B has become a huge priority for the company as it looks to expand services beyond credit cards, Mastercard realized that payment is just one piece of the puzzle. There is often a patchwork of processes and lack of interoperability in the whole B2B space which results in a lack of trust within the auto industry ecosystem.

The new solution from OpenText and Mastercard will streamline many of the operations processes while providing peace of mind to business buyers. The goal is to increase the speed, compliance and security for business information, payments and financing in the automotive supply chain. It is designed to facilitate integrated payments and to enhance the management of vendor master data, enabling suppliers to better manage risk for trade finance, accelerate cash flow for outstanding invoices and secure financial transactions with enhanced digital identity. This collaboration further advances a connected and scalable digital ecosystem, allowing companies, irrespective of size, location or technical capability, to build increased trust and security into trading partner relationships.

## Collaboration

Sustainable innovation calls for deeper collaboration, for example between internal product designers and suppliers or between external data sources and internal decision-makers. This requires much more open access to internal systems and connectivity with partners and data sources. Organizations must break down the information silos that have built up over the years to bring together internal functions and various players within the supply chain.

## Transparency

Both trust and collaboration are built on a new level of transparency within the supply chain. An organization must know the production processes, work practices and sustainability agendas of its partners. It must be able to see quickly whether its suppliers and partners are complying with its own sustainability goals. Every organization must be more open about how it operates and willing to share that information with existing and prospective partners, suppliers and customers. A central integration platform allows organizations to manage and share their circular credentials.

## Visibility

A circular supply chain eliminates waste from operations, recovers materials for reuse, and educates consumers about reuse and reclaim. But to achieve this, organizations must reach the holy grail for supply chain operations: full end-to-end supply chain visibility. An enterprise-grade integration platform enables the information flows needed to gain full visibility into all suppliers, customers and others involved in the value chain.

## Cloud

For organizations implementing a unified management platform and reimagining their business models, cloud is essential. With near-limitless resources, it facilitates ideas across the entire business ecosystem, enables information to flow end-to-end and simplifies interactions between applications, businesses, people and things. It is the connective tissue of the modern business that acts as a force multiplier for innovation.

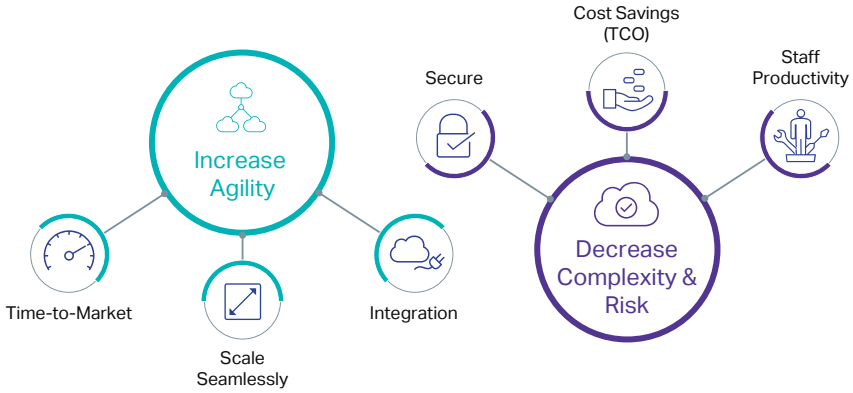



**Figure 10:**

Cloud Is the Destination for Innovation

Furthermore, the cloud (along with the rapid advance of mobile devices) has played a central role in dematerializing products—that is, replacing physical things with digital alternatives. Think of the fate of CDs, newspapers and brick-and-mortar travel agencies. Cloud-based, digital business models have already disrupted entire industries. They are more efficient. Customers get hyper-personalized content while saving time and money. It is the perfect groundwork for a sustainable system. Without physical goods to manufacture and ship around the world, the environmental footprint of these businesses is smaller. For example, digital music creates between 40-80% lower carbon emissions than its physical counterpart on CDs.[49] Cloud also supports the subscription and share models of consumption.

## The Internet of Things

Few innovations will be as essential to creating a circular economy as the Internet of Things (IoT). IoT devices are becoming smaller, cheaper and more intelligent. With the IoT, it is now possible to achieve complete visibility throughout the entire supply ecosystem and production process. Factors like temperature, usage and quality issues can be monitored to improve logistics, make production more efficient and dramatically reduce waste. As the IoT is increasingly embedded in consumer spaces, it is also becoming possible to monitor products after purchase, as some automakers are already doing. As materials reach the end of their "first" lifecycle, they can be tracked and flagged for recycling and reuse, putting them back into the production system rather than the landfill. Supply chain spending on IoT devices is forecasted to increase by over 20% between 2017 and 2023.[50]

The IoT is revolutionizing supply chains worldwide. The EU has even established a framework for IoT in the circular economy to "drastically change the nature of products, services, business models and ecosystems."[51]

IoT offers benefits across the entire supply chain:


**Figure 11:**

The Internet of Things and the Supply Chain

## Asset Track-and-Trace

IoT devices allow organizations to track products from the materials stage to the customer and beyond. Almost every aspect of a product can be monitored, including granular data like an item's temperature, how long it spent in cargo and how long it spent in store. Forrester found the track-and-trace sector to be the largest IoT spenders, with 24.2% growth.[52]

## Supplier Performance

IoT can be extended into managing supplier performance. Organizations can track how well suppliers are performing across many metrics, including sustainability standards. Within the circular economy, organizations have a responsibility to monitor how vendors are creating and handling the supplies they are sending, wherever possible. Ignorance will not be an excuse for being associated with unsustainable or unethical practices.

## Inventory Management

IoT sensors can provide far more accurate inventories, indicating where the inventory is within the supply chain and how fast products are moving off the shelves. Tracking and processing orders becomes more accurate and efficient, and the organization is aware of the status of all supplies in real time. In addition, this IoT data can be fed into analytics systems to fine-tune inventory planning and performance.

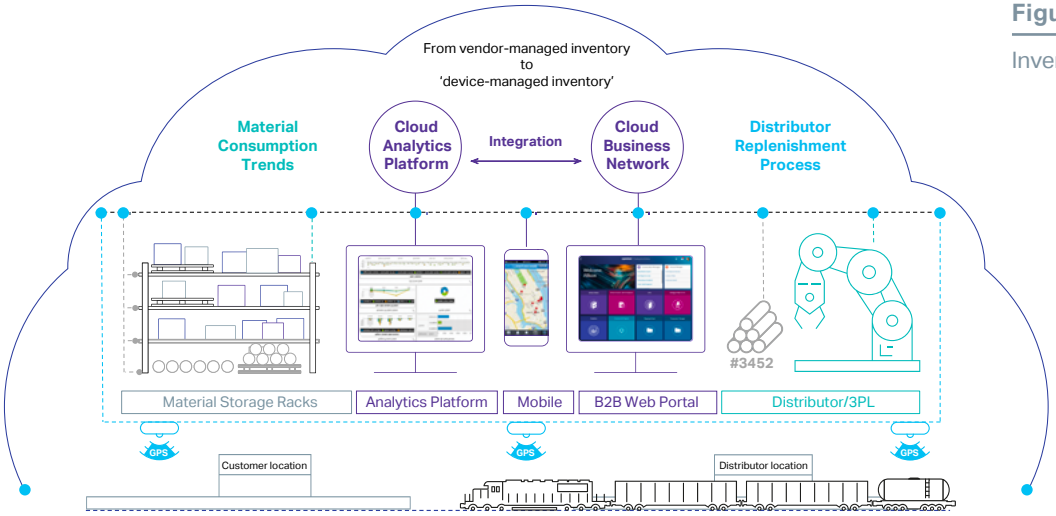



**Figure 12:**

Inventory Management with IoT

## Product Use and Performance

For the circular economy, IoT offers the breakthrough ability to understand how a product is being used in the real world. For the first time, a company can see exactly how customers use their products and what features are popular. They can then attune product design to customer needs, limit unnecessary features and materials, and stimulate increased reuse and recycling within the customer base.

## Predictive Maintenance

The IoT, combined with intelligent analytics or AI, gives organizations major new capabilities for predictive maintenance to manage planned and preventive maintenance. This allows production assets to be monitored in real time to minimize repair and part replacements while extending the life of the asset—and, in some cases, automating remedial actions. It also reduces the likelihood of failures that can result in safety or environmental catastrophes.

## Artificial Intelligence and Analytics

Combine the IoT with big data, artificial intelligence, real-time analytics and machine-to-machine (M2M) communication, and the applications are endless. This is all about unlocking the power of the data we already have.

To start, big data and AI will help businesses analyze the supply chain and make smarter decisions at every step. These technologies can provide insights on product use patterns and customer preferences, as well as optimizing supply and demand, product maintenance schedules, and labor and resources needs. Along with delivering predictive maintenance suggestions, AI will be able to improve our ability to automatically disassemble, sort and separate all kinds of used products so they can be reused or put back into the system as resources.

Great opportunity also exists to analyze and minimize waste patterns. For example, start-up Zabble combines smart monitoring technology with intelligent data analytics software to provide businesses with actionable suggestions for their waste streams, from diversion to contamination to greenhouse gas emissions.[53] We could also optimize every part of our food's journey from farm to table—IoT technologies can collect sensor data at harvest, storage and consumption while AI and analytics step in to improve yield, streamline distribution and enable surplus food to be shared before it perishes.

Beyond that, these technologies are our best tools for accelerating the transition to a circular economy. AI can be used to help design new products, components and materials based on very specific criteria needed for success in the circular economy. Big data analytics can optimize circular economy business models and crunch massive amounts of data to give us new solutions faster and with more precision than humans are capable of alone.

However, to truly realize the circular supply chain and successfully implement powerful information technologies, certain obstacles must be overcome.

## Obstacles to the Circular Economy

Although the circular economy is where we are headed, the reality of implementation is a challenge. When asked, 80% of organizations admitted they struggle to include sustainability in their supply chain management, with 47% doing little or no work with suppliers to manage sustainability.[54]

Businesses must surmount many hurdles to achieve a circular supply chain and sustainable business model.

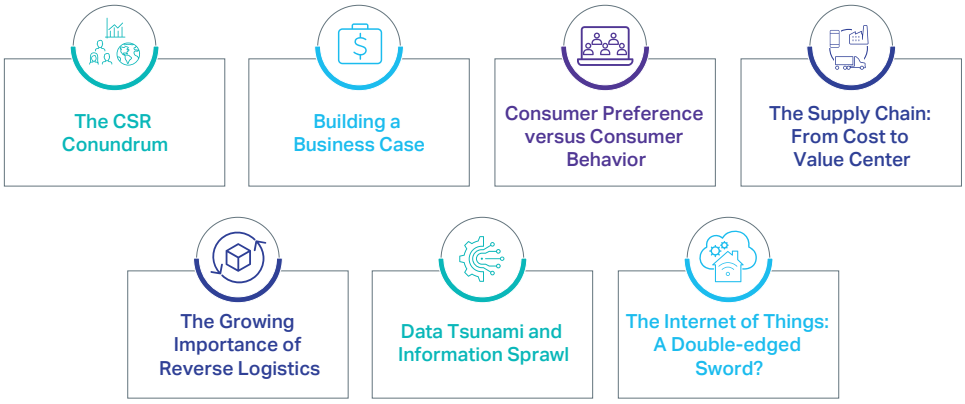



**Figure 13:**

Obstacles to the Circular Economy

### The CSR Conundrum

Conflict between commercial and CSR goals is the single most significant challenge to implementing a circular business model, according to the Newsweek Vantage survey.[55] The research group suggests that circular initiatives should not be seen as a natural extension of existing sustainability or CSR programs.

Professor Cory Searcy at MIT Sloan takes this even further: *"Corporate sustainability is often framed using the triple bottom line (TBL) of economic, environmental and social performance. … But the TBL does not connect company performance to the economic, environmental and social resources on which they rely. Performance is assessed relative to the company itself or its peers, rather than against thresholds linked to those resources. This makes it impossible to assess true sustainability."*[56]

TBL performance metrics must be built into operational measurements. Supply chain managers need to develop KPIs that take sustainability into account and build relationships with supply chain partners that revolve around sustainable business practices. To do this, resource thresholds and targets—such as those set out in the UN Sustainable Development Goals (SDGs)—need to be translated into tangible business actions and supply chain models.[57]

### Building a Business Case

Another big challenge is simply the lack of a proven business model.[58]

Businesses are focused on cost-savings; in many instances, using virgin resources is more immediately economical than recycled or reusable alternatives. It takes a lot of work to communicate—and ultimately build understanding and acceptance of—the long-term value of the circular approach across the organization and to partners and customers.

Many examples of circular supply chains delivering tangible benefits involve large organizations that were able to change primarily internal processes with little or no effect on their supply chains. Implementing a "cradle-to-cradle" circular approach across the multidimensional digital ecosystem of the modern supply chain remains a major challenge for supply chain managers.

The World Economic Forum points to the process-related industries to explain the difficulty of deploying circular strategies across the supply chain: *"Chemical companies work upstream as a tier-one value creator after the extractive industries. Since most partners are downstream, laying out a circular economy scenario is like pushing a rope."*[59]

## Consumer Preferences versus Consumer Behavior

Do consumers say what they mean?

There is a mountain of evidence that consumers say they want sustainable products and are willing to pay more for them.[60] However, when it comes right down to it, they do not always put their money where their mouths are. In industries such as fashion and food, consumers have *said* they want sustainable, responsible products but have not actually been willing to pay for it.[61] [62]

While meeting consumer expectations on sustainability and ethical business is important, in the short term organizations should view the brand reputation boost not as the main goal but a beneficial byproduct. Eliminating waste, increasing the value of resources, delivering a smaller environmental footprint and benefiting from government incentives are likely to carry more weight at the board level.

In the longer term, sustainable products will likely outperform traditional options. Evidence suggests that markets are already moving in that direction—representing an impressive 50.1% of all market growth between 2013 to 2018.[63]

## The Supply Chain: From Cost to Value Center

The supply chain has traditionally been viewed as a cost of doing business. However, through digital transformation the supply chain evolves into a multi-tier ecosystem and strategic driver of business growth, agility and differentiation.

Unfortunately, achieving the required level of digitization has been slow. For example, recent research demonstrates that 85% of U.S. retailers still rely on manual processes.[64]

The days when suppliers did only that—supply—are in the past. Most organizations look to their partners for collaborative product development. In fact, as much as 65% of the value from a company's products or services are derived from its partners.[65] Ongoing innovation relies on organizations selecting the right suppliers for any specific project and working closely with them. At the same time, the supply chain must be flexible enough to manage increasing complexity and to shift rapidly, when necessary, to meet changing customer demands or significant disruptions (as the world discovered during the COVID-19 pandemic).

No single company can excel at everything. In the context of the circular economy, organizations must build strong and transparent relationships with a growing range of suppliers that are able to align their production capabilities with the company's sustainability strategy, help redesign supply chain processes, and reach new market segments with products or services tailored for them. In many areas, new recycling and reuse solutions are becoming available as innovative solution providers emerge to meet the demand.

## The Growing Importance of Reverse Logistics

Reverse logistics is "the cornerstone of the circular economy."[66] Providing input into product use, end-of-life, and the processes related to reusing products and materials, reverse logistics is essential for the circular supply chain.

It is not just about product returns; there is a great deal of complexity in the process. It involves planning, implementing and controlling the efficient flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or effective disposal. Remanufacturing and refurbishing activities can also be included as part of reverse logistics.

Making reverse logistics cost-effective is the central challenge. In the U.S. alone, customers return over $360 billion in merchandise annually—and that number is on the rise.[67] Many ecommerce organizations now build reverse logistics into their business models, since 30% of ecommerce goods are returned.[68] Some categories are even higher, with returns of shoes bought online estimated at a massive 70%.[69]

To meet the increased pressure on revenues as more products and materials reenter the production and manufacturing process, all trading partners in the supply chain must work together to reduce costs and drive efficiencies in the reverse logistics process.

## Data Tsunami and Information Sprawl

The supply chain has been slow to adapt to big data; despite compelling benefits, implementation is difficult for most organizations. They struggle to collect and analyze the huge amount of information across processes, data sources and siloed applications. And that is only the internal picture. Fewer still have visibility and control over data within the systems of suppliers and partners.

However, fully leveraging this data delivers an information advantage that is pivotal to success for every supply chain venture, including the circular economy. To compete in today's digitally transformed business landscape, organizations must evolve or die.


**Figure 14:**

Information Drives Disruptive Models

Forbes notes: *"The future of supply chain digitization will be driven by data and analytics. Data is a commodity, which is not necessarily valuable in and of itself—insights from that data are far more useful. Numerous advances powered by technologies like predictive analytics and location intelligence are improving the way the entire supply chain makes use of data."*[70]

Pioneers in big data analytics have seen impressive tangible benefits, including visibility into inventory levels, order fulfillment rates, and material and product delivery; optimization of supply chain strategy and commercial priorities; and launching entirely new ventures.

We have a paradox. More information means greater opportunity for insight and innovation. But it is also more difficult to analyze and gain the value in such enormous volumes of data. We are close to an inflection point. Technologies such as AI and advanced analytics are making it possible to tame the data tsunami and enable the seamless information flows and visibility needed to drive a circular supply chain.

## Matson Logistics

As one of the top logistics providers in North America, Matson Logistics offers domestic and international rail intermodal services, long haul and regional highway brokerage, and supply chain services, as well as third-party logistics services that include warehousing, distribution and international freight forwarding. Matson Logistics sought a B2B platform with world-class EDI capabilities to securely exchange business documents, such as purchase orders and invoices, in a standard electronic format with its network of business partners.

Matson Logistics wanted to focus on their core competencies and move away from the daily grind of managing B2B integration operations. The company was spending too much time and money onboarding new trading partners and managing trading partner issues, rather than on its primary focus of delivering first-rate logistic services to customers.

OpenText B2B Managed Services was the ideal solution to manage the company's B2B network needs, including onboarding and enabling trading partners, mapping, translation, document tracking and monitoring. Matson Logistics consolidated its EDI operations from four different service providers to a single platform and handed off the day-to-day responsibilities to OpenText. With OpenText B2B Managed Services, Matson Logistics achieved cost savings and operational efficiencies, as well as enhanced service delivery to its customers. The company was able to reduce support costs by 24%, cut down trading partner onboarding by five weeks, reduce advanced shipping notice (ASN) fines by 12% due to improved ability to meet service level obligations, and redeploy their IT staff to other value-added functions.

### The Internet of Things: A Double-edged Sword?

While IoT has significant benefits, it also represents a new style of computing and can therefore be hard to deploy. Implementing an IoT network for the circular economy means tackling new issues in integration, device management, data privacy, IT security and access management.

IoT is not simply about managing devices on an internet-based network. For the first time, the organization is creating a complex ecosystem of people, applications and things. Each must communicate and interact with each other. Gaining value from IoT investments involves a wide range of other technologies—such as cloud platforms, sensors, connectivity, machine-to-machine communications and data analytics—that must interoperate and be managed as one integrated solution.

## Business Network: Supply Chains for Circular Economy

Over the past decade, linear supply chains have evolved into collaborative ecosystems, driven largely by the globalization of many of today's businesses and the change from local to global sourcing of products. Through the cloud, companies can connect with suppliers anywhere in the world, collaborate with them on a regular basis and ensure information is available anytime, anywhere, from any device.

Like the shift from linear to collaborative, organizations transitioning to the circular economy must automate manual business processes and leverage cloud-based integration across both internal and external business ecosystems. A unified business network platform is the digital foundation needed to support organizations as they embrace more ethical and responsible supply chain practices:

- **Connect:** Connect and transform data for seamless information flows with any person, system or thing
- **Optimize:** Gain insight into transaction trends to optimize productivity and mitigate risk
- **Grow:** Accelerate time to market, exceed customer expectations and comply with mandates

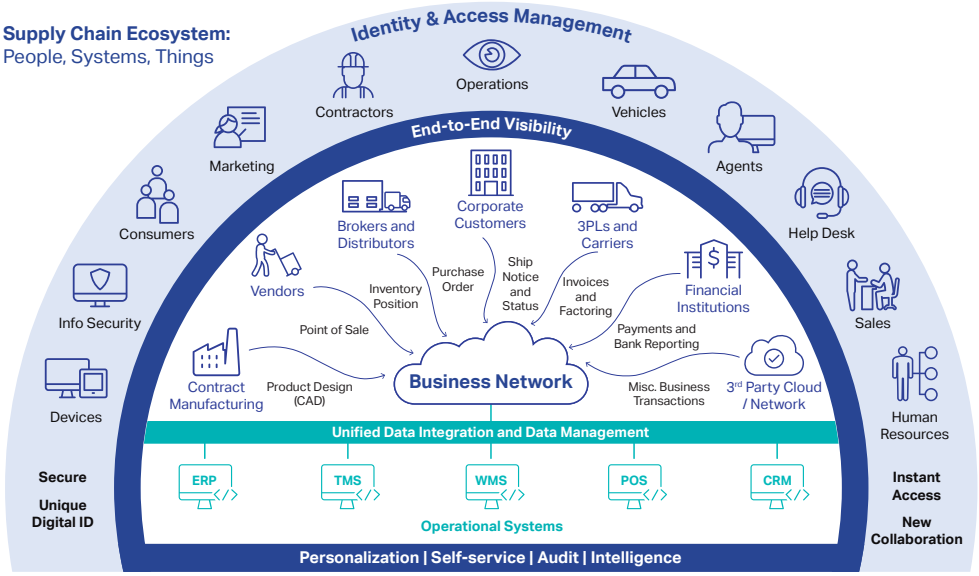



**Figure 15:**

A Frictionless Business Network Solution

For the circular economy to operate seamlessly, organizations must not only think about how they receive parts to make products and distribute them to customers—they must also embrace reverse logistics and consider how they can facilitate recycling and reuse. Companies will need tracking and visibility on materials and products from end-to-end, all the way from material sourcing, to production and delivery, to consumer use and the eventual return of the product or material into the system for reuse.

To illustrate how business network solutions can empower the circular economy, let's consider a car manufacturer:

Accelerating its electric vehicle development strategy to compete with new market entrants such as Tesla Motors, a North American OEM is about to embark on a new electric vehicle project. Given the green nature of these vehicles, the OEM wants all parts going into the vehicle to be ethically sourced and up to 90% of the vehicle to be recyclable. One of the main components is the battery—what happens when these batteries reach their end-of-life? How are the materials that make up the battery recycled? And how can these batteries be tracked during their lifetime and through to recycling?

This is where a suite of cloud integration solutions can help. Imagine a business network securely connected to hundreds of thousands of trading partners, including the top vehicle manufacturers and suppliers around the world.

### Identify Potential Suppliers

Our automaker wants to ensure all components and sub-systems used to manufacture the new electric vehicle are ethically sourced and that suppliers follow their responsible sourcing guide. Considering the thousands of parts that go into manufacturing a car, how does a procurement team quickly identify suitable suppliers to work with?

Ethical sourcing relies on the ability of businesses to swiftly and easily find and onboard new suppliers, based on compliance with environmental and social responsibility standards. To do this, organizations have traditionally resorted to internet searches and referrals from trusted partners—often ending up with either an endless list or just a handful that may not even qualify to do business with.

Today, a new generation of trading partner directories allow organizations to search and identify suppliers based on specific search criteria, including B2B capabilities and ethical qualifications and certificates. The directory could also hold information on the recyclable nature of the products being supplied. These directories enable organizations to:

- Manage supplier communities strategically and ethically
- Accelerate onboarding and time to market with pre-qualified partners
- Gain quick visibility over a supplier's ethical credentials
- Ensure compliance with ethical supply chain initiatives and goals
- Gain agility and control from the supplier community
- Increase global sourcing options and flexibility
- Gain supplier insights for efficient supply chain processes

## Secure Trading Partner Relationships

Our electric vehicle manufacturer has now selected key suppliers to work with. They need to secure all information exchanged and set conditional access for internal business applications, such as design or inventory management systems, that support the electric vehicle project.

Today's supply chain is a complex network where suppliers collaborate with other suppliers, access an organization's internal system and applications, and use data from IoT devices connected to assets within the production and supply chain processes. Suppliers may need secure access to inventory systems if they are operating within a vendor-managed inventory system, and other external contractors may need secure access to enterprise systems and information based on their role.

To manage all of this securely, businesses need a platform with central, robust identity and access management (IAM) capabilities. Trading partners, systems and things across the business ecosystem must be assigned unique digital identities with varying levels of access, from external business partners such as third-party logistics carriers to internal logistics and warehouse management systems.

Securing the supply chain increases trust and minimizes risk across trading partner relationships—just as important in the circular economy as it is today.


The ACG represents over 9.4 million members and is one of the largest AAA clubs in the national association.

Using OpenText Identity and Access Management, ACG will create a single digital member identity across all business units to reduce complexity, increase security and streamline the digital experience for customers. ACG wants its members to be able to securely access any of its products and services from any digital channel, whenever and wherever they choose. By securely connecting ecosystems of people, systems and things, ACG believes it can enable new service offerings, optimize operations, develop new business models and ultimately take advantage of the connected economy business model.

The platform will be a game changer for the organization operating in today's digital ecosystem where identity awareness and secure access is at the core of managing all interaction, whether human or machine generated.

## Digitize Information Flows

Having secured the supplier network for the electric vehicle project, the next step is to facilitate electronic information exchange across every partner in the digital ecosystem.

Developing an ethical and sustainable supply chain should be the goal of every procurement and supply chain leader. To do this, the organization needs to know it can trust its information. This means capturing accurate data linked to its ethical strategy from all areas of the supply chain. And to do that, the flow of data and transactions must be digitized.

Replacing manual, paper-based purchase orders and invoices with digital Electronic Data Interchange (EDI) transactions is more cost- and time-effective. It also greens the supply chain, saving millions of trees each year. Even small suppliers can exchange information through fax-based communications converted to an EDI format. Fax remains a critical and widely used method of sharing document-based information, particularly in the healthcare and financial services industries.

For delivering end-to-end trading partner integration and collaboration, the ideal platform is a single cloud solution that provides:

- Seamless integration with internal applications, including APIs and web services integration
- End-to-end visibility of all transactions and documents exchanged over the network
- Fast and secure connections to hundreds of thousands of pre-qualified trading partners
- Workflow orchestration to ensure supplier compliance to the organization's policies
- Complete community management beyond initial onboarding, including customer tools for ethical qualification, community collaboration and information management

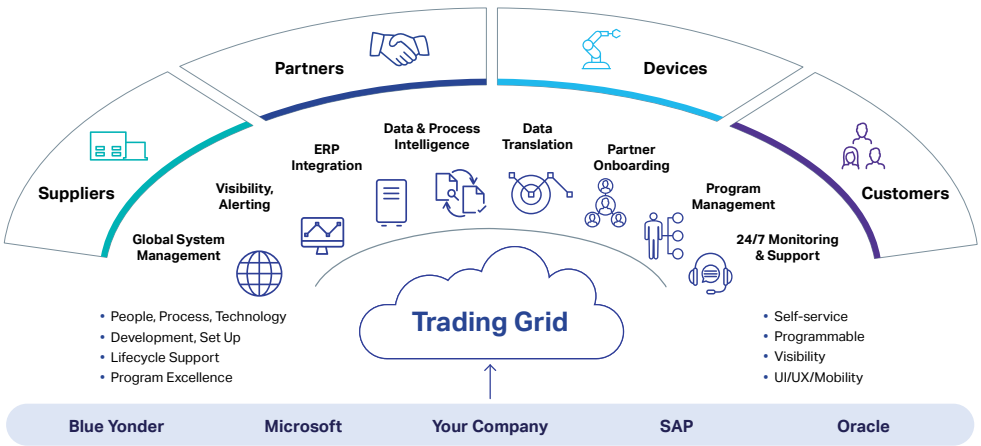
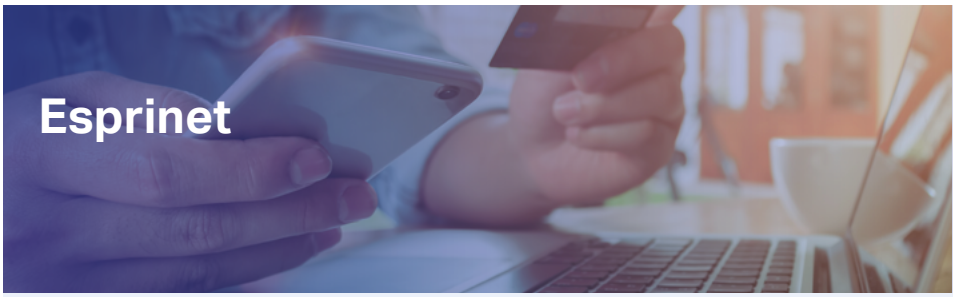



**Figure 16:**

One Platform for Information to Flow

Modern cloud integration solutions provide a foundation for trading partner ecosystems to work and collaborate effectively. The organization and its suppliers can exchange business transactions and documents to deliver complete supply chain visibility and transparency, ensuring that all business happens in an ethically compliant manner.



## Esprinet

Esprinet is a wholesale technology distributor in Italy and Spain established in the 1970s that today supplies more than 600 brands to over 40,000 resellers. Esprinet's unique internet-based business model is especially focused on delivering technology to resellers that address small-to-midsize businesses, retailers and corporates. Top brand names, such as Apple, IBM, HP, Toshiba and Lenovo, among many others, form their portfolio. The range of technology includes personal computers, tablets, supplies, consumer electronics, servers, networking, storage, peripherals and software with more than 45,000 Stock Keeping Units (SKUs). For more than a decade, many of Esprinet's large suppliers have mandated Electronic Data Interchange (EDI) as the only means to exchange documentation relating to orders. These include the orders themselves, acknowledgements, shipping notices, receipts, invoices and credit notes. With a growing number of suppliers moving to EDI, Esprinet found it was expending greater amounts of precious internal resources on establishing new connections. Added to this, many existing suppliers would periodically require changes to be implemented.

Having researched potential solution suppliers, Esprinet selected OpenText and established their first connections, mapping the various data points internally to enable the exchange of data. Being able to release staff from the workload involved in establishing and maintaining these connections has meant that focus can be applied elsewhere. With OpenText B2B Managed Services, their system now automatically checks the invoice against a PO, confirming goods have been received and matching delivery notes. Esprinet can now save time, reduce the potential of human error during data entry and have a complete audit trail.

### Monitor Shipment Provenance

Our car manufacturer needs end-to-end visibility of inbound shipments so their just-in-time production system can operate seamlessly. As COVID-19 has highlighted, improved visibility helps ensure inventory stock is available when needed—especially during periods of disruption. Once the electric vehicle has been manufactured, the automaker must also track the shipment across the delivery network and let customers know when it will be delivered. Finally, when a vehicle or part reaches its end-of-life, it will need to be tracked through the reverse logistics process to ensure it goes through the recycling process. These are the three main supply chain visibility stages that support the circular economy.

Supply chain visibility solutions enable companies to track and trace the flow of goods, products and transactions through the full production and distribution process.

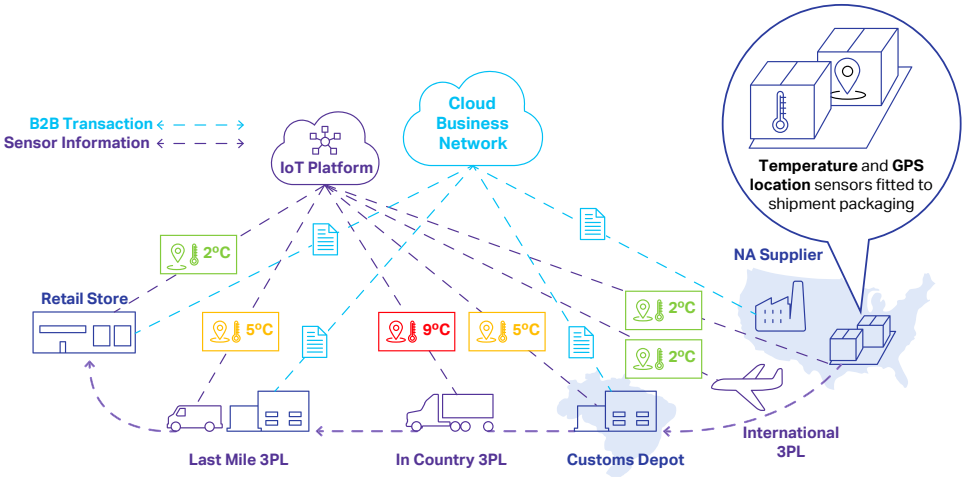



**Figure 17:**

Track-and-Trace

Using Industry 4.0 technologies, it is now possible to track the movement and monitor the condition of goods as they traverse the supply chain. Everything can be IoT-enabled so its location and condition can be continuously monitored. The combination of an IoT platform with other technologies, including blockchain, can capture source information and retain the provenance of goods. IoT solutions will become a key enabler of reverse logistics environments in the future.

In our electric vehicle example, a sensor could be placed on the battery pack for performance monitoring. Then, at its end-of-life, a GPS location sensor could be activated to provide visibility as the battery is tracked to an appropriate recycling center, confirming it has been ethically recycled or disposed of.

Blockchain stands to transform ethical sourcing practices. Many companies are just beginning to understand the technology and how it can be applied. For example, blockchain could provide a permanent, immutable record to verify that parts of the electric vehicle have indeed been recycled. Once written to a blockchain, this information cannot be falsified, providing another way to secure the information that supports the circular economy.

## Manage Supplier Communities

While our vehicle manufacturer is producing their new car, they will need to manage collaboration between all trading partners associated with the new vehicle.

Experts anticipate the growth of collaborative platforms for trading partner communities to store, share and report on information related to the supply chain, such as purchasing practices, labor rights and ethical standards. Organizations must find an integrated way to engage with strategic suppliers, leveraging their knowledge and capabilities while enhancing customer service and experience.

Compliance—both in terms of ethical standards and regulatory mandates—must be vigilantly maintained across the entire supply chain. Companies that do not comply can face fines, lost contracts and legal action. However, this is a complex endeavor as regulations change over time and differ across industries and regions.

The solution is a supplier information management (SIM) platform that delivers a single source of the truth for each supplier. It lets companies digitally exchange key business documents with suppliers and share vital information on how each trading partner is operating.

SIM has the technology, tools and processes to drive efficiency and collaboration in the supply chain by:

- Creating a centralized, real-time source of supplier information, including ethical qualifications, contacts, performance and compliance
- Delivering a single, shared view of all supplier information across the organization
- Facilitating the process of adding and updating information to ensure total accuracy, including supplier self-service
- Expediting supplier information organization, search and retrieval
- Improving the execution of supply chain initiatives, such as regulatory compliance, green standards and supplier chain visibility
- Minimizing risk and disruption across the supply chain

## National U.S. Retailer

As an example, consider a leading national retailer that delivers name brand family apparel, accessories, cosmetics, footwear and houseware goods across the U.S. The retailer faced immense challenges with suppliers that were unaware of its requirements. The compliance and vendor relations team had to show suppliers how to ticket, pack and comply with the retailer's requirements and guidelines.

To be successful, the team needed to streamline the communication process that would advise the suppliers of the company's requirements, alert suppliers when they were non-compliant and create a clearly identified communication path for them to ask questions and receive responses in a reasonable time.

The other challenge was the company's manually intensive processes. Doing everything by hand created time-consuming bottlenecks to getting problems resolved. It also did not foster a friendly environment with suppliers.

To solve these pain points, the company choose OpenText™ Active Intelligence, which now keeps its supply chain running smoothly with real-time transaction visibility and automated deduction management, reporting and analysis for monitoring partner performance. The solution helps improve the accuracy, completeness and timeliness of the company's B2B transactions. By combining the Active Intelligence solution to help automate processes with the human element of the compliance team, the company can communicate more efficiently with suppliers and be even more vigilant with enforcing compliance.

Beyond cost savings and compliance, a SIM platform delivers confidence in the quality and accuracy of the supplier information. It helps provide assurance that suppliers are meeting environmental and social commitments and builds trust and transparency to meet customer expectations.

### Gather Ethical Insights

Our automaker is eager for insight into its end-to-end operations—not just across the external ecosystem, but its internal business environment as well. With these insights, it will be able to optimize the processes associated with the new electric vehicle.

It is not easy to get insight into trading partner performance and understand the ethical pulse of supply chain operations. Massive, unruly amounts of data are created every minute within global supply chains. Fortunately, we now have powerful technology that can unleash the value in that data.

Big data analytics, AI and machine learning deliver the insights that today's supply chain executives need. A comprehensive analytics platform empowers companies to manage social performance, determine compliance, manage risks and improve profitability. AI is transforming every aspect of business, including supply chain operations. In support of the circular economy, supply chain professionals can use sophisticated self-service AI-enabled analytics dashboards to monitor the ethical performance of trading partners and apply measurable KPIs tied to sustainable goals and standards. With this information, organizations can weed out partners that are not living up to their sustainability requirements and find other, higher performing, suppliers.

Intelligent, connected and secure business network platforms along with Industry 4.0 technologies are key to closing the circularity gap and evolving business models for circular economy—the only economy of the future.

## The Only Economy of the Future

The call for a new economic model cannot be ignored. The revolution is transforming linear chains into dynamic ecosystems. It is reorganizing markets. It is reshaping relationships between materials, products, consumers and businesses.

The opportunity is now. It is time to transform or be left behind.

We are in the pioneering phase of the circular economy, where scalable sustainable business models—based on methods made possible by Industry 4.0 technologies—will soon unseat long-standing incumbents. This is an economic opportunity worth billions.[71]

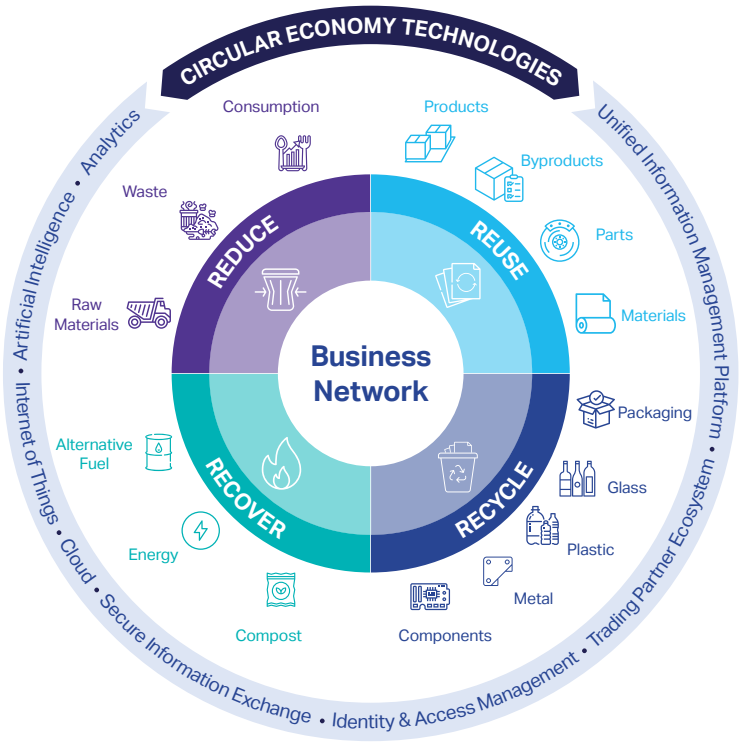



**Figure 18:**

Powering the Circular Economy

Leading global businesses are taking action. Organizations including Unilever, Amazon, Target, Cisco, Walmart and Nike have already begun making investments in circular economy models. For example, both Unilever and Walmart have made huge commitments to ensure that 100% of their packaging is reusable, recyclable or compostable by 2025.[72] [73] Cisco has set an ambitious goal for 100% of new products to include circular design principles by 2025 and was a founding member of the Ellen MacArthur Foundation, whose mission is to accelerate the transition to a circular economy.[74]

A recent study from the United Nations Global Compact and Accenture Strategy reports that 99% of CEOs from companies with more than $1 billion in annual revenue believe sustainability will be important to the success of their business.[75] *Ninety-nine percent.*

To stay competitive, business leaders must make real change within their business models and supply chains, forging ethical ecosystems that reuse and renew.

Disruptive digital technologies will be at the center of the zero waste circular economy. They are the result of humanity's ingenuity, and now it is time to put that ingenuity to work crafting the innovative products, business models and global ecosystem needed to thrive in the sustainability crisis of our era.

The circular economy promises enduring benefits. Production cost savings and less resource dependence. A more resilient economy. An economic system built to last. A healthy, thriving planet for future generations.

We are at the beginning of a massive movement, predicted to go mainstream in the next ten years.[76] This is the biggest opportunity of our lifetime. Entire industries are rising and falling. Yet, no organization will conquer these challenges singlehandedly—it will take collaboration between suppliers, retailers, partners, governments and individuals to build a future of responsible consumption. Business leaders who make the choice now to embrace circular economic practices will catch this wave at the start and ride it with a strong competitive advantage—a circular advantage.

The circular economy is not just the preferred economy of the future. It is the only economy of the future… and *for* the future.

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