



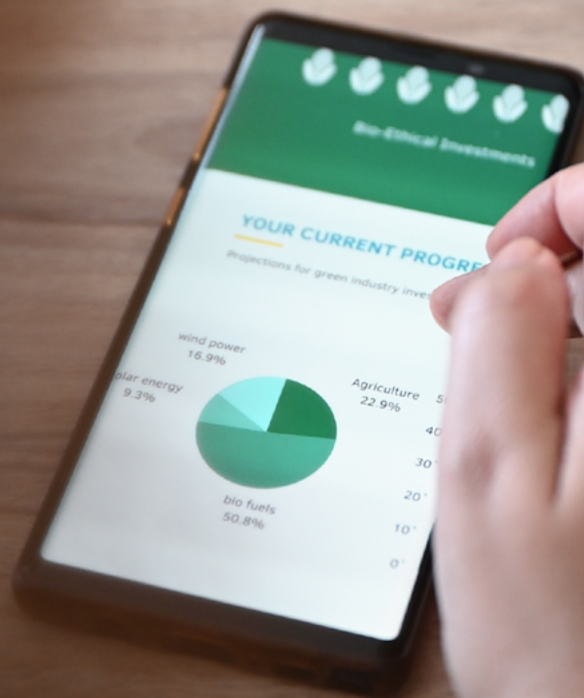
# “Green Deals” Go Digital

How Can Companies  
Gain from Sustainable  
Digitalization?



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# “Green Deals” Go Digital

## How Can Companies Gain from Sustainable Digitalization?

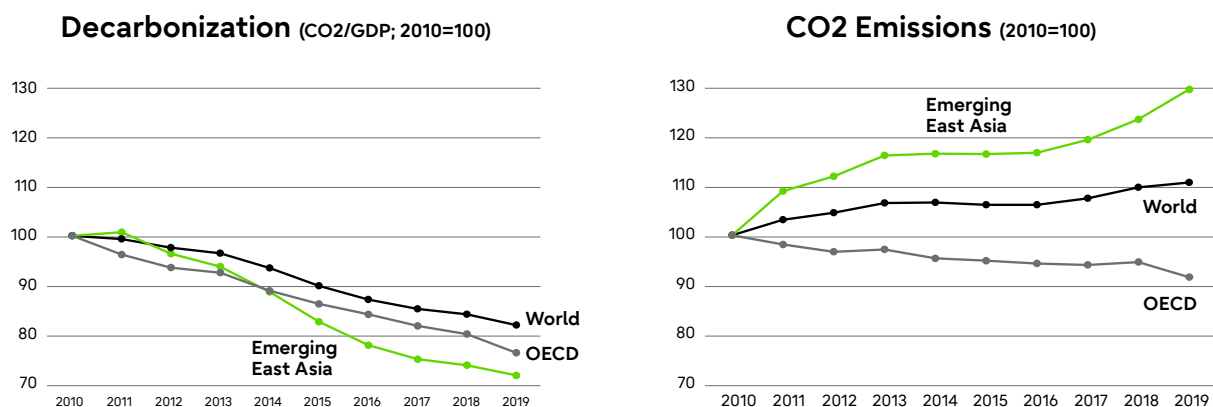
As we experience greater insecurity than ever before, from geopolitics to climate change, sustainability has become an increasingly critical global priority. In this environment, executives are focusing on protecting the technology core of their organizations, while adapting their underlying partnerships and technology platforms.

To build the resilience required, entire value chains need to become more secure, flexible, and sustainable to future-proof operations. At the same time, governments are experimenting with a new wave of Green Deal decarbonization policies, promoting digital transformation as the route to developing more circular economies. In this context, innovative companies can gain by aligning their digital value chain strategies with the requirements of sustainable transformation.

# 1. What's new for green growth and sustainability strategies?

Around the world, the increasing number of unexpected natural disasters related to climate change has shocked governments into action. Slow-moving international cooperation talks, and incremental carbon emission regulation, is no longer seen as an adequate response. The result has been a rethinking of “green growth” policies that have successfully increased efficiency, without significantly reducing emissions on a global scale (see Chart 1). A new generation of Green Deals around the world is therefore now setting net zero emission targets, while pioneering sustainable transformation (SX) that creates a circular economy with fewer material inputs and much less waste.

Chart 1 Decarbonization Success vs Emissions Default



Note: CO2 emissions (kg per 2017 PPP \$ of GDP). CO2 emissions (kt). 2010 = 100.  
Source: World Bank (2022) - Open Data.

Green Deals are now helping to establish new industrial policies that can achieve absolute emission reductions. Governments have started their own massive investment into renewables, energy infrastructures and carbon efficiency. In the EU, the Green Deal and associated recovery fund provide about \$1.8 trillion of transformation funds, largely earmarked for green investment and transition projects. In the US, three government investment acts, the Infrastructure, CHIPS and Inflation Reduction Acts, are raising an unprecedented \$3.5 trillion in new investment. These projects are already having a strong impact on driving greener corporate investment and innovation decisions. In the fast-growing Asian economies, while governments are less likely to invest themselves, they are encouraging their industries to focus on digital-first investment that enables the development of greener, smarter cities.

However, for most companies, the most fundamental change in environmental strategies is not coming from new investment and subsidies. Rather it is coming from a sea change in government thinking, that now sees digitalization as a necessary and potent transformation force to achieve green objectives. “There is no Green Deal without digital” says the EU Commission. In the US, unprecedented funding is flowing into technology and digital research. Across Asia, digital-first strategies are becoming aligned with green decarbonization targets. The hope is that the innovation triggered by digital transformation (DX) can be channeled into sustainable transformation (SX) by encouraging companies to cooperate and integrate sustainable targets into their ongoing transformation plans.

Another sea change in government and public thinking might become far more challenging. Green Deals have become increasingly skeptical about the positive impact of globalization. While climate change can only be solved on a global scale, with emerging countries fully engaged to reduce future emissions, the strategies and means of cooperation have changed. In the past, governments regulated their own domestic emissions, while negotiating global long-term targets at international conventions such as the recent COP27 summit. The result has been relative decarbonization in the OECD and continuous emission growth on a global scale, as companies cut their domestic high-carbon production while importing such products from less efficient (emerging) countries. Green Deals are now encouraging companies to bring production back home, while sustainably restructuring their entire end-to-end value chains.

## 2. Aligning green and digital strategies

Green Deals have shifted from regulating incremental efficiency gains and emission cuts towards a focus on the economy-wide sustainable transformation that's required to achieve net zero targets. This requires close industry cooperation with mutually agreed long-term strategies on all sides and all levels. On the green side, industry will need to shoulder unprecedented investment and binding targets. In exchange, Green Deals will support a broad range of innovation and technology development. On the digital side, governments will increasingly support digitalization as a springboard for productive innovation across entire value chains, beyond the necessary steps for decarbonization. On the government side, serious steps towards digital-first strategies are taking root, with support for green investment and finance steadily growing. Finally, on the corporate side, sustainability has become a fundamental theme of digital strategies and leadership agendas.

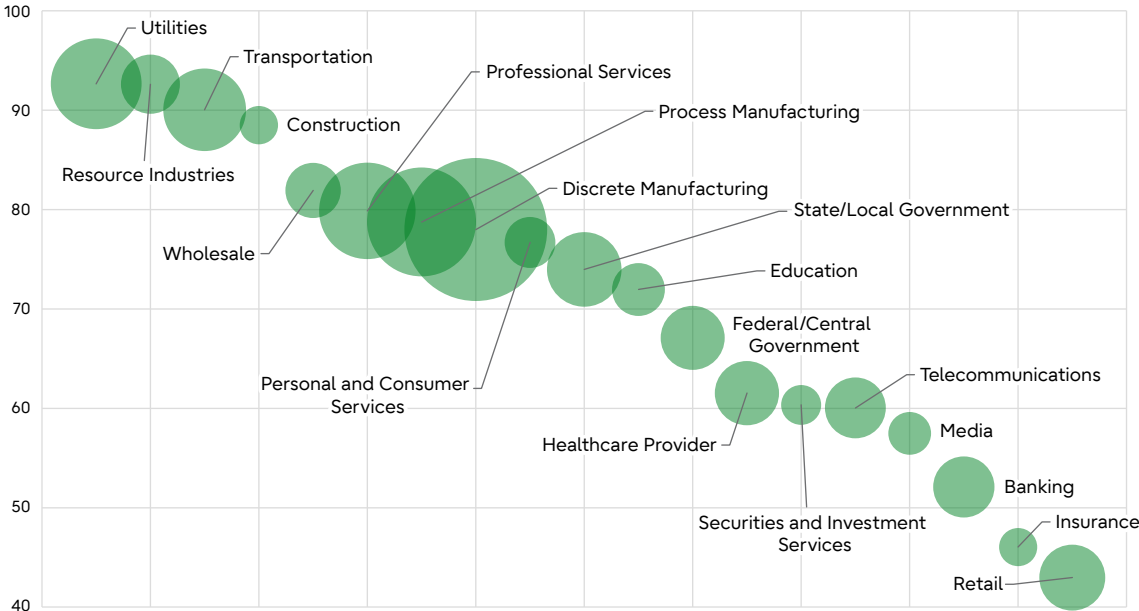
Optimism about the potential of DX to support SX objectives is supported by a growing body of research, which shows that digital technologies can indeed help to increase efficiency and solve green transformation challenges. Electrification, digitalization and virtualization of products can reduce the CO<sub>2</sub> footprint as services move online and become powered by renewable energy. Digital data can help to monitor and track energy use and emissions in production processes, as well as while consumers are using the products themselves. Information and communication can provide the necessary data to improve sustainable management and to inform consumers. Simulation, forecasting and digital twins of products, production processes, energy grids, even entire (smart) cities can support a new generation of innovative management solutions ([JRC Publications Repository - Towards a green & digital future \(europa.eu\)](#)).

At the same time, companies are facing the challenging reality that digitalization is not a miracle cure for reducing high carbon emissions. By consuming increasing amounts of electricity and high-carbon materials for the 55 billion devices currently in use globally, the carbon footprint of the digital sector will soon be larger than the entire aviation industry, at about 2.3% to 3.8% of global CO<sub>2</sub> emissions. Given its strong growth, the digital sector will likely become one of the largest emitters in major economies in the near future. Furthermore, digital sustainability does not spring from replacing analog with digital processes for marginal gains. It depends on successful innovations in order to replace outdated analog processes. Complex digital and analog changes in supply chains, product design and consumer cooperation need to go together. How can they be best aligned?

The potential of DX and SX can only materialize when they are both embedded in a company's vision, supported by broad-based innovation, and integrated in changing business models. In practice, each strategy will be different. As Chart 2 shows, almost all DX projects in high-carbon industries, such as utilities, resources, transportation and construction, can be linked to decarbonization gains. Transport optimization, predictive energy management solutions, production automation and even back-office upgrades can clearly have a major impact. Adding value through digitalization and decarbonization efforts can often work together.

In the large manufacturing and professional services sectors, there is also a clear business case for integrating DX into SX targets. Enterprise design, analytics and visualization, employee enablement and machine-to-machine communication can be effectively linked to value chain optimization, more resilient supply chains and decarbonization. Fujitsu's Sustainable Manufacturing services impressively demonstrate how SX adds value to a broad range of use cases ([Sustainable Manufacturing - Fujitsu Uvance : Fujitsu Global](#)).

**Chart 2: DX Spending with a Significant Impact on Decarbonization (% of Use Cases)**



Source: Data from IDC (2021.04) – DX Transformation Spending Guide.

In some of the most important sectors for SX, however, in government services, telecoms, banking, insurance and retail, the positive impact of digitalization on decarbonization is far less direct. In these vital sectors, digitalization needs to support the development of sustainable ecosystems, information platforms, investment finance, risk management and environmental value trading to have a significant impact. Alignment of green and digital strategies is most important and most difficult in these sectors. Adding value while not alienating stakeholders will be key and requires executive engagement at the highest level just as much as close cooperation with government strategies.

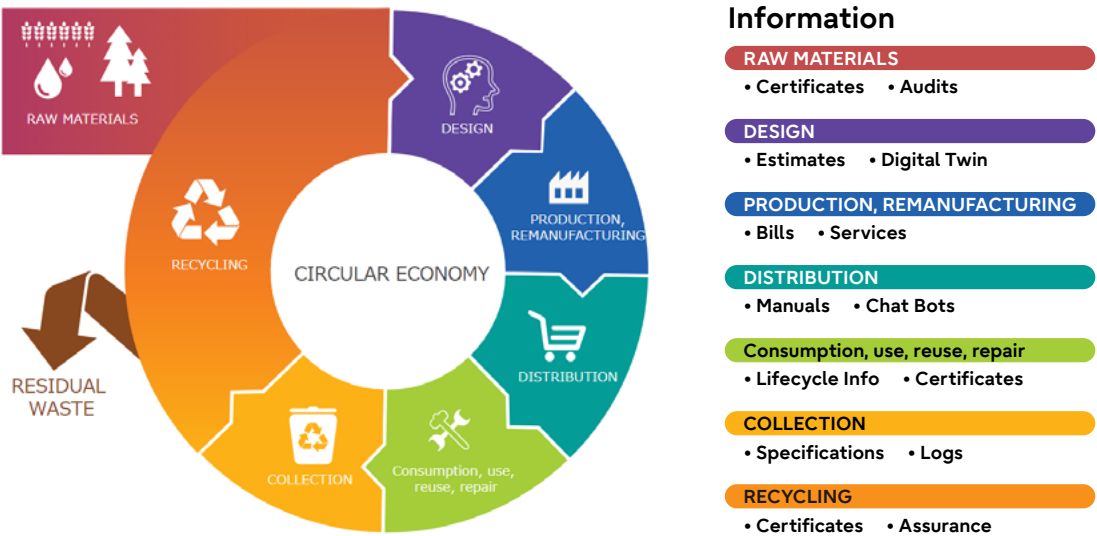
# 3. Information is at the heart of a sustainable digital transformation

A green and digital “twin transition” depends on creating new data and information flows along and across entire value chains. One of the early sustainable transformation initiatives in this context focused on financial information. The Task Force on Climate-related Financial Disclosure (TCFD), initiated by G20 finance ministers in 2015, supports environmental risk disclosure related to corporate governance, strategy, risk management and targets. It has gained broad industry support for developing new international disclosure standards, which are now built into government Green Deal initiatives.

In the future, companies will need to know exactly how their inputs are being produced and how much CO2 is embodied in them. They will need to know how customers are using products and services to improve efficiency, reuse, and final disposal. Already today, digital platforms provide the basis for such information. The entire production process can be tracked, analyzed, and adapted towards the most sustainable results. Functional updates can be provided “over the air” without replacing the entire process. User behavior can be continuously informed and encouraged towards more sustainable outcomes.

In a circular economy, information requirements will increase even further. An increasing number of certificates, estimates, reports and data for entirely integrated services will have to be exchanged (see Chart 3). The necessary exchange of sustainability data will have to become mostly automated and increasingly depend on machine-to-machine communication, which will expand the flood of data even further. The main challenge will be the smart use of information for the digital designs that will shape the success of sustainable strategies. The EU (2020) Circular Economy Action Plan rightly points out that 80% of products’ environmental impact is determined during the design phase. To achieve the necessary gains from new digital designs, companies need to provide their product and business designers with access to user data, help in using complex modeling platforms (AI and digital twins), and the ability to embed products into digital infrastructures (based on 5G) that allow for secure interaction in real time.

**Chart 3: Information and Transparency at the Heart of a Circular Economy**



Source: European Parliament (2021): Circular Economy Action Plan.

While a truly circular economy is still a long time off, companies that plan for its principles today will have a significant advantage. A Tesla, for example, is already designed as a “smartphone on wheels”. Its production has become digital-first, the cars are integrated in their charging network during their lifetime, updates are provided over-the-air, autonomous driving support is added step-by-step, and finance builds on selling carbon offsets to other companies. As part of the platform, the company is rolling out home energy and storage systems, which help to reuse the car batteries before they need to be recycled. While Tesla is a pioneer in developing a viable sustainable business case, Japanese companies, such as Toyota, have been working on the integration of cars into smart homes and smart cities for even longer. Their focus on developing technologies for the mass-market, however, has held them back until now. Digital and more circular economies are still facing major challenges in the broad consumer markets where they will need to have their biggest impact.

Green Deals are now providing the basis for successful SX strategies across a wide range of industries. By providing significant funds for circular economy R&D, support for the implementation of secure data platforms, and help for smaller companies to develop the necessary skills, they plan to provide the necessary infrastructure. Given their limited resources, however, the main tool to achieve sustainable transformation will again be regulation. As ever, the EU is pushing ahead with new regulation by demanding information on the environmental impact of investment, governance, and entire value chains, even across borders. Information will therefore not only be the basis for a circular economy, it will also become its main enforcer.

The EU’s Non-Financial Reporting Directive (NFRD) requires companies to provide information to investors and stakeholders about their ESG (Environmental, Sustainable, Governance) initiatives. A taxonomy of sustainable economic activities now includes a green list of sustainable projects, closing the grey zone between truly sustainable and only carbon-shifting initiatives. Based on such information, the Sustainable Finance Disclosure Regulation (SFDR) requires asset managers, banks and other financial agents to provide transparency across their sustainable investment products. Starting in 2023, the Corporate Sustainable Reporting Directive (CSRD) requires major companies to integrate their climate impact reporting to clearly signal the (%) share of their sustainable business operations. A new Supply Chain Law will require companies to manage their entire supply chain sustainably across borders. Finally, a Carbon Border Adjustment Mechanism (CBAM) will introduce carbon tariffs for high-carbon materials, and a broader range of products later.

Together, these policies and standards are paving the way for higher carbon prices, economy-wide carbon trading, and a new form of protectionism against unsustainably produced imports. Hopefully, they will also support innovative solutions in production, distribution, reuse, and recycling not only in advanced countries, but also across emerging country supply chains. In the EU, the stated goal is that “only companies that do not harm the environment and fully respect human rights should operate in the EU.” This puts the responsibility on companies, to support these principles with their purposes and visions, and to implement them into their business models and global operations.

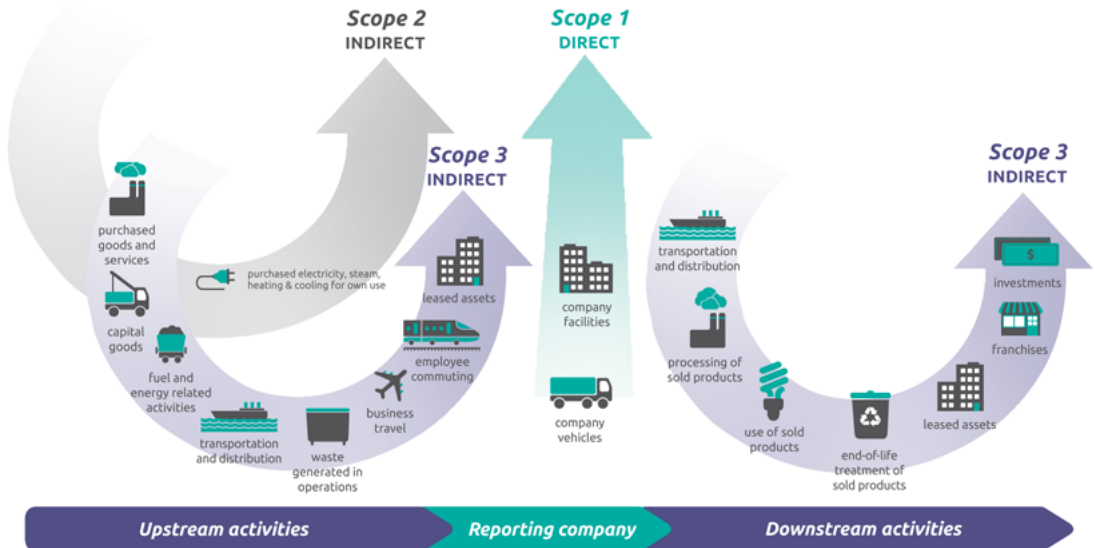


# 4. Preparing for a circular economy from the bottom up

For many companies, the information requirements of sustainable supply chains can carry a high cost burden. To add new value beyond supporting long-term climate goals, they need to be integrated into processes that prepare the company for a more complex and challenging circular economy environment. These processes will be different from those supporting previous transformations. While companies have been continuously optimizing their own operations, they have long relied on a relatively stable international environment and progressing globalization for improving their value chains. Now, companies have to simultaneously learn how much risk, potential instability and carbon footprint is lurking in their supply chains. They need to improve these supply chains to drive business, regulatory, and climate benefits as fast as possible.

To become more sustainable, one of the most important steps is to reduce so-called Scope 3 emissions that reach far beyond a company’s own operations. The WBCSD and the Greenhouse Gas Protocol Partnership have shown the extent to which such emissions emerge at different levels of entire product value chains (see Chart 3). Emissions come from the upstream side, from the products and services that companies need as inputs, and the downstream side, from the use of products at the customer level. In information technology industries, which have billions of devices in use, these downstream emissions can account for more than 70% of the total.

Chart 4: Supply Chains and Scope 3 Emissions



Source: [WRI/WBCSD Corporate Value Chain \(Scope 3\) Accounting and Reporting Standard \(pdf\)](#).

As a result of the increasing complexity of supply chains, the pioneers of sustainable supply management have been surprised by the number of environmental risks and challenges that need to be addressed before a sustainable corporate platform can become operational. Fujitsu, for example, has developed its Eco Track environmental database system and its green management system to resolve in-house accounting and reporting challenges. It has now integrated the two systems into a full Environmental Management System (EMS). Today, such systems can be certified under the ISO14001 standard and introduced “as a service” on a wider digital platform. This initial step, however, can only be the basis for building a sustainable supply chain, which requires additional technologies and planning to integrate supplier and user information.

When Fujitsu approached its value chain and supplier network for comprehensive emission reductions, about 140 suppliers were immediately willing to cooperate. Together the group investigated Scope 3 emissions in the next tiers of their supplier networks. They found a network of over 60,000 suppliers that also needed to be engaged. Based on this experience, Fujitsu became a “supplier engagement leader” of the global CDP (Carbon Disclosure Project) in 2020. It has also since improved its SX strategy and business model by founding the new Uvance business brand, supporting SX digital innovation both in its own operations and for its customers. In the meantime, a whole range of new SX solutions and platforms, such as Fujitsu's electric vehicle fleet optimization in cooperation with the WBCSD and the British National Grid, are being developed ([WBCSD members demonstrate that data sharing is crucial for transport decarbonization - World Business Council for Sustainable Development \(WBCSD\)](#)).

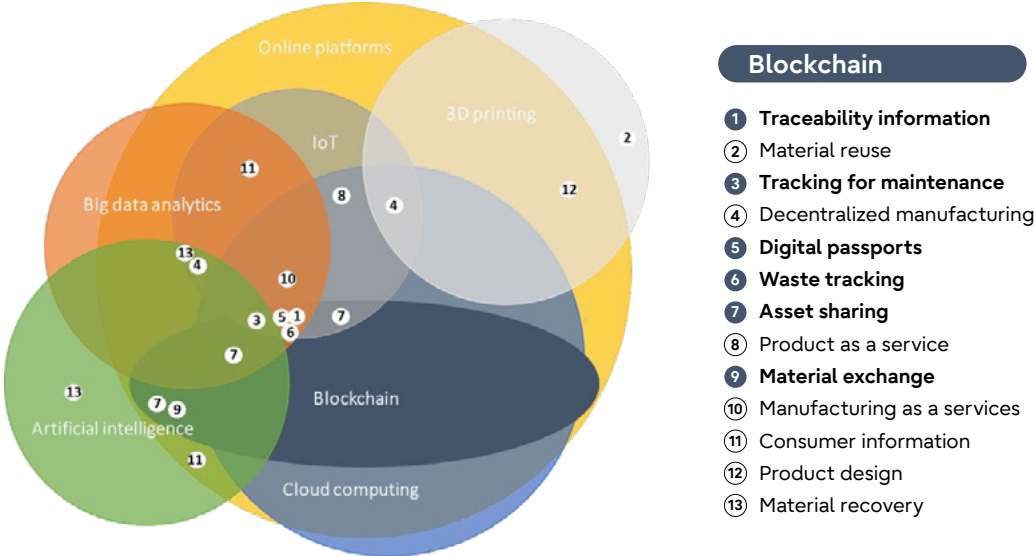
## 5. Technology platforms are key to a sustainable future

Sustainable supply chains require the seamless integration of a growing number of partners and ecosystems. They need to build on flexible technology platforms that can secure, connect and integrate data across different industries, borders, and regulatory standards. Such platforms exist in the public cloud services of major providers, such as Microsoft, Amazon and Alphabet. Governments, at the same time, are supporting the development of non-commercial standards for information exchange, such as the International Data Spaces (IDS) project. Of course, companies also need to pursue their own independent solutions, making sure that they select the best technologies for themselves and their partners.

An increasingly popular solution for sustainable supply chain integration in industry has arrived from an entirely unrelated development: blockchains, the foundational technology of cryptocurrencies, such as Bitcoin. Blockchains, which are basically secure, distributed databases (or ledgers) that can exchange and report information in open networks at almost no cost, are proving to be tremendously useful in increasingly diverse supply chains. The notoriety they gained through the association with cryptocurrencies has been a curse and a blessing from a technology perspective. It has been a blessing because “cryptos” have proven that they can be used to exchange digital information and assets (tokens or digital coins) with unbreakable security among partners who do not even need to trust each other (“trustless”) and do not require a central (clearing) authority. However, it's also been a curse because this technology, which can be so useful in industry, has gained a bad reputation as a tool for global speculation and trading of assets for unscrupulous purposes.

In industry, however, blockchain technologies stand out for their versatility in securing information exchanges while allowing for a growing number of diverse partners. By providing up-to-date data in distributed ledgers to all value chain partners, they establish one of the most flexible and cost-effective methods of data sharing. Instead of having to integrate partners into complex information systems or cloud services, new partners can simply download the entire information database. Participation can be granted and revoked by providing the keys to parts of the information that the partner needs. Continuous updates of all information are provided automatically to all partners. A report of the OECD on the necessary technologies for a circular economy has therefore placed blockchains at the center of technology development (see Chart 5).

**Chart 5: Blockchains at the Center of a Circular Economy**



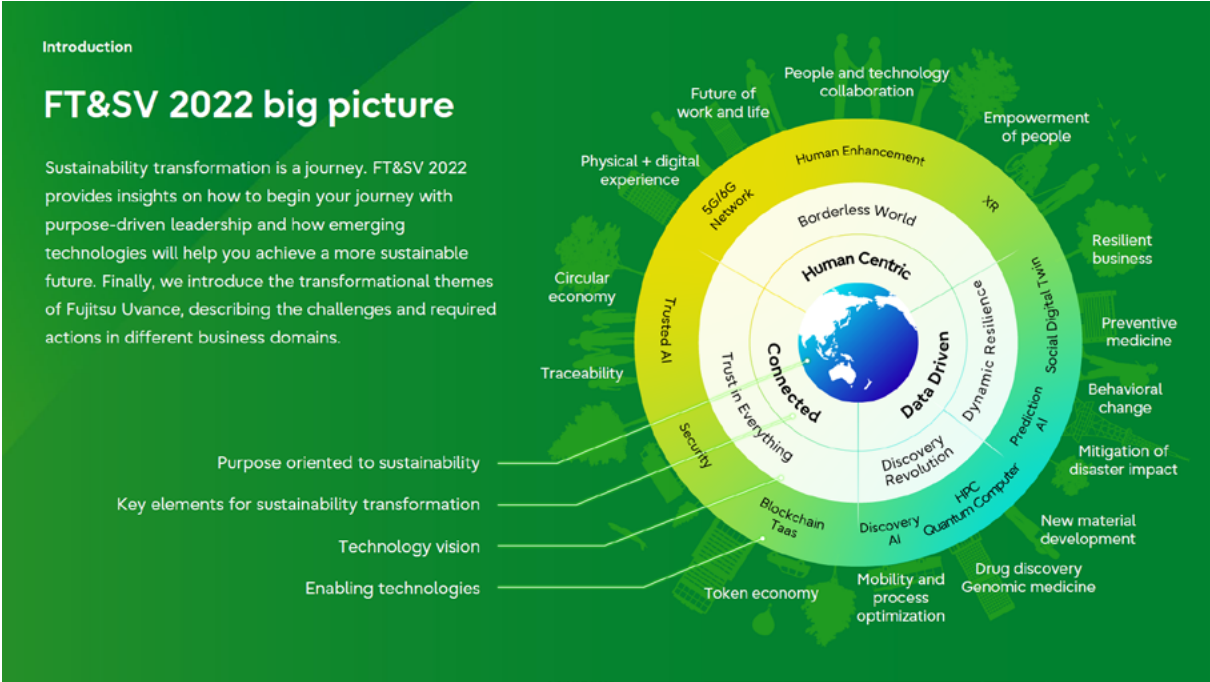
Source: OECD (2022) – Digitalization for the Transition; 6f6d18e7-en.pdf (oecd-ilibrary.org)

Blockchains are already being used in a growing number of supply chain projects around the world (see [DLT & Enterprise Blockchain Solutions : Fujitsu Global](#)). A major challenge remains, however. When each corporate network uses its own blockchain solution, companies who are partners in a growing number of networks continue to face trade obstacles and information barriers. Technologies that integrate blockchain interfaces and allow for data integration, such as Fujitsu’s Connection Chain, can solve this problem, but international standards that would allow for more seamless integration would be the much better solution for sustainable supply chains in the long term. So far, however, companies remain reluctant to commit to single technologies when too many alternatives exist, and agreements on international standards have become even more difficult to negotiate.

Fujitsu Technology and Service Vision (FT&SV) 2022 therefore explains sustainability transformation as a journey (see Chart 6). For companies, the technology side of the journey will not be as challenging as it is often thought. It starts with the technologies and platforms that companies already employ, while sustainable solutions can be added with increasing flexibility “as a service.” To become a success, however, business leaders need to develop a vision of a sustainable future that aligns possible journeys with their products, services and corporate potential. Only replacing old with new technology will not be enough to fully align sustainability with corporate value added in a truly circular economy.

Green Deals and their emerging regulation provide a good starting point here. They require immediate improvements in supply chain reporting, pushing for industrial policies that encourage more circular economies at home, and threaten to disrupt international operations that do not support sustainability. Companies will have to bring such visions to life and deal with the challenges as they develop their own sustainable value chains. By adding their objectives of operational security, resilience against disruption and the potential for ecosystem development, SX requirements can become valuable additions to DX innovation for a far more sustainable future.

**Chart 6: FT&SV 2022 Sustainability Transformation**



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 Martin's work focuses on the impact of digitalization, government policies and corporate strategies. His analyses are widely quoted in international media – with regular interviews at CNBC, Bloomberg, NHK World etc. His latest articles include:

- What is necessary for a "hybrid digital" work model to succeed in the next normal?, Fujitsu Leadership Challenges, 2022
- "How Has the COVID-19 Pandemic Changed the Future?" Fujitsu Leadership Challenges, 2021



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