Capgemini
RESEARCH INSTITUTE

The *dual transition*

The path to a digital and sustainable economy

Conversations
FOR TOMORROW

Quarterly review
N°8 — 2024

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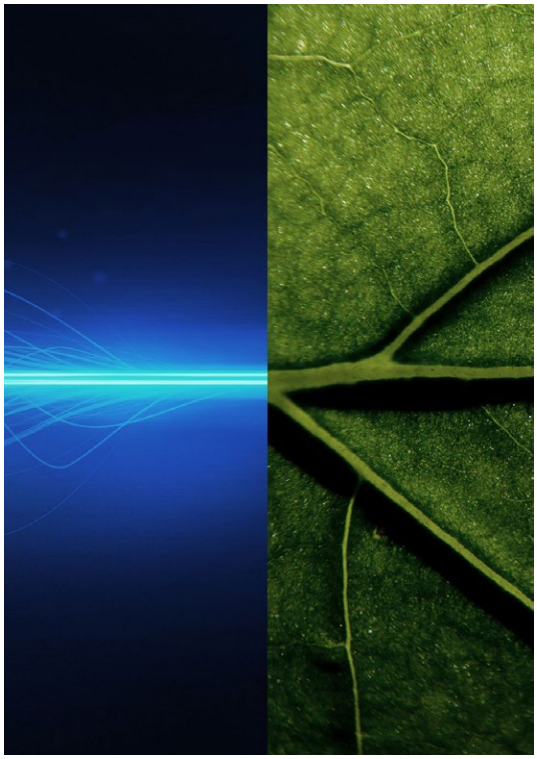

The image represents the path to the dual transition. One that is equal parts about leveraging digital technologies, while ensuring it is done so in a way that helps the planet. It points to a future where digital technologies and sustainability complement one another in one seamless transition.

Foreword

At Capgemini, we help organizations prepare for tomorrow by distilling the unique insights and perspectives of leaders from global business, academia, the startup community, and wider society.

The dual transition: The path to a digital and sustainable economy

Through *Conversations for Tomorrow,* the Capgemini Research Institute identifies the strategic imperatives for the future of business and the society in which it operates. In this eighth edition of the journal, we explore why digital transformation needs to progress in harmony with the effort to reach sustainability goals in order to secure robust, long-term economic growth, and how organizations can go about achieving this. It is no longer about choosing one over the other.

Our recent research, conducted in partnership with Harvard Business School, explores what we are calling the eco-digital era™. It shows that around six out of ten organizations believe that digital technology can help realize sustainability goals. Organizations across industries are becoming more digital. Investment in digital transformation – from scaling up mainstream technologies and implementing cybersecurity measures, to reskilling the workforce and automating business processes – is expected to result in significant financial and sustainability returns over the next five years. In the eco-digital era™, there is greater exploration of the value of digital to business, as well as the rapid evolution of emerging technologies such as generative AI and synthetic biology, and greater collaboration giving rise to digital eco-systems.

Against this backdrop, sustainability and climate change remain front and center. Only recently, according to some reports, Earth passed the 1.5°C threshold, adding even greater urgency.

Organizations are increasingly acknowledging the need to evolve, build new business models, and to be sustainable by design. Adding sustainability into business plans as a bolt-on is no longer viable. Digital technologies and sustainability are increasingly intertwined – and this will only become more the case. Our research reveals that, over the past five years, through the implementation of digital technologies, organizations have achieved a 24% reduction in energy consumption and a 21% decrease in greenhouse gas (GHG) emissions, among other notable environmental benefits.

Organizations globally face the challenge of moving forward managing this dual transition to a digital and sustainable economy. And it is this transition that we have focused on in this edition of Conversations for Tomorrow.

We would like to thank all the leaders and experts who have enriched this edition of the journal with their insights. By sharing the perspectives of such a diverse range of accomplished individuals, we aim to present a complete view of the key aspects of the eco-digital era™.

Key contributors include:

- The former UK treasury minister accredited with coining the acronym BRIC (Brazil, Russia, India and China)
- The US neuroscientist credited with being the first woman and first life scientist to serve as President of MIT
- A leading professor at Harvard Business School
- Senior executives from Google Cloud, Audi, Schneider Electric, Mercedes-Benz Group AG, Logitech, Bayer, and La Banque Postale
- Capgemini's own subject-matter experts

Pulling together such a wide range of views was an extremely instructive exercise for us. We hope you enjoy reading this edition as much as we did putting it together for you.

Fernando Alvarez Tabio
Chief Strategy and Development Officer, Capgemini

Conversations FOR TOMORROW

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Executive Summary

The world is undergoing a dual transition towards a more digital and sustainable future. We at Capgemini call this future the eco-digital era™. The term 'eco-digital economy' refers to an economic system that delivers not only financial value but also environmental and social value. In the eco-digital era™, there is greater exploration of the value that digital technologies hold for business, in which they play a crucial role in achieving sustainable goals; the rapid evolution of emerging tech such as generative AI and synthetic biology; and the more profound and sophisticated collaboration that can give rise to effective digital ecosystems.

A new eco-digital economy in the making

Together with Harvard Business School, the latest research by Capgemini Research Institute on the eco-digital era™ reveals that nearly eight in ten organizations (77%) agree that we are experiencing a dual transition towards a more digital and sustainable world.

Suraj Srinivasan, Philip J. Stomberg Professor of Business Administration at Harvard Business School and Faculty Chair of the Digital Value Lab at Harvard's Digital, Data, and Design Institute, defines this new era as: "The eco-digital economy refers to the dual transition to an economy that delivers not only economic value but also environmental and social value."

Nadège Petit, Chief Innovation Officer at Schneider Electric shares how eco-digital economy is core focus of businesses: "It (dual transition) is core to our mission of being our customers' digital partner for sustainability and efficiency."

Thomas Kurian, Chief Executive Officer of Google Cloud summarizes this new economy: "Digitization and sustainability go hand in hand."

> **Digitization and sustainability go hand in hand."**
>
> **Thomas Kurian,**
> Chief Executive Officer of Google Cloud

The eco-digital economy is also an era of profit – with purpose

The eco-digital economy is not just about driving profit. Rather, it targets growth alongside environmental and societal sustainability. Aiman Ezzat, Chief Executive Officer at Capgemini, comments: "We are today at a crossroads: organizations need to deliver growth and prosperity in a sustainable and ecologically safe way."

While, in theory, higher profits should lead to greater investment, increased productivity, and a rise in wages, in reality, this has not always transpired. Understandably, stakeholders are looking for more meaningful action. Jim O'Neill, a former economy minister and a member of the UK House of Lords, and former Head of Asset Management at Goldman Sachs, elaborates further: "This is leading to what I call an era of 'profit with better purpose,' where we cannot afford to avoid sustainability. More and more, we will see politicians attacking companies that just [aim to] make [a] profit."

The optimal integration of digital technologies with sustainability goals will deliver environmental gains across the entire value chain, as well as delivering societal gains by generating job opportunities, mitigating bias and discrimination, and empowering small businesses, among other significant advantages.

Prakash Arunkundrum, Chief Operating Officer at Logitech, talks about Design for Sustainability: "When applied to sustainability, (good design) means thinking about what design decisions can we make at every point of the life-cycle."

Data is at the core of the eco-digital economy

Data is the key to progress in all aspects of business.

Thomas Kurian, Chief Executive Officer at Google Cloud, talking about the significance of data in the eco-digital economy says: "Data is essentially the foundation of digitization." The widespread availability of technologies such as cloud, semiconductors, graphics processing units (GPUs), the Internet of Things (IoT), sensors, etc., has enabled more organizations to use data to drive strategic decision-making.

Eefje Dikker, Head of Global HR Transformation, Digitization and Operations at Mercedes-Benz Group AG, highlights the importance of implementing a data strategy across various functional areas: "It has become even more important for us to focus on a common, coordinated data approach across departments."

Data is also important in setting, measuring, and tracking sustainability goals. Vincent Charpiot, EVP, Head of Group Sustainability Business Accelerator at Capgemini, elaborates: "Smart use of data will also be essential to increasing efficiency across a range of industries and preventing unnecessary emissions."

Software is the new competitive differentiator

Organizations are continuously searching for new strategies through which to derive greater value from digital technologies. These are now at the core of the business model, rather than being simply a differentiator. Jiani Zhang, EVP and Chief Software Officer, Capgemini Engineering, elaborates: "Software is no longer an 'add-on' to the product lifecycle and value chain. Rather, it's the key to staying ahead of the competition and unlocking new revenue streams."

Today, most organizations are realizing software-driven benefits. For example, 73% of organizations achieve faster R&D in existing products and services, and 62% of organizations have used software to gain a competitive advantage (e.g., an increase in market share).

Capgemini's Aiman Ezzat comments: "I believe we are at the dawn of a new transformative era, and we have only scratched the surface of how digital technologies can expedite the delivery of substantial economic, environmental, and societal benefits."

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> **Aiman Ezzat,**
> Chief Executive Officer,
> Capgemini

Generative AI is top-of-mind for industry leaders

Generative AI has the potential to become a powerful transformative tool in the eco-digital economy. Following unprecedented growth over a short time period, it has already had significant impact across sectors including manufacturing, healthcare, finance, and logistics.

Generative AI has a wide range of applications, from creating text, images, and videos in different styles to generating tailored content, including speech-to-text conversion and voice recognition. Bijoy Sagar, EVP, Chief Information and Digital Transformation Officer (CIDO) at Bayer speaks about its significance: "I believe that the next decade is truly going to be the decade of AI – especially of text-based AI." Jim O'Neill mentions the possible application of generative AI in drug development: "If you can teach a computer to [find new antibiotics], that is one of the most powerful positives of AI I can think of."

Aiman Ezzat elaborates on how organizations can benefit from the adoption of generative AI: "By using generative AI to automate processes, optimize resources, implement predictive maintenance, optimize the supply chain, mitigate risks, and improve decision-making, organizations can achieve cost savings and enhance overall financial performance."

It is important to balance exploration of emerging digital innovations with legacy landscape

Adoption of new technologies needs to be balanced with respect for the existing social, cultural, and organizational considerations in order to derive maximum

value. Frank Loydl, Chief Information Officer, Audi shares: "We needed to transform the existing architectural landscape such that new technologies could operate using the existing data to create value."

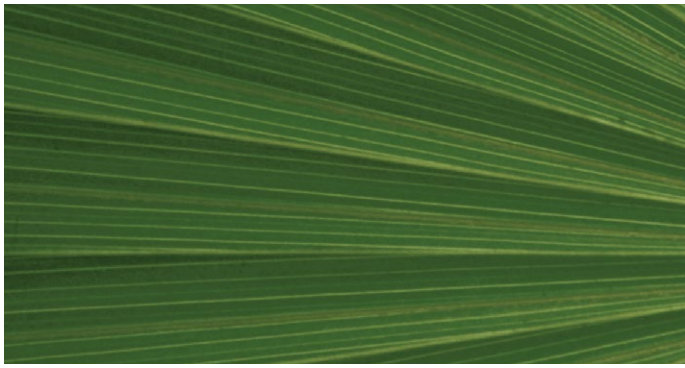
Adoption of digital technologies also means re-engineering the skill sets of the existing workforce. Mercedes-Benz's Eefje Dikker comments: "We are entering a digital era in which most people will be expected to adapt to working with new technology." Training programs to help long-serving employees upskill and stay relevant will nurture a positive culture amid digital transformation initiatives. Adrienne Horel-Pagès, Chief Sustainability Officer at La Banque Postale says: "The only way to drive change is to train and reskill people continuously."

Collaboration is the key to success in the eco-digital era™

In the eco-digital economy, organizations – and, indeed, nations – can no longer afford to operate in isolation. Collaborative ecosystems will become imperative to harnessing the various digital technologies effectively for sustainable growth.

Jim O'Neill emphasizes the need for all nations to work together: "When it comes to digitalization and sustainability, world leaders have all got to be sitting in the same room. At the moment, they are not." Bayer's Bijoy Sagar adds: "We will achieve sustainability goals only if everybody in the ecosystem works on them together."

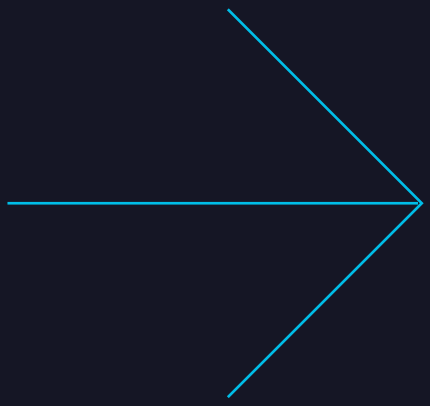
The emergence of any new technology is associated with ethical concerns around potential misuse. Emerging technologies such as generative AI and synthetic biology are not immune to this ethical conundrum. Susan Hockfield, Professor of Neuroscience and President Emerita at MIT, reiterates: "We need to set strongly enforced perimeters but, unfortunately, we do not have strong international agreement." Collaborative commitment between the various participants is required to facilitate the formulation and implementation of clearly defined boundaries around the use of emerging technologies.



Get the culture right

A culture that encourages experimentation is essential to the success of this new eco-digital economy. It will also rely on ensuring access to education, information, and facilitating conditions, is available to everyone, irrespective of their gender or socio-economic background. Unfortunately, there remain subtle barriers to women in particular that will result in the early death of some brilliant ideas. Susan Hockfield highlights this challenge in practical terms: "Less than 4% of venture-capital dollars go into women-founded companies."

As a way of overcoming such obstacles at a structural level, Eefje Dikker advises organizations to be more forward-looking: "A strategy may have been successful for the preceding 10 years, but this does not guarantee success for the next 10. When the organization is faced with waves of change, leaders need to avoid the complacency of living in past glory and move forward with their eyes open."



Thomas Kurian
Chief Executive Officer,
Google Cloud

Google Cloud

The CEO Corner

in discussion with

Aiman Ezzat
Chief Executive Officer,
Capgemini

Capgemini

The CEO Corner

Thomas Kurian,
Chief Executive Officer,
Google Cloud

Thomas *joined Google in November 2018 as the Chief Executive Officer of Google Cloud. Prior to Google, Thomas spent 22 years at Oracle, where most recently he was President of Product Development. Before that, Thomas worked at McKinsey as a business analyst and engagement manager. His nearly 30 years of experience have given him a deep knowledge of engineering, enterprise relationships, and leadership of large organizations.*

Aiman Ezzat,
Chief Executive Officer,
Capgemini

With more than 20 years' experience at Capgemini, ***Aiman Ezzat*** *has a deep knowledge of the Group's main businesses. He has worked in many countries, notably the UK and the US, where he lived for more than 15 years. Aiman was appointed Chief Executive Officer in May 2020; prior to that, from 2018 to 2020, he served as the Group's Chief Operating Officer and, from 2012 to 2018, as Chief Financial Officer. Aiman is also on the Board of Directors of Air Liquide and is a member of the Business Council and the European Round Table for Industry.*

THE RISE OF THE ECO-DIGITAL ECONOMY

What is your view of the dual transition to a more sustainable and digital economy?

— **Thomas:** We believe that digitization and sustainability go hand in hand.

Today we are seeing digital services span virtually every part of a consumer's life from the way they find information to the way they buy products and pay for them. We are focused on enhancing the consumer experience and bringing in new experiences in search and maps, as well as conversational assistants and more. We believe these digital services can help people make more sustainable decisions—in fact, in 2022, we reached our goal to help one billion people make more sustainable choices through our products, and we continue on this journey.

Through our cloud business, we offer organizations a new way to drive impact for their business and sustainability. We help organizations harness AI for improved sustainability measurement to build resilience, AI-powered insights to use energy and resources more efficiently in operations and supply chains to reduce costs, and AI tools to unlock new growth opportunities and markets while accelerating sustainability impact.

> **"Digitization and sustainability go hand in hand."**
>
> Thomas Kurian

— **Aiman:** We are today at a crossroads – organizations need to deliver growth and prosperity in a sustainable and ecologically safe way. The ongoing shift towards a more digital and sustainable world not only boosts economic strength but also aligns with social and environmental responsibilities. By putting digital inside everything, from product development to manufacturing and operations, businesses can leverage vast amounts of data and become insights-driven, in real time – creating opportunities for more efficient, resilient, and sustainable business models. Hence, we are totally aligned with the idea of an eco-digital economy. In scale and impact, the eco-digital era™ is comparable to the industrial revolution. It is unlike anything that has come before and, to date, society has harnessed only a fraction of the overarching potential of digital technologies. In the same vein, going forward, sustainability will be embedded in all business practices, driven by digital, to deliver economic, environmental, and social value. Technology will drive this dual transition, not just in the way we enable business, but in the way we create value. In a nutshell, technology can enable business leaders to do more, or better, even with less.

> **"We are today at a crossroads – organizations need to deliver growth and prosperity in a sustainable and ecologically safe way."**
>
> Aiman Ezzat

Achieving the necessary dramatic decrease in carbon emissions will require massive investment and a huge creative effort. Organizations will need to harness digital to streamline their core businesses, in order to free up investment to support their dual transition. I believe we are at the dawn of a new transformative era, and we have only scratched the surface of how digital technologies can help expedite the delivery of substantial economic, environmental, and societal benefits.

"I believe we are at the dawn of a new transformative era, and we have only scratched the surface of how digital technologies can help expedite the delivery of substantial economic, environmental, and societal benefits."

Aiman Ezzat

In this digital and sustainable era, why do you think organizations, irrespective of size, are now thinking cloud-first?

— **Thomas:** Cloud has always been about simplifying technology, making it more intuitive. The original premise of cloud computing is ease of access to technology without the responsibility of running it yourself. For example, for an organization to understand its inventory position or to understand how to segment its customers, it requires access to large-scale data-processing infrastructure. Hence, data is essentially the foundation of digitization. You must have a strong data foundation, and cloud platforms such as Google's BigQuery enable this.

On top of that, people increasingly want to use AI to automate workflow, streamline processes, and reach customers more effectively. For all these reasons, they need the scale of processing that cloud providers can offer for packaged AI models, facilitating training and operational efficiency. Cloud solutions also protect data, systems, and critical infrastructure from cyberattacks.

Google Cloud not only helps organizations digitally transform, we help customers run their businesses more sustainably. We have matched 100% of our annual global electricity use with renewable energy every year since 2017, and we have made strides towards our goal of running 24/7 carbon-free by 2030, providing a more sustainable infrastructure for customers.

> **Google Cloud not only helps organizations digitally transform, we help customers run their businesses more sustainably."**
>
> Thomas Kurian

— **Aiman:** Cloud technologies and solutions today deliver an easy adoption path while improving upon legacy systems. The ability to scale and manage the ever-growing volume of data makes it an economic and sustainable option. Cloud enables us to deliver our leading capabilities in business transformation, infrastructure, applications, data, AI and engineering, in an array of industry-specific use cases and accelerators, to assist clients in their digital and sustainable transformation journeys. Cloud solutions provide us a path to leverage emerging technologies such as AI in a sustainable and economically feasible way.

> **Cloud enables us to deliver our leading capabilities in business transformation, infrastructure, applications, data, AI and engineering."**
>
> Aiman Ezzat

AI FOR DRIVING VALUE

Where do you think AI can add the most value for large organizations?

— **Thomas:** AI applies to large organizations, typically in four places.

First, some organizations, like Home Depot, are using AI to streamline and improve core internal processes, such as accounts receivable management, their HR/IT helpdesk, procurement processes, and supply chain.

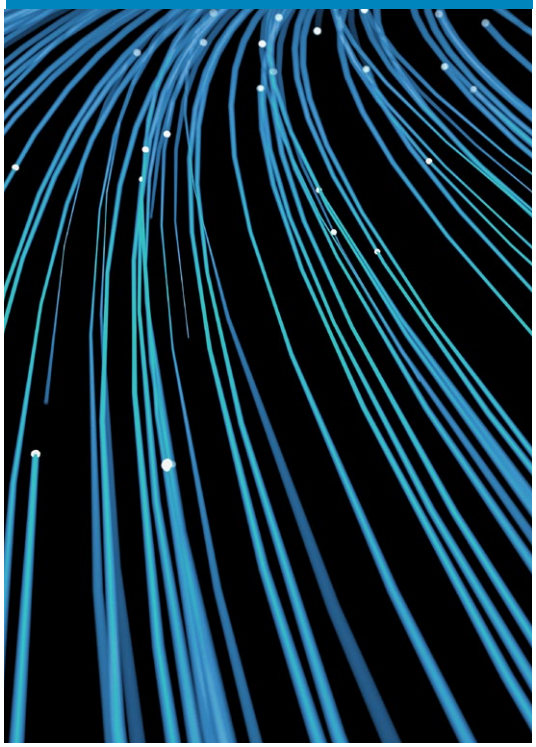
A second area is productivity. AI can help onboard employees more quickly, helping to scale support to more customers. An example is the work we're doing with Victoria's Secret, where we're helping them build AI systems and agents that can identify the best products for a customer while they are shopping in a store.

The third area is innovating around customer interfaces. This takes many forms: helping Wendy's streamline how people order food, helping Instacart streamline customer service, and helping Verizon streamline the call center. It's all about integrating that customer experience across all interfaces and channels: web, mobile, point of sale, and call center.

The fourth area is experimenting to build completely new experiences featuring our products, essentially changing the nature of their businesses. Organizations are using AI to create new products or fundamentally change how their existing products function.

"Organizations are using AI to create new products or fundamentally change how their existing products function."

Thomas Kurian



— **Aiman:** Today, generative AI is already a top agenda item in boardrooms, and most organizations view the technology as a disruptor. The potential of generative AI to drive innovation and improve efficiency and productivity extends to nearly all functions and has applications across all industries. We have been working with clients on generative AI for several years – much before the technology drew mainstream attention - and have been leveraging it to drive specific business benefits, in particular in the areas of life sciences, consumer product and retail, and financial services. Use cases are wide-ranging, from creating unique content and automating and accelerating tasks to shaping personalized experiences and generating synthetic data. Our own research reveals that generative AI has the greatest potential within the IT, sales and customer service, and marketing functions.

> **"By using generative AI to automate processes, optimize resources, implement predictive maintenance, optimize the supply chain, mitigate risks, and improve decision-making, organizations can achieve cost savings and enhance overall financial performance."**
>
> Aiman Ezzat

Organizations can use generative AI for personalization; extracting real-time insights; intelligent customer service; predictive analytics; continuous improvement; and optimized customer journeys. These benefits ultimately lead to greater customer engagement, satisfaction, and loyalty.

Generative AI is also great at producing personalized marketing; pricing optimization, demand forecasting, improved customer experience, enhanced sales support; and data-driven decision-making. This helps organizations attract more customers, foster life-long content-driven conversations, and boost conversions.

By using generative AI to automate processes, optimize resources, implement predictive maintenance, optimize the supply chain, mitigate risks, and improve decision-making, organizations can achieve cost savings and enhance overall financial performance.

How does Google Cloud help organizations develop AI responsibly, safeguarding security and privacy?

— **Thomas:** Our vision for generative AI is to build agents that assist people in their work every day. We are doing this in three ways.

First, our foundational platform, Vertex, allows an organization to discover and explore the various types of generative AI models, pick the right one for them, tune it for their data, and then integrate it into their applications. We also provide a variety of tools to improve the quality of results. For example, we give organizations "grounding"[1], to limit hallucination in the model, and we give customers responsibility controls to filter responses that a model can give, for example, to protect against violent answers or harmful images.

> **"Our vision for generative AI is to build agents that assist people in their work every day."**
>
> Thomas Kurian

On security and privacy, Vertex offers the ability to keep data completely private, and organizations can choose the location where their data is used. Neither Google nor any third party has access to their data. This includes the data that the model accesses, any inputs or feedback that your users may give, and any outputs from the model. The second way we bring generative AI to customers is by providing specific packaged agents for assisting developers. For example, a programming assistant to help you write better software; an analytics assistant to help you understand your data better; and a cybersecurity agent to support cybersecurity investigation and protection. We've also integrated these agents into our collaboration tools to help users write, build beautiful slides, or collaborate more closely.

Finally, customers can build quickly, securely, and cost-effectively using modern infrastructure that is optimized for AI.

1 The techniques used to reduce the risk of AI hallucination are referred to as "grounding" and/or "aligning" the model.

GROWING SUSTAINABLY

Can you tell us a little bit more about how you're helping your clients to transition to sustainability?

— Thomas: We address sustainability in a few ways.

First is our commitment to control our own carbon footprint, which we have been doing for decades now. Google's data centers are some of the most efficient in the world, operating about 1.5 times more efficiently than a traditional data center. In addition, in several of our locations, we are over 90% carbon-free.

Second, we help customers understand the carbon footprint of their own cloud with Active Assist Unattended Project Recommender, which sits in Google's cloud console. This allows our customers to measure their own carbon footprint when they use our cloud services.

Third, we've identified critical areas where cloud can help customers build more sustainable businesses. For example, water usage or the impact of electric vehicles on natural resources. We've taken each major area, and we work with a partner to help measure their impact on the environment. For example, to measure the impact on sourcing of products in consumer-packaged goods, organizations such as Unilever are using the Earth Engine from Google to take satellite images of deforestation to help them understand whether and how their sourcing of raw materials is contributing to it.

Finally, we also wanted to help with climate tech financing, and have collaborated with HSBC to provide financing options to companies who are part of our Google Cloud Ready - Sustainability program.

Google's data centers are some of the most efficient in the world, operating about 1.5 times more efficiently than a traditional data center."

Thomas Kurian

— Aiman: Today, the call for climate action resonates deeply with business leaders. It's not just the right thing to do – it's also good business. As part of our Business to Planet philosophy, we have developed a portfolio of services designed to navigate the transition, building in innovation and sustainable performance, at scale. We work closely with global clients on several topics, including:

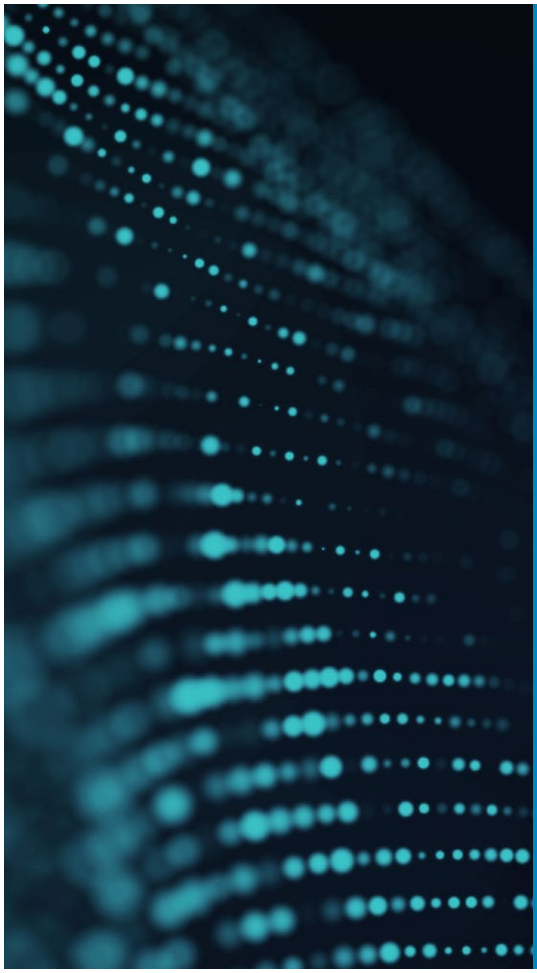
Sustainability strategy and governance: Achieving greater sustainability requires vision and a coordinated approach. We help clients develop a pragmatic roadmap that embeds measurable commitments, engages employees, customers, and suppliers, and delivers tangible value for stakeholders and the planet.

Developing sustainable products: There is increased pressure on manufacturers, from consumers, shareholders, and regulators, to create products that generate lower CO_2 emissions, use less water and energy, and generate minimal waste. We use our engineering expertise to redesign and configure products – whether vehicles, airplanes, or packaged food and drink – focusing on sustainable materials, cost constraints, and reusability.

Re-engineering for sustainable operations, manufacturing, and supply chain: Scope 3 emissions represent a large percentage of a manufacturer's emissions, from design and procurement to distribution. As many of these sources are outside a company's direct control, they are hard to track and report. We help clients meet this complex challenge through re-engineering supply chains, lifecycle assessments, energy efficiency, and smart data collection.

Migrating to sustainable technology: Organizations must design and plan for the integration of sustainable IT to reduce the environmental impact of IT operations. We help our clients evaluate the purchase, use, management and disposal of IT devices and equipment; champion sustainability through employee engagement; and move towards greater take-up of environmentally sustainable technologies. We are also exploring opportunities leveraging technology for green, especially with the advent of climate technologies.

Maximizing ESG management and reporting: We help organizations collate the data they need, analyze and evaluate, monitor progress, and report confidently on their ESG performance to customers, shareholders, and regulatory bodies.



"As part of our Business to Planet philosophy, we have developed a portfolio of services designed to navigate the transition, building in innovation and sustainable performance, at scale."

Aiman Ezzat

What is the role of technology in driving sustainability and what is the intersect between generative AI and sustainability?

— **Thomas:** First, AI can help improve the efficiency of power consumption in our data centers. We have implemented an AI system that measures power consumption very accurately and optimizes thermodynamic flow for air cooling and water cooling in our data centers. They are now fully controlled and adjusted by an AI model, and they have improved efficiency hugely.

Second, we're helping organizations use AI models to address sustainability. A practical example is wind power, which is sustainable but unpredictable. We've used our AI models to more accurately forecast wind energy generation for utilities.

The third initiative is continually optimizing the size and efficiency of our models. The smaller and more efficient they are, the less impact they have on the environment. The perfect example of that is the work we've done with Samsung. We took a model that processes images and downscaled it so efficiently that it can run on a phone. This is part of our effort to advance AI while maintaining our sustainability commitments.

> **AI can help improve the efficiency of power consumption in our data centers."**
>
> Thomas Kurian

— Aiman: Technology plays a pivotal role in sustainability. Take the case of climate tech. Climate technologies will be critical to achieving ambitions. Examples of climate tech include renewable energy, carbon storage, biofuels, low-carbon hydrogen, and synthetic biology. These innovative technologies will drive significant emissions reduction and will be integral to new business and operating models.

Equally, emerging technologies such as generative AI and digital twins can play a significant role in enabling and driving new sustainability use cases. Data can aid enormously in building a circular economy and understanding positive and negative environmental impacts.

What do you see as the next innovation around generative AI?

— Thomas: Today, models are really assisting people one skill at a time. We're developing models to think and process information the way that humans do – that is multimodally; processing video, text, and audio simultaneously. So, one boundary is enhancing the way models think to more closely represent the way that humans think.

The second is interacting with them in more natural ways. Today, models interact with prompts. We're working to make the process more natural. It's not just text; increasingly, you interact with models with other modalities. For example, you can ask it to extract information from a video feed.

Third, we're working with reasoning and advanced mathematical concepts. The current generation of models look on the internet to find the most acceptable answer, rather than understanding the mathematical bases that lead to it. We are building models to develop a humanistic reasoning process, making it easier for users to interact with them.

Thomas Kurian
Chief Executive Officer,
Google Cloud

"We're developing models to think and process information the way that humans do."

Aiman Ezzat
Chief Executive Officer,
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"Emerging technologies such as generative AI and digital twins can play a significant role in enabling and driving new sustainability use cases."

Executive conversations with...

AUDI AG

Frank Loydl

Chief Information Officer

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Conversations FOR TOMORROW

Executive Conversations

FRANK LOYDL

Chief Information Officer

Audi AG

DRIVING VALUE, WITH DATA

Audi AG is one of the world's leading producers of premium cars. It is a part of the Volkswagen Group, and is headquartered in Ingolstadt, Bavaria, Germany. The company operates in more than 100 markets and has 85,000+ employees worldwide. The group reported a revenue of €50.4 billion in the first three-quarters of 2023. Audi has set a goal of introducing only fully electric models to the market from 2026 onwards, accompanied with gradual phasing out of production of vehicles with internal combustion engines by 2033.

Frank Loydl started his career with Electronic Data Systems, gaining extensive experience in various positions in the manufacturing sector, particularly in the automotive industry with General Motors. He subsequently worked with Logica CMG and EMC Corporation before moving to head delivery management at T-Systems for Volkswagen AG in 2009. He took on this task directly with the group in 2013 and since 2016 has been responsible for software development within the group. During his time in the Volkswagen Group's IT department, Frank established not only agile work methods but also a value-oriented management model and oversaw the process of internal change to make the organization into an agile enterprise. Frank Loydl has been the CIO of Audi AG since February 1, 2018.

TRANSFORMING LEGACY APPLICATIONS TO IMPLEMENT NEW TECHNOLOGIES

Can you give us an overview of Audi's transformation journey?

At Audi, we started our transformation in 2018, repositioning IT from a responsive department to a leading strategic function. Audi has a 100-year-plus history, which is reflected in the technology base. The biggest challenge was to navigate an IT landscape of over 3,000 applications designed in the late 1970s and 1980s. So, it was not just about the adoption of new technologies. We needed to transform the existing architectural landscape such that new technologies could operate on the existing data to create value.

We need to figure out how to balance innovations with legacy. Effective coordination of social, cultural, and organizational changes is required to realize the true value of newer technologies.

Frank Loydl,
Chief Information Officer,
Audi AG

"We needed to transform the existing architectural landscape such that new technologies could operate on the existing data to create value."

SOFTWARIZATION

'Softwarization' is one of the biggest trends in the automotive industry. How has this impacted your business?

As the market changes, with software as a service point, we need to understand how much existential risk we are willing to take. Hence, the entire portfolio is discussed in this context. The strategy is to decide what we can manage in-house and where we need to partner.

I have started to create our in-house software development centers, in partnership with top-quality software developers, to reconfigure our supply base.

For the rest, we identify partners based on requirements, quality, compliance issues, etc. There will be much more cooperation with other software players, and this is something that has already started.

"I have started to create our in-house software development centers, in partnership with top-quality software developers, to reconfigure our supply base."

What is your road map for future usage of AI, augmented reality (AR), and virtual reality (VR)?

Currently, we have a very strong team working on generative AI. Let me give you a few examples. For the past couple of years, we have been designing tire rims with the help of generative AI. In concrete terms, FelGAN works either by rapidly proposing a large number of photo-realistic designs itself or by recombining existing designs in a targeted way. In this way, the system acts as a kind of spontaneous idea hub for Audi's rim design team, allowing them to exchange new versions and variations.

> "For the past couple of years, we have been designing tire rims with the help of generative AI."

Another example is the roll-out of AI for quality control of spot welds in car-body construction. Using AI, we are able to analyze 1.5 million spot welds on 300 vehicles in each shift. Previously, using an ultrasound model, we were only able to check around 5,000 spot welds per vehicle. Similarly, audio streams are being used to diagnose car problems.

In general, we see a huge potential in AI. On the one hand, to improve our internal processes, on the other hand, to offer a better customer experience. We are also experimenting with AR. However, we do work quite a bit with digital twin and simulations. That said, usage of VR is largely limited to marketing aspects, often used in showrooms, and not so much in product design.

HARNESSING DATA

What are the key value drivers that organizations can use to realize the potential of digitalization?

Availability of data is the key value driver. People think that our data is in databases, which is not true. There are applications where more than 50,000 lines of code are required to interpret the data.

For example, in a dealer-network-based sales approach, there is a local in-country subsidiary that sells to big dealers. They, in turn, sell to smaller dealers, from whom the end-customers purchase the cars. This results in sales data being distributed in various formats across thousands of networks in different geographies. This makes sales data incomparable or inaccessible in real time, making it impossible to generate insights for decision-making.

We need to extract this data from these disparate databases and make it available to people or systems in a form that they can actually use. This is the maximum value driver we can provide to the business.

"Availability of data is the key value driver."

"There are applications where more than 50,000 lines of codes are required to interpret the data."

"We need to extract this data from these disparate databases and make it available to people or systems in a form that they can actually use. This is the maximum value driver we can provide to the business."

How will this kind of data availability create value?

There are two clear advantages that come with wider availability of data. First, we will reduce redundancies significantly and thereby have the opportunity to create synergies. Secondly, we will be able to respond faster, not only to customer requirements in respect of the end product but also to any kind of requirement in the system. It will also help create new products and optimize existing ones.

THE VALUE OF COLLABORATION

How important will collaboration be in creating new business value in the digital landscape?

Partnering gives us access to knowledge we don't have, not only in terms of product development but also in terms of direct cultural interchange.

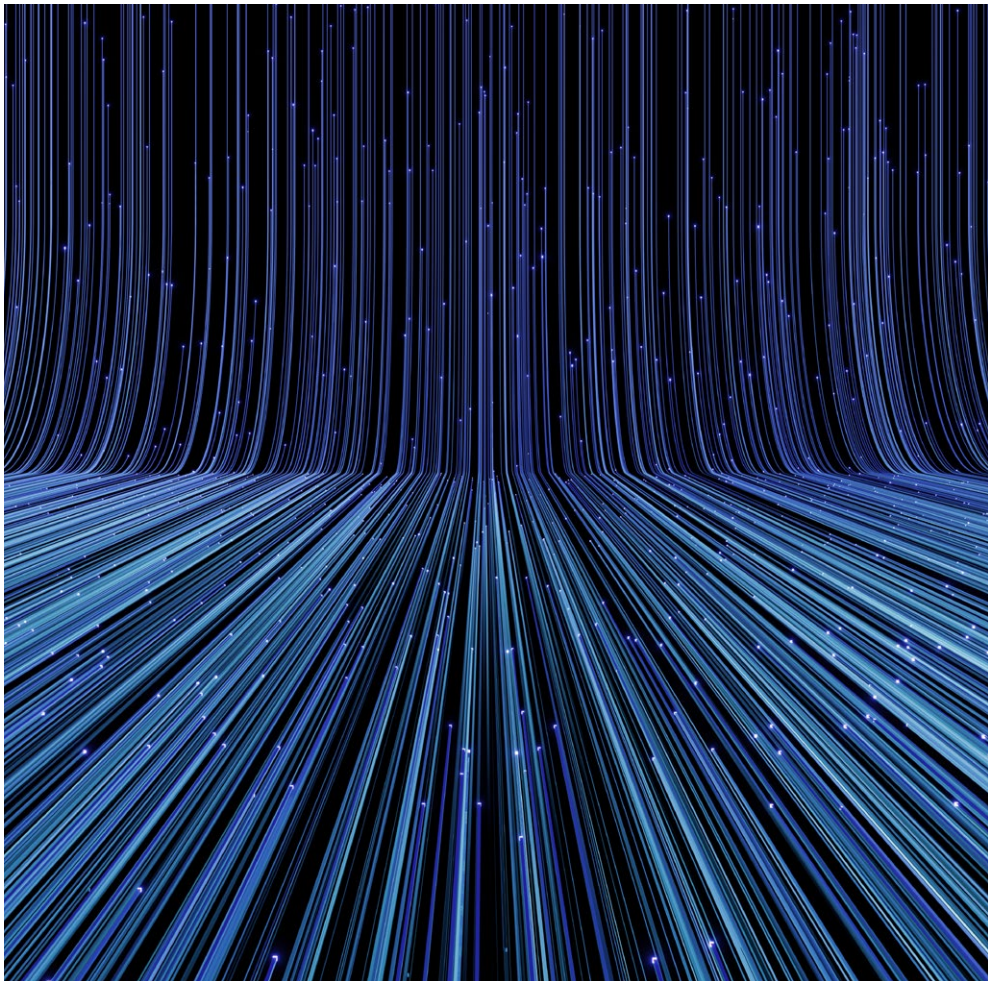
For example, we have a successful joint venture with Capgemini called XL2 to provide technology and consulting services. The joint venture helped us to become faster and improved quality, and we are now able to provide services we couldn't previously, while creating new business models.

Similarly, we have a hybrid strategy for cloud. We are big enough to derive value from economies of scale, having our own cloud for the group. However, we also use public cloud, which allows us to access new technologies and scale software products rapidly. For example, our partnership with 4.screen helps us deliver more comprehensive, context-related real-time information to our customers through our in-car infotainment systems.

PREPARING YOUR PEOPLE

How do you plan to prepare the workforce for this fast-evolving environment?

There are assessment centers where trainers will evaluate employees interested in upskilling. We have developed a transformation program that consists of 18 modules, lasting about two years. These modules are customized based on workforce level and geography. It's all about preparing for the future.



Frank Loydl,
Chief Information Officer,
Audi AG

"There are assessment centers where trainers will evaluate employees interested in upskilling."

NADÈGE PETIT

Chief Innovation Officer

Schneider Electric

POWERING A SUSTAINABLE FUTURE

Schneider Electric is a 180+ years old French multinational company, which specializes in digital transformation of energy management and automation. The company reported a revenue of €36 billion in 2023. It has featured in both, Corporate Knight's Global 100 list of Most Sustainable Corporations in the World and Dow Jones Sustainability World Index for 13 consecutive years.

Nadège Petit is the chief innovation officer of Schneider Electric and a member of its global executive committee. She oversees Schneider Electric's external innovation activities, including its corporate ventures arm, SE Ventures, as well as its incubations, partnerships, joint ventures, and prosumer businesses. Nadège joined Schneider Electric in 2004 and has held various operational and management positions globally. In May 2023, Nadège became a member of the supervisory board of E.ON SE, serving as a member of that organization's Innovation and Sustainability Committee. Nadège is based in Boston, USA.

As the Chief Innovation Officer of a firm at the center of the energy transition, how do you assess your progress and that of your customers toward net zero?

Nadège Petit,
Chief Innovation Officer,
Schneider Electric

At Schneider Electric, we often say that our scope 1 and 2 emissions become our customers' scope 3. So, our own progress toward net zero is crucial to ensuring that our customers can also get there. We are proud of our commitment, which has four key elements:

- **2025: Become carbon neutral in our operations**
- **2030: Achieve 25% absolute carbon reduction across our entire value chain, and get our operations 'net zero ready'**
- **2040: Become end-to-end carbon neutral across our value chain**
- **2050: Achieve net zero CO_2 emissions across our entire value chain**

We're certainly seeing a desire across industries and sectors to progress to net zero. This aligns with broader, undeniable trends toward greater sustainability, whether from a policy or public sentiment standpoint.

SCHNEIDER ELECTRIC AND THE DUAL TRANSITION TO SUSTAINABILITY AND DIGITAL

How is the dual transition to a digital and sustainable world transforming Schneider and its customers?

We embarked on this dual transition many years ago. It's ingrained in what we do – that's why it is core to our mission of being our customers' digital partner for sustainability and efficiency.

> **"It (dual transition) is core to our mission of being our customers' digital partner for sustainability and efficiency."**

For the grid to become more sustainable, it needs to become more flexible, more adaptable – and, yes, digital. It needs to evolve from the analog, unidirectional transmission of energy from plant to consumer, to become a truly multi-directional platform, through which energy is orchestrated from the grid to prosumers.

For prosumers, our upcoming range of home-energy management products will accelerate the adoption of clean-energy technologies. These will work in synergy with our portfolio companies including EnergySage, our online comparison marketplace operator, to help our customers choose a home energy system, as well as Qmerit, an installation partner, to facilitate easy and smooth installation.

For the grid, we've coupled the demand-side capabilities of Uplight, a customer-engagement platform, and Autogrid, a provider of distributed energy resource-management systems, with the advanced network-management software from our digital grid business. And, in the electric vehicle (EV) space, EVConnect can select, deploy and manage reliable EV-charging solutions.

Working together, these five portfolio companies offer a complete, end-to-end set of solutions spanning every segment of the grid-to-prosumer journey. This helps to simplify the experience and remove friction for the consumer – and accelerate progress toward a sustainable future.

ECOSYSTEMS FOR A GREENER PLANET

What is the role of collaboration and ecosystems in our collective transition to net zero?

Collaboration is essential. Ecosystems need to be able to align to create and realize efficiencies between them. This is equally true, whether it's utilities orchestrating prosumers' assets for virtual power plants (VPPs) to relieve stress on energy infrastructure, or whether it's at a more micro level, addressing the systems in a particular facility, or even within the home, sharing data and working together to optimize efficiencies, and power consumption and generation.

"Collaboration is essential. Ecosystems need to be able to align to create and realize efficiencies between them."

NEXT-GENERATION GRIDS

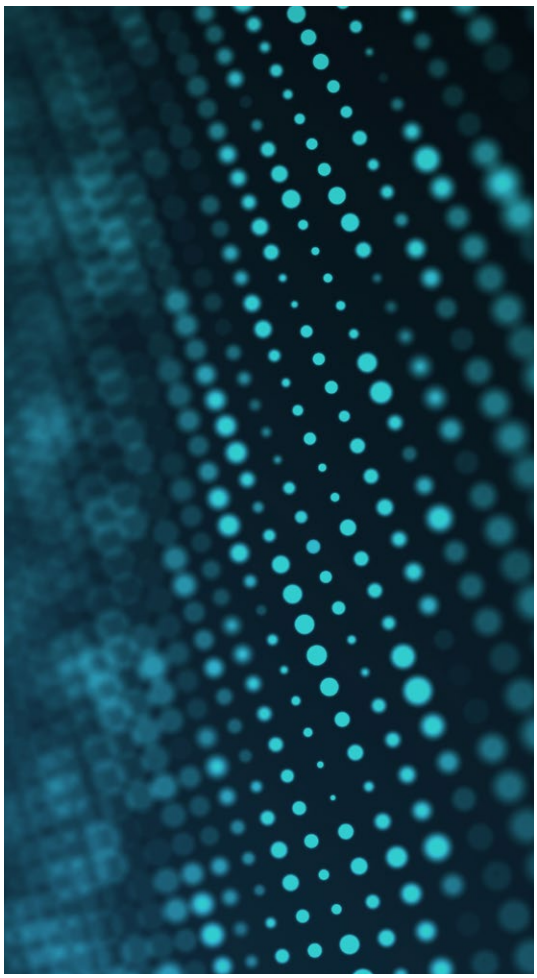
What are the key technologies that you believe will have an outsized impact on energy grids?

I would first say VPPs – which are formed when we aggregate the energy storage of groups of prosumers to augment traditional generating capacity. VPPs can rapidly add significant surge capacity to the grid and, when integrated into advanced distribution management systems (ADMS), the resulting automation is game-changing. Such prosumer technologies will have a huge impact, and all are necessary to equip the grid for the new (electrified, digital) energy landscape.

How is Schneider harnessing emerging tech such as artificial intelligence (AI) to build solutions for the future?

AI has the potential to be transformative as we build the new energy landscape. AI-powered VPPs can aggregate and optimize large portfolios of distributed energy resources (DERs), from EVs and battery storage to solar panels and smart loads, using algorithms to account for each DER's specific characteristics and maximize overall utilization. This, in turn, reduces the need for balancing with inefficient and polluting sources (such as gas peaking plants). It can also strengthen the resiliency of the grid,

"AI has the potential to be transformative as we build the new energy landscape."



predicting maintenance needs and minimizing downtime, and can help us in the discovery of novel materials for batteries, carbon capture, and hydrogen production.

Increasingly, AI will be at the heart of the modern electrical grid, to develop predictive models of energy production and consumption, and to manage distributed resources accordingly.

"Increasingly, AI will be at the heart of the modern electrical grid, to develop predictive models of energy production and consumption, and to manage distributed resources accordingly."

How does interoperability enable innovation and sustainability?

Interoperability can be a huge accelerator, while closed standards and hardware 'walled gardens' can often be a drag on innovation. That's why, as we develop new technologies, products, and services in the prosumer energy space, we aim to be hardware-agnostic and interoperable. So, for example, our home energy systems can interoperate with components from other providers, and our software-based grid-management solutions are designed to coexist with a broad array of infrastructure and hardware.

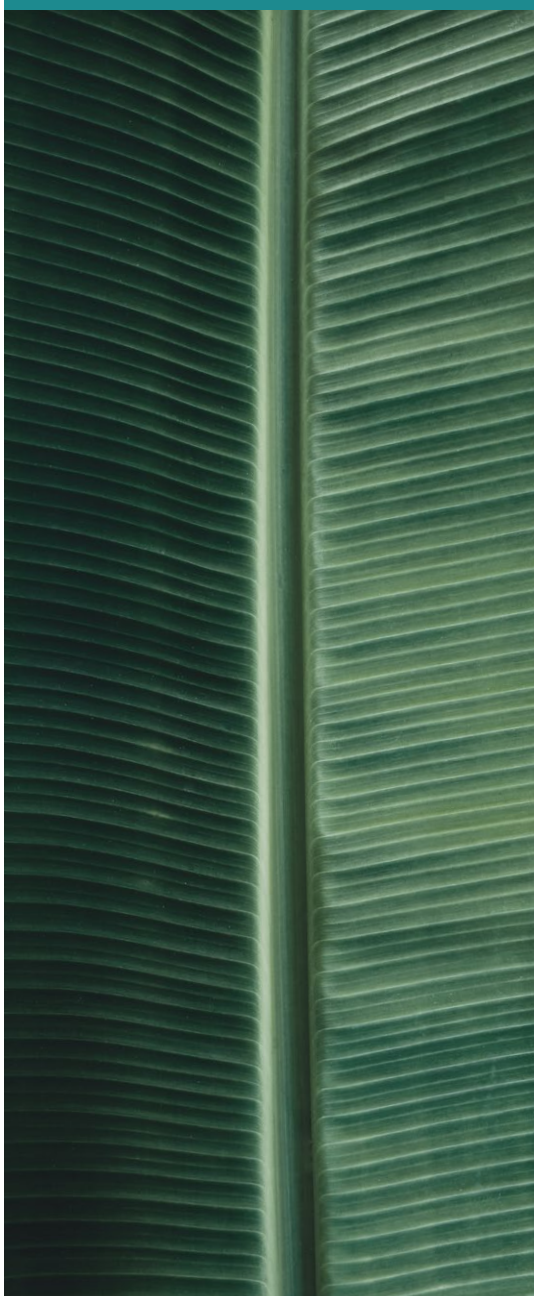
"Interoperability can be a huge accelerator."

What are the roles of prosumers and microgrids? How do you envision the energy grid of the future?

The energy grid of the future will be distributed and multidirectional. We have two joint ventures to deliver customized Energy-as-a-Service solutions: AlphaStruxure™ and GreenStruxure™. These help consumers and communities improve energy resilience and sustainability, while also reducing performance risk and capital burden. At one end of the scale, you have large projects, such as the new terminal at JFK airport or the bus transit system for Montgomery County, Maryland. At the other end, there are small, local microgrids, bringing reliable power supply to remote locations in developing countries.

Microgrids make all of this progress happen. When a microgrid connects multiple prosumers, each with their own power generation and storage capacity, you unlock the true potential of this adaptable and flexible grid.

"The energy grid of the future will be distributed and multidirectional."



IN CLOSING

How do you build a culture of innovation and sustainability in a large firm such as Schneider?

We all know that the culture of large organizations can stifle innovation. To help overcome this challenge, we have set up our Innovation at the Edge organization. It acts as an internal innovation engine, with our own R&D resources, with external input from our investments in early-stage innovative companies. This helps us discover, develop, and deliver the disruptive technologies that we need to progress towards our collective goal of a new, electrified, and digital energy landscape.

If you had a magic wand, what would you change to make the planet more sustainable?

More electrification! We now have the tools and the technologies available to bring emissions under control. We can retrofit existing buildings and industrial operations; we can electrify; we can digitize … but what I would change first would be to bring every building, every structure, into the prosumer equation. Imagine if every home, every commercial or industrial building was able to produce its own clean, renewable energy, storing the excess and feeding it back into a digital, intelligent grid for use when needed. This is the dramatic change I'd like to see.

Nadège Petit,
Chief Innovation Officer,
Schneider Electric

"Imagine if every home, every commercial or industrial building was able to produce its own clean, renewable energy, storing the excess and feeding it back into a digital, intelligent grid for use when needed."

PROF. SURAJ SRINIVASAN

Philip J. Stomberg Professor of Business Administration at Harvard Business School and Head of the Digital Value Lab at Digital Data and Design (D^3) Institute

Harvard Business School

USHERING IN THE ECO-DIGITAL ERA™

Prof. Suraj Srinivasan is the Faculty Chair of the Digital Value Lab at Harvard's Digital, Data, and Design Institute and the Philip J. Stomberg Professor of Business Administration at Harvard Business School. He is a widely published author and the recipient of several awards including Greenhill Award for Outstanding Faculty Service and the Apgar Award for Innovation in Teaching from the Harvard Business School and the Management Science Distinguished Service Award. Capgemini Research Institute spoke to him about the role of data in the new digital economy.

THE RISE OF A NEW, DATA-DRIVEN ECONOMY

Are we entering a new age of the world economy?

I believe that we are witnessing the start of an era that we call the "eco-digital economy". The eco-digital economy refers to a dual transition to an economy that delivers not only economic value but also environmental and social value. In one of our recent studies, we found that a large majority (77%) of senior executives believe that we are experiencing a dual transition to a more digital and sustainable world.

In the Eco-Digital Era™, there is greater exploration of digital technologies' value to business – for instance by scaling of data and cloud, digital technologies play a crucial role in achieving sustainable goals, there is a fast evolution of emerging tech such as generative AI and synthetic biology, and greater collaboration giving rise to digital ecosystems. The rapid rise and democratization of generative AI is a prime example of how this shift is truly fundamental, cross-sectoral, and global in nature.

Prof. Suraj Srinivasan,
Philip J. Stomberg Professor of Business Administration at Harvard Business School and Head of the Digital Value Lab at Digital Data and Design (D^3) Institute at Harvard

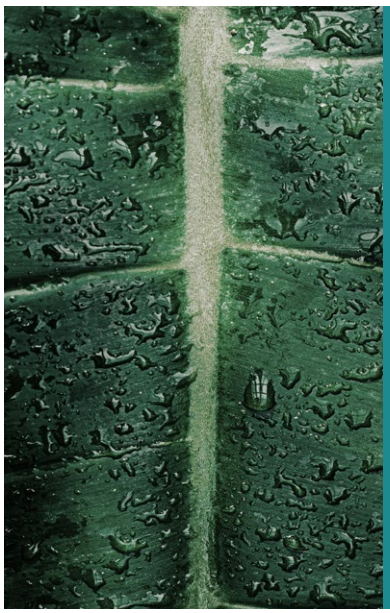
"The eco-digital economy refers to a dual transition to an economy that delivers not only economic value, but also environmental and social value."

How is the eco-digital economy different?

The digital economy today is amplified by a huge degree of magnitude as compared to the one in the last decade, made possible due to exponential technological and algorithmic advances. The eco-digital economy is driven by the ability to capture and store large quantities of data, and the capacity to process and analyze it at ultra-high speed. It has become so much cheaper to create, access, store, analyze data, and derive meaningful insights.

This advancement has been made possible due to the availability of several technologies such as cloud, semiconductors, graphics processing unit (GPU), Internet of Things (IoTs), and sensors, etc. These have allowed us to make innovation broader, cheaper, and therefore more accessible.

"The digital economy today is amplified by a huge degree of magnitude as compared to the one in the last decade, made possible due to the exponential technological and algorithmic advances."



"The exponential growth in the capacity to process and analyze data has allowed more organizations to become 'reasoning enterprises', i.e., entities with enhanced data-driven decision making."

The exponential growth in the capacity to process and analyze data has allowed more organizations to become 'reasoning enterprises', i.e., entities with enhanced data-driven decision making.

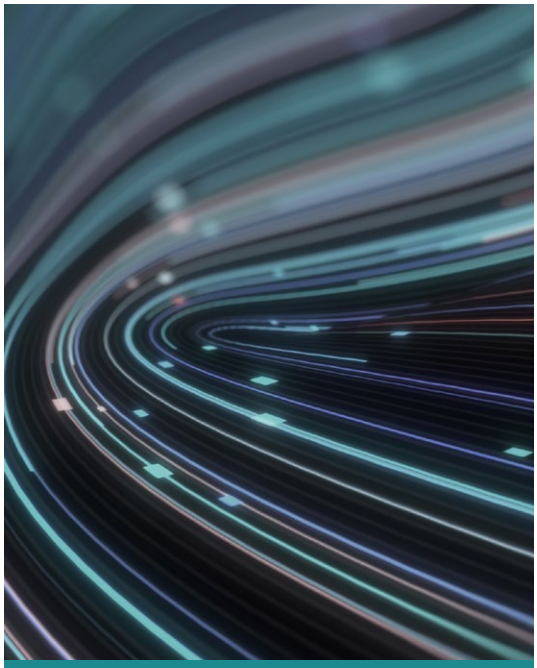
What would you say are the key characteristics of this eco-digital economy?

From a data perspective, there are three key characteristics of the eco-digital economy:

- **Cost efficiency:** The capacity to access, collect, and store data is cheaper than before because of cloud, sensors, 5G/Edge, and other associated technologies.
- **Better capabilites** for analyzing and understanding the data for decision making: This has been made possible because of two kinds of technology, one on the hardware side such as Graphics Processing Unit (GPU), and the other on the software side such as improved algorithms.
- **Ubiquity of digital and data capabilities:** Lower cost and enhanced capabilities have given the ability to embed digital and data-driven ideas everywhere. Our imagination is the only barrier to where these capabilities can be used.

How are data and AI helping the world become more sustainable?

There are a number of good examples from using data for climate change mitigation and adaptation, reducing energy consumption and waste, to personalizing education. But one of my most favorite uses of data for driving sustainable outcomes is when data and AI bring together economic, environmental, and social benefits. An example of this is a startup in India that I'm working with that's providing farmers with intelligence to optimize their crop yield using satellite data on soil moisture, nutrient content, etc. Farmers with small plots of land typically do not have the capital to invest in expensive tech or advice to improve productivity. However, access to data, network connectivity, and custom-made apps are bringing a step change in the level of productivity and thereby quality of life of these farmers. This is just one case example but imagine doing this at scale in large parts of the world – we're starting to see that happen.



"One of my most favorite uses of data for driving sustainable outcomes is when data and AI bring together economic, environmental, and social benefits."

MEASURING THE VALUE OF DATA

How will you describe the role of data in the eco-digital economy?

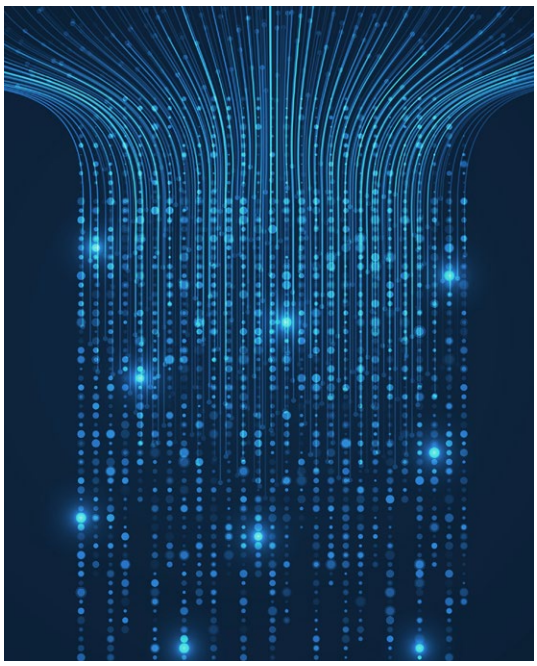
The eco-digital economy will be highly data-driven and AI-driven. Data and data insights should be available as much as, say, water.

Water is the fountain of life, and in that sense, data is the fountain of all decision making and this resource should be equally available. Everyone, whether rich or poor, should have equal access to water. Similarly, the capacity to use data for good decisions should be easily available everywhere.

In the last few years, we have seen data create immense value for organizations. Generative AI is turbocharging it now by making creation of insights, software, and design ubiquitous. You no longer need to be an expert in these fields to harness the value of data.

One of the biggest impacts of the leaps in AI will be seen in the enhanced decision-making by leadership teams. Leaders augmented with AI-driven intelligence will outperform their peers who don't leverage AI's potential.

This kind of democratic access and use of data is a key aspect of economy today, which should also be an important part of policymaking.



"The eco-digital economy will be highly data-driven and AI-driven."

Why is it important to measure the impact of data?

If one can't measure the outcomes, you either under- or overinvest in the data initiatives. Hence, it is important to think about careful measurement of the outcomes.

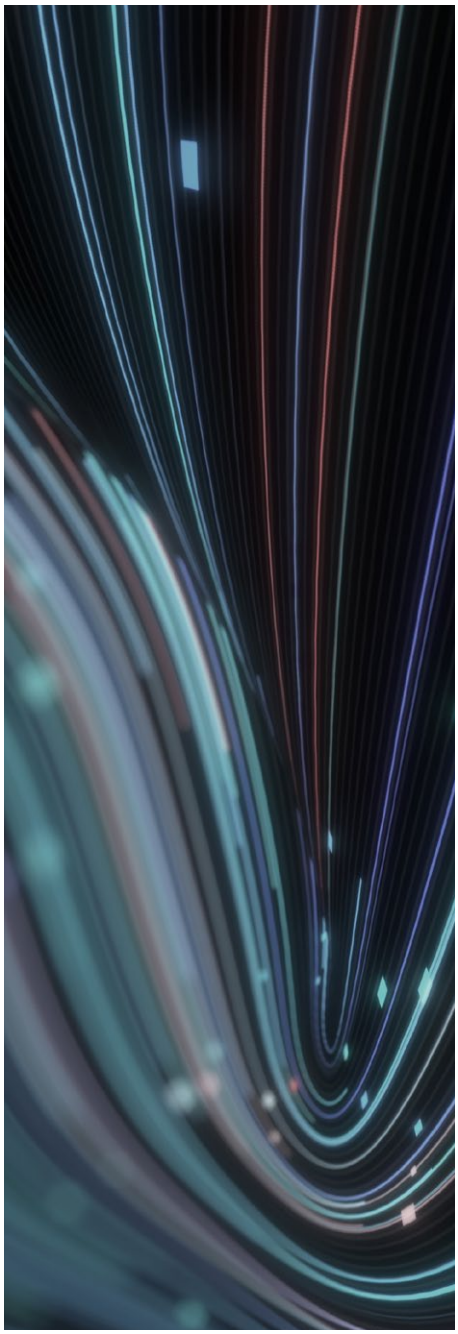
One thing preventing people from calculating return on investment (ROI) when it comes to data is the availability of so many low-hanging fruits (data initiatives), all guaranteed to generate high value. But it is still important to understand which initiatives create more impact.

Personal intuition is often biased by personal experiences, therefore, almost certainly not representative and likely to be wrong. More practically, this doesn't help when there are multiple uses or places to invest.

"Democratic access and use of data is a key aspect of economy today, which should also be an important part of policymaking."

What are some of the ways organizations can calculate the ROI for data initiatives?

While understanding the value proposition, one can do either qualitative or quantitative measurement. For example, if a data product is created for internal use, one can map its cost vis-à-vis its adoption rate as a quantitative metric of success. Similarly, the change in productivity can be mapped against the cost for a data initiative on a factory floor to get an indication of the ROI.



Large language models (LLMs) enable companies to assess how a customer interaction is going in real-time and take immediate remedial actions. So, the investment in deploying a generative AI technology at a call center can quickly be quantified by using something like a net promoter score (NPS) to measure customer service quality.

If there is training or an investment in scaling digital capabilities, organizations should be able to measure that simply by measuring how many people completed the program.

Investment in creating data literacy can be assessed by measuring how data literacy helps make better decisions or how many new data-driven products were created.

On the other hand, responsiveness to feedback, ability to support business, anecdotal stories of improvements, and maturity of agile data product teams are a few instances of qualitative measurements of value creation.

ETHICAL USE OF CUSTOMER DATA

With increasing concerns around data privacy and ethical use of data, how can organizations ensure that they earn the trust of consumers when dealing with their data?

Data-driven decision-making is important, however, ensuring data privacy is equally important. It is imperative for organizations to not just think about the opportunity, but also responsibility that comes with data collection, storage, usage, etc. There are multiple ways to protect privacy - one can anonymize the data or use cutting-edge techniques such as differential privacy. How an organization respects or uses customers' personal data is a reflection of its culture and core values.

Organizations should work towards creating the right data policies and data catalog, building data literacy, and ensuring common understanding across the organization on these aspects.

> **How an organization respects or uses customers' personal data is a reflection of its culture and core values."**

BUILDING AND SCALING A DATA ECOSYSTEM

With the ever-increasing quantity of data being captured and processed, what would be your advice to organizations looking at scaling up their data ecosystem?

The biggest question that organizations have to address and manage as they scale is knowing what to centralize and what to decentralize in terms of platform architecture, and most importantly, data governance.

Data is captured for some purpose such as decision-making, product creation, improving customer value, etc. So, organizations should first understand the kind of value they plan to create through data. The other aspect is how they propose to improve productivity in the process.

Decisions on areas such as big data, cloud, computing efficiency, data use, data management, data privacy, etc. should ideally be centralized.

Decentralization of areas such as production, customer service, etc., empowers people closest to the problem or opportunity to take the decisions since they are best equipped to figure out what is the most value added in that setting.

Prof. Suraj Srinivasan,
Philip J. Stomberg Professor of Business Administration at Harvard Business School and Head of the Digital Value Lab at Digital Data and Design (D^3) Institute at Harvard

"Decisions on areas such as big data, cloud, computing efficiency, data use, data management, data privacy, etc. should ideally be centralized."

EEFJE DIKKER

Head of Global HR Transformation, Digitization and Operations

Mercedes-Benz Group AG

HR AT THE CORE OF TRANSFORMATION

Mercedes-Benz

Mercedes-Benz is one of the leading global suppliers of high-end passenger cars and premium vans. The company also offers financing solutions and innovative mobility services. In 2023, the company had a workforce of around 166,000, sold about 2.5 million vehicles, and reported a revenue of €153.2 billion. The company aims to have a net carbon-neutral new vehicle fleet across all stages of the value chain by 2039.

Eefje Dikker is the head of global HR Transformation, Digitization and Operations at Mercedes-Benz Group AG. Prior to this, she was HR director and, later, a member of the board of management and director of Labor Relations at Daimler Mobility AG. In April 2023 she took over Transformation, Digitization, and Operations within the Personnel department of the Mercedes-Benz Group. She has held several leadership positions in HR across her rich career in the industry, spanning more than 25 years. She is based in Stuttgart, Germany.

HR AS AN ANCHOR FOR OVERALL BUSINESS TRANSFORMATION

Which strategic objectives are you currently working towards??

My top priority is HR transformation, where I have a twin focus on digitization and overall organizational transformation. On the operations side, I am responsible for shared services for HR in Germany and internationally, in addition to managing Tech for People, which is the unit responsible for the IT side of our HR, on a global scale. I also manage HR strategy and change management as part of our broader transformation program, which is implementing some of the greatest changes we have seen in the history of the organization.

What is Mercedes-Benz's approach towards its data transformation journey?

The automotive industry is going through a remarkable transformation. A great deal of innovation has sprung up, especially in software development and the use of integrated data on customers and vehicles. Data is key for HR, too. It has, therefore, become even more important for us to focus on a common, coordinated data approach that can be followed across departments. This common data approach deals with issues such as storage, handling, and usage. We make sure that different functional areas are involved in the joint pilots to ensure that our data strategy is applicable across the organization.

Eefje Dikker,
Head of Global HR Transformation, Digitization and Operations, Mercedes-Benz Group AG

New technologies have impacted your industry greatly. What is the role of HR in the organization's transformation journey?

HR is pivotal for any transformation. Moreover, we are actively transforming HR from the inside. We have set up new structures and end-to-end responsibilities as we introduce a product mindset into HR processes, with the required training and qualification initiatives to support these.

We are entering a digital era in which most people will be expected to adapt to working with new technology. We are constantly on the lookout for opportunities in other functional areas, such as finance and legal, in which we hope to use tools such as generative AI to unlock greater value. Over the last few decades, HR has transitioned from a comparatively narrow focus on contracts, hiring, and related activities to handling transformations, testing strategies, and helping organizations to build the resilience required to weather the changes brought by the digital transformation.

We are entering a digital era in which most people will be expected to adapt to working with new technology."

How do you attract the candidates you require to respond to the rapidly changing technology environment?

We have adopted some approaches to attracting people with varied skills. For example, we have invested a lot in employer branding, including pushing social media to engage with different target groups. We created a pathway for manufacturing employees to join the IT workforce, following the successful completion of a course in digital skills. This ensures that our workforce can keep contributing to Mercedes-Benz, even if some of the drive train production jobs disappear as a result of the industry's shift towards electric vehicles (EVs).

Mercedes-Benz has promoted this initiative very strongly and there is high-level backing from the board and our manufacturing leadership. We already have our first round of success stories: our people from manufacturing who have not only completed IT training but have also gone on to make impactful contributions in their new assignments.

"We created a pathway for manufacturing employees to join the IT workforce. Our people from manufacturing have also gone on to make impactful contributions in their new assignments."

For certain technologies, we have relied on upskilling internal employees. In areas such as artificial intelligence (AI) and data management, we made training available to existing IT staff, rather than hiring new people. For instance, if there is a new cloud solution we need to implement, we utilize the same people who maintain our Oracle on-site solution, after enabling them with new skills. We are planning to make a €2 billion investment between 2022 and 2030 in employee training worldwide, as part of our Turn2Learn qualification initiative. We strongly advocate using innovative technologies to enhance process stability, bolster product quality, build resources, and enhance overall efficiency. This frees up employee hours, allowing us to deploy them in other areas.

"We are planning to make a €2 billion investment between 2022 and 2030 in employee training worldwide."

How do you incorporate emerging technologies into HR practices and broader business operations?

AI is a crucial area for us because HR has two roles in implementing AI across the organization. One is to use it for ourselves, for our operations. The other is to use it for broader impact. For instance, we are working to harness generative AI to answer employees' more straightforward HR questions. Consequently, HR colleagues can focus on more complex tasks that require human intervention, including individual development, identifying trends, capacity planning, and adjusting business strategy.

We are always looking at new technologies that we can apply to our business. This, in turn, makes HR's role critical. Increasingly, HR will focus on the human interface. The last five years have shown us that we simply can't predict the future, and volatility is a constant. And getting the business through this volatility and enabling it to transform will be key to the role of HR.

What is the role of HR in helping Mercedes-Benz meet its sustainability goals?

Generally speaking, we have a wider definition of sustainability. It is not just limited to KPIs (key performance indicators), carbon footprint, green manufacturing, and compliance with regulation. For us, sustainability is also linked to data quality and processing. Therefore, we have set up guidelines and knowledge-management portals to ensure we handle data in a consistent manner. Our support of the transformation process and our efforts to empower employees through skill-development initiatives are all based on our commitment to sustainability. In my view, a big part of sustainability is about enabling your employees and giving them the opportunity to learn and grow, so that they can adapt to new technology and take on different tasks. I think the learning initiatives that we have in our company are a very big part of it. And our employees make great use of them. For example, in 2022 around 120,000 training courses undertaken at Mercedes-Benz worldwide were related to digitalization, such as software, coding, and IT.

> **"In, 2022 around 120,000 training courses have been undertaken at Mercedes-Benz related to digitalization, such as software, coding, and IT. "**

How do you think HR leaders at large organizations can prepare for large-scale technological transformation?

One piece of advice would be to build a culture that is open for the future and does not restrict the organization to its past. A strategy may have been successful for the preceding 10 years, but this does not guarantee success for the next 10. When the organization is faced with waves of change, leaders need to avoid the complacency of living in past glory and move forward with their eyes open.

Eefje Dikker,
Head of Global HR Transformation,
Digitization and Operations,
Mercedes-Benz Group AG

"A strategy may have been successful for the preceding 10 years, but this does not guarantee success for the next 10. When the organization is faced with waves of change, leaders need to avoid the complacency of living in past glory and move forward with their eyes open."

Executive Conversations

JIM O'NEILL

Member of the UK House of Lords, Former Goldman Sachs Chief Economist

UK House of Lords

AN ERA OF PROFIT WITH BETTER PURPOSE

Lord Jim O'Neill is an economist, policy adviser, author, and keynote speaker on the global economy. Between 1995 and 2013, he held various roles at Goldman Sachs, including that of Chief Economist and Head of Economics, Commodities and Strategy Research (ECS). He is known for his work on developing economies, in the course of which he coined the acronym 'BRICs' (to refer to the developing economic bloc including Brazil, Russia, India, China and [since 2010, as BRICS] South Africa). He recently completed a documentary for the BBC entitled MINT: The Next Economic Giants. The Capgemini Research Institute spoke to Jim about organizational focus on strong economic growth coupled with sustainable purpose.

PARADIGM SHIFT

How do you see investment patterns developing in digital infrastructure and sustainable technologies?

The role of technology, including AI, is just so front-and-center that it seems like tech will always be the source of the 'next big thing' for business. The interplay between digitalization and sustainability is important because these technologies may have harmful consequences and you don't want evil actors to cause environmental problems.

How do you think this balance can be maintained?

The onus is on policymakers to draw up the right regulatory policies.

On sustainability, many economists would say we need a set carbon price that is applicable to the whole world. But achieving consensus on that remains a challenge for policymakers. Are they bold enough to do the right thing?

When it comes to digitalization and sustainability, world leaders have all got to be sitting in the same room – and, at the moment, they are not.

Jim O'Neill,
Member of the UK House of Lords, Former Goldman Sachs Chief Economist

"When it comes to digitalization and sustainability, world leaders have all got to be sitting in the same room – and, at the moment, they are not."

Are there any unique advantages or challenges that the BRICS nations possess or face in transitioning to a green economy?

The answer is yes! If you look at the two big powerhouses of the BRICS, China and India, these two countries together have almost 3 billion people, which is over one-third of the world's population. They are becoming bigger users of energy and, with this, ever more influential in the world economy. What India and China do on alternative energy and sustainability policy is probably more important than anywhere else. The other three nations, Russia, Brazil, and South Africa, are big commodity producers. It is vital that all BRICS nations, together, develop a proper and serious strategy about greening the world.

But, of course, each country wants what they think is best for themselves. BRICS countries have the potential to play a significant role in transitioning towards a green economy through their policy initiatives and cooperation.

Alongside political or economic drivers, what are the other drivers for organizations to move towards a sustainable digital model?

Over the past decade, I have become quite a strong believer that there is something not quite right about the international capitalist economic model. In theory, when you get very strong profit growth, it leads to high investment, which is supposed to boost productivity and wages. We had the profits, but we didn't receive the investment, productivity, or a rise in real wages.

One of the consequences of that is that more people, particularly in older Western economies, want something better. This is leading to what I call an era of 'profit with better purpose,' where we cannot afford to avoid sustainability.

ROLE OF GENERATIVE AI

What are your thoughts on generative AI?

I have been looking at economic issues for over 40 years and, every five years or so, we go through an era where people say that automation of a process is going to destroy jobs – and it has never happened. It just helps us create other additional jobs.

I will give you a really powerful example of the positive side. There was a very interesting article published recently describing how some health scientists in the US had used generative AI to find a new antibiotic, a field in which I have been heavily involved for the past seven years. At the core of the problem is that nobody wants to spend money on finding new antibiotics. But, if you can teach a computer to do it with data alone, that is one of the most powerful positives about AI I can think of.

For many countries' healthcare systems, the cost of building a workforce continues to rise, and they can afford it only by increasing tax. AI could make a big difference here in keeping costs down.

"If you can teach a computer to [find new antibiotics], that is one of the most powerful positives of AI I can think of."

PEOPLE PERSPECTIVE: PREPAREDNESS

Which skillsets do you think will be required by organizations to balance digital and sustainability?

The best companies have a really good culture and shared purpose, giving workers the feeling that they are delivering what society needs, instead of just focusing on profit. More and more, we will see politicians attacking companies that just make profit.

Therefore, I guess the vital ingredients for organizations are a really educated workforce and open minds among the leadership. Of course, it is good to have more people trained in technologies and digital things, but if you haven't got the right mindset, it won't work. It is more important to invest in nurturing the right culture than to invest in other, non-technological skills.

> **"More and more, we will see politicians attacking companies that just make profit."**

LOOKING FORWARD

Ten years from now, what framework do you see emerging for large, tech-powered, sustainable organizations?

There is quite a lot of evidence that the most successful large, sustainable companies are the ones that can adapt, not only in terms of where they focus but also in how they are organized.

There are many examples of companies with a very rigid framework, which ends up controlling their ability to think and they end up no longer being so good.

Organizations have to be agile, with a good culture and open-mindedness. Because, the one thing we know from the last five years, never mind a decade, is we don't know what is around the corner!

What would be your advice to organizations in terms of how to navigate this twin transition?

I would say three things:

- **Agility:** First of all, recognize that you can't predict the future. If you have got too rigid a policy and you are too committed to a certain path, you are not going to be able to adapt if the path falls away or takes an unexpected turn.
- **Shared purpose:** Secondly, have a really good, clear culture in your organization, where everybody feels they share this purpose, even if it means you have to be adaptable.
- **Sustainability:** Thirdly, achieving sustainability of the planet is definitely one of the several challenges companies face. They must develop agility while being mindful of their responsibility to manage the climate.

We can't be too narrow-minded, since that could mean missing out on some amazing technological breakthroughs. The sustainability challenge needs to be approached with an open attitude so that we can benefit from and preserve our planet in the future.

Jim O'Neill,
Member of the UK House of Lords,
Former Goldman Sachs Chief Economist

"The one thing we know from the last five years, never mind a decade, is we don't know what is around the corner!"

BIJOY SAGAR

EVP and Chief Information Technology and Digital Transformation Officer

Bayer

ADDING LIFE TO DIGITAL TECHNOLOGIES

Bayer AG is a leading German multinational pharmaceutical and biotechnology company. In 2023, the group reported a revenue of €47.64 billion, approximately half of which came from the crop sciences division. The company has set a target of becoming climate neutral at all its sites (Scope 1 & 2) by 2030, and net-zero green-house gas across the entire value chain (including Scope 3) by 2050 or earlier.

Bijoy Sagar is executive vice president (EVP) and chief information technology and digital transformation officer (CIDO) of Bayer. Bijoy has more than 20 years of experience in the healthcare sector and chemicals industry. Prior to joining Bayer, he served as the chief digital technology officer and CIO of Stryker, a leading medical technology company, where he was also a member of the executive team.

PARADIGM SHIFT

How do you see the digital economy developing in the coming decade?

We will see a maturation process. For example, in the past decade cloud made scaling possible, while in this decade it's more about AI. With the reduced cost of computing and greater availability of data, more businesses will get off the ground, and more cash will be invested and also harvested from the processes.

It is difficult to predict which technologies will be adopted. Blockchain was heavily touted in the past decade, but it did not come to fruition as predicted. In contrast, generative pre-trained transformers (GPT) and generative AI have unexpectedly blown up in a short time.

Bijoy Sagar,
EVP and Chief Information Technology and Digital Transformation Officer, Bayer

UNLOCKING NEW VALUE

How do you see the business model at Bayer changing with the adoption and scaling of digital technologies? Which untapped sources of value can these bring to your business?

Our business model has already changed quite a bit. For example, the entire process of large-scale agriculture, encompassing crop planning, protection, planting, yield, etc., is already highly digitalized. Our crop science farming business uses drones to cover 80 million acres, collecting a significant amount of data. We have access to our own satellite data, enabling us to predict within one square meter the moisture level and composition of soil. We use this data in our algorithms to help in the crop-planting process.

Pharma has already gone to market with Calantic, an AI-based radiology solution, which helps physicians simultaneously analyze radiology data and make disease determinations. This helps maximize the benefit to the end-customer and the radiologist.

On the consumer health side, it will be more about behavioral context, targeted advertising, and customized message creation for the customer. In pharma, it will be largely in research and development. We already have a high TPU (tensor processing unit) quantum computing project going on with Google, for example.

DIFFERENT SOURCES OF VALUE FROM DIGITALIZATION

How does Bayer define ROI when it comes to digital initiatives?

At Bayer, rather than assessing cumulative value to the business, we look at value per project or per investment. This is because we are neither a purely digital business nor do we digitalize the entire value chain. Rather, we look at individual business cases where we know what the value of digitalizing is from short-term, medium-term, and long-term perspectives.

We evaluate whether an innovation could make a slight improvement or a fundamental change to the business. So, the initial business cases are more about where we can actually prove some return on investment.

We need to make sure that we are investing for maximum value. We can't take on too many good-looking 'cottage projects,' because, ultimately, value only comes with scale. We aim to create sufficient value to become self-sustaining.

"We can't take on too many good-looking 'cottage projects,' because, ultimately, value only comes with scale."

However, some technologies have become commoditized. For example, if we decide not to use cloud, we need to have very clear justification for that. It is now table stakes, and everything new is going directly to cloud. On the flip side, cloud also means increased data consumption. Hence, even though the unit cost of compute has come down, the total cost has gone up. This needs to be balanced.

We are a science-based business, and our use of cloud has evolved greatly. Drug discovery and crop science are very innovation-intensive businesses, which means high-cost early-phase development. Owing to cloud technology, much of drug discovery is now going to be *in silico* (i.e., on the computer), instead of *in vivo* (in living organisms) or *in vitro* (in glass laboratory containers). This is a complete game changer, since *in silico* allows experimentation in a much wider range of scenarios than was possible physically in the laboratory or the field. That is where we anticipate that we will generate value.

In coming years, which are some of the key technologies that you are likely to invest in?

We are already investing significantly in machine learning (ML) and cloud, and this will be ongoing. High-throughput computing (HTC) will be a priority. Generative AI is going to be a big target for investment as well, particularly

"Owing to cloud technology, much of drug discovery is now going to be *in silico* (on the computer), instead of *in vivo* (in living organisms) or *in vitro* (in glass laboratory containers)."

multimedia/image-based AI.
Digital twinning is another area of focus. Creating digital twins of drug molecules and tracking them has already become an integral part of pharmaceutical development. Crop science is another avenue for digital twin. Both computer vision and augmented reality (AR) will play a big role in the way we manufacture.

"Creating digital twins of drug molecules and tracking them has already become an integral part of pharmaceutical development."

We are doing a lot of 'arm's-length' investments in areas where we feel it is still early days. For example, cell and gene therapies, which are going to be very much high *in silico* business models. We may enter e-commerce in consumer health, which is more about personalized medicine and product choices. 5G has the potential to help facilitate and build a better connection with farmers.

We are also investing in using data in new ways. We have already announced an open-platform marketplace that we are building with Microsoft, where data can be shared in ways where everybody's data is protected, but the value is still created by the behaviors happening there.

"We have already announced an open-platform marketplace that we are building with Microsoft, where data can be shared in ways where everybody's data is protected."

VALUE CREATION THROUGH GENERATIVE AI

What value can AI create for the healthcare and agriculture sectors?

The next decade is truly going to be the decade of AI, especially of text-based AI. At Bayer, we are investing heavily in image-based and other forms of AI. However, text-based AI is going to become embedded in everything we do, and I expect this to change the way we structure processes, conduct searches, and create documentation.

There are endless AI use cases with potential, from crop science to pharma, whether it comes to growers; modeling risk for physicians to provide the right recommendations; or targeting the right patient population for diseases and helping them through the process of disease progression and management.

We believe that AI is going to speed up research and development. With Bing adopting generative AI directly into its browser, we will obviously be deploying the technology extensively.

I believe generative AI will be complementary, and not supplementary, in people-based services because human judgment and oversight will still be required. Maybe 20 years from now, generative AI will have evolved sufficiently to require less human intervention, but I do not see it happening in the next decade.

"Text-based AI is going to become embedded in everything we do."

TECHNOLOGY FOR SUSTAINABILITY

How are you harnessing technology to drive progress towards your sustainability goals?

By 2050, we want to have met net zero targets across the value chain in greenhouse gas (GHG) emissions. More urgently, we aim to reduce value-chain GHG emission by 6% by 2024. This means looking at the entire supply chain, including both primary and secondary suppliers. Sustainability goals will work only if everybody in the ecosystem works on them together.

We use computing in three different ways to fully understand the impacts on our gas emissions:

- To continue to monitor and meet sustainability goals
- To help our customers achieve sustainability goals, as well as building sustainability into business models, such as carbon capture and storage
- To analyze our supply chain in near-real-time, enabling whole-ecosystem compliance for a sustainable future

"WE AIM TO REDUCE VALUE-CHAIN GHG EMISSION BY 6% BY 2024."

Bijoy Sagar,
EVP and Chief Information Technology and Digital Transformation Officer, Bayer

"Sustainability goals will work only if everybody in the ecosystem works on them together."

ADRIENNE HOREL-PAGÈS

Chief Sustainability Officer

La Banque Postale

FINANCING THROUGH A SCIENTIFIC AND SOCIAL IMPACT LENS

Founded in 2006, La Banque Postale is a postal bank and a subsidiary of La Poste, the French national postal service. It offers retail banking, insurance and asset management. In 2021, it became the first European bank and one of the first global banks to have a decarbonization trajectory validated by the "Science Based Target initiative", which includes phasing out investments in thermal coal, oil and gas sectors by 2030.

Adrienne Horel-Pagès is chief sustainability officer and a member of the executive committee of La Banque Postale. She is responsible for implementing the group's sustainable finance strategy in all its dimensions. She led the transformation of the organization required to qualify for the French Economy and Finance Ministry's Socially Responsible Investment (SRI) label. She is based in Paris.

As chief sustainability officer of a bank, what does your role involve?

Adrienne Horel-Pagès,
Chief Sustainability Officer,
La Banque Postale

My first mission is to define the sustainability strategy of the bank at group level. This includes our financing activities; our asset-management arm's investment activities; and also our insurance subsidiaries. My responsibilities include defining our trajectories and/or goals regarding the transition to net zero, our approach to conserving biodiversity, and our social engagement program.

The second mission is to make sure that our bank is at the forefront in terms of climate and social commitments, in order to protect ourselves from the risk of greenwashing and reputational damage. These are key issues, especially in light of the breadth of our engagement and commitments. I am tasked with ensuring that all the products or services we present as 'sustainable' comply with the criteria we set at group level.

My third mission is to ensure that each employee in the bank can participate in our transition. This involves managing a network of sustainability ambassadors; working on the training programs for all the employees; and ensuring that employees can engage in socially beneficial 'giving-back' activities.

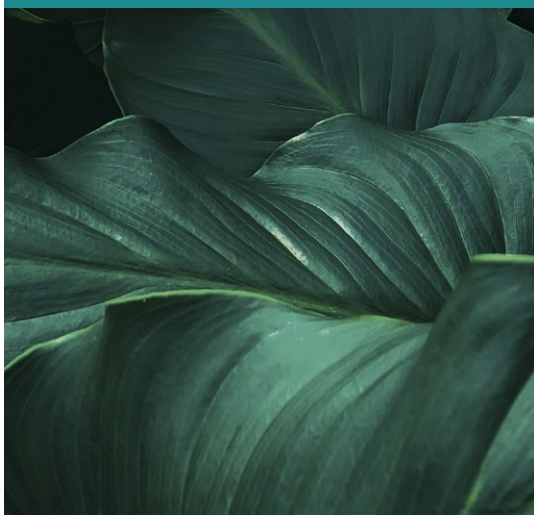
My role is also about engaging with external parties and our stakeholders. I deal with all the regulatory reporting and manage the relationships with external financial-rating agencies, non-governmental organizations (NGOs), and our other stakeholders to drive our mission.

SCIENCE, FOSSIL FUELS, AND FINANCING

You are one of the first banks globally for which the Science Based Targets initiative (SBTi) has validated their carbon trajectory. How did you achieve that?

We co-constructed the methodology with SBTi and that definitely gave us an edge in terms of understanding the nuances of our balance sheet and portfolio. It also took care of the methodological aspects of the validation. But that's only one part. The other aspect is our firm commitment to net zero. What is really important now is implementation. We have to find an equilibrium between risk, return, and impact. We are still on the implementation journey, and we're very humble about the distance we still have to travel. Nevertheless, we are also aware that, with each passing day, better data becomes available to us; we have a greater understanding of our corporate impact, both environmental and social; and we are conscious of the need continually to reset goals. We need to focus on being on the right path, creating that conversation, and taking everyone along the journey.

"With each passing day, better data becomes available to us; we have a greater understanding of our corporate impact, both environmental and social; and we are conscious of the need continually to reset goals."



In 2021, La Banque Postale announced that it was going to stop financing fossil fuel companies. How did you arrive at this decision?

This decision was made as part of our net zero commitments. We realized that financing oil and gas exploration doesn't align with any of the scientific scenarios and pathways connected with our goals. Today,

the broad scientific consensus is that, if we are to be in alignment with the Paris Agreement by 2050, we need to stop exploring new oil and gas fields as of today.

It was quite clear to us that we needed to have a strict policy on this front. We are a big retail bank, but, on the corporate side, we are more of a challenger bank. It finally came down to a combination of our history, our balance sheet, and our net zero commitments, which drove us to this decision. By taking such a decision, we were also hoping to set a strong precedent for the whole financial services sector.

> "We realized that financing oil and gas exploration doesn't align with any of the scientific scenarios and pathways connected with our goals."

How did you ensure that you took the organization along in implementing such a decision?

When taking such a big decision, the most important and difficult thing is to take out individual convictions on climate change and say clearly that we are following scientific consensus. The other important aspect is to take a step-by-step approach to driving systemic change. For instance, we started with a new oil policy, and have since published an aeronautics policy, and a deforestation policy. By clearly articulating our position in each area, we can gradually drive adoption and implementation across the organization.

> "The most important and difficult thing is to take out individual convictions on climate change and say clearly that we are following scientific consensus."

How has the focus on sustainability changed your employees?

Sustainability is changing the role of the banker dramatically. If you think about the role of the financial advisor, the standardization of financial products and digitalization has very much formed the role of the financial adviser, particularly in relation to the retail market. In most cases, clients knew

as much as the adviser when it came to product features. Now that we are talking about sustainable investments, the dynamic of the relationship and the regulation that surrounds it are more complicated. This complexity is now adding value to the advisor role, particularly in the context of AI impacting jobs. The only way to drive change is to train and reskill people continuously.

"The only way to drive change is to train and reskill people continuously."

DRIVING A JUST TRANSITION

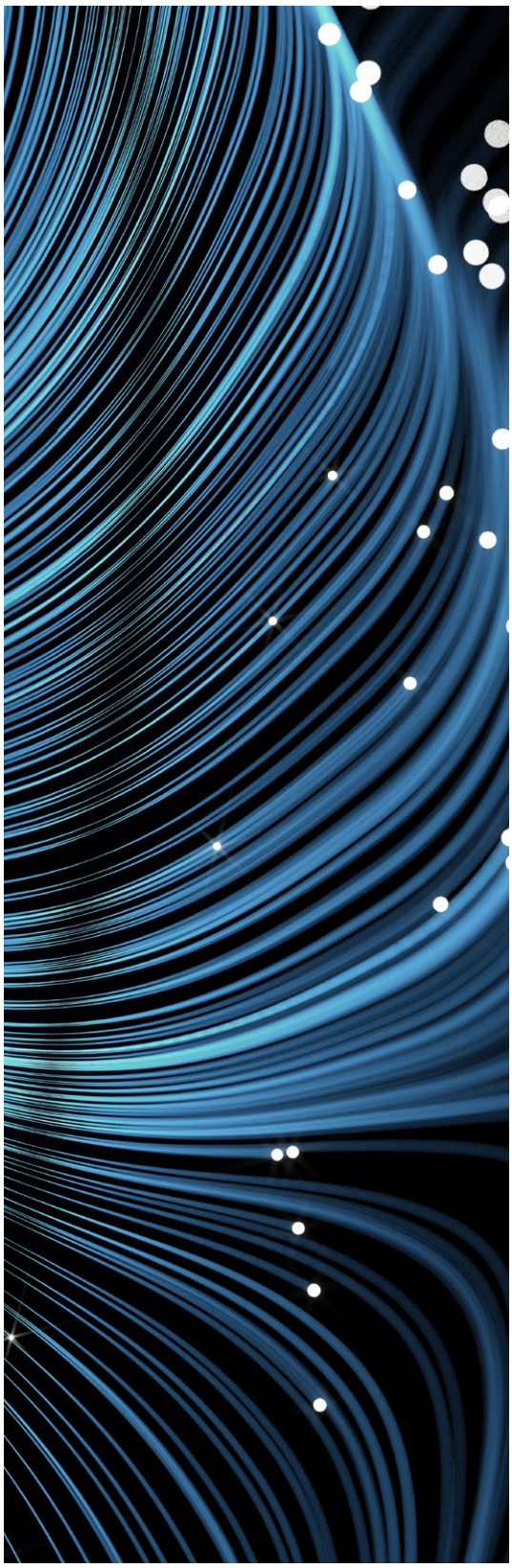
How can we ensure a just transition?

It's very challenging but we are absolutely convinced that environmental transition cannot be socially detrimental. At La Banque Postale, the social dimension is rooted in our DNA because we are a postal bank with nearly 17,000 points of contact in France and a clear mandate to serve the people. We believe that just transition is a way of striking a balance between economic development and positive impact to meet the social, ecological, territorial, and digital challenges we face. None of these transitions can be approached in isolation. They are, in principle, deeply interconnected. Also, being state-owned, while we have to be profitable, we have some financial leeway when it comes to making more socially oriented business decisions.

"We believe that just transition is a way of striking a balance between economic development and positive impact to meet the social, ecological, territorial, and digital challenges we face."

How do you operationalize a just transition through your day-to-day activities?

We have created what we call an impact weighting factor, which is an impact score built on environmental, social, and territorial criteria. For example, if an individual were applying for a mortgage to buy a home, the impact weighting factor considers aspects such as the number of people who will reside in the home, and local and regional location, among other factors. Taken together, these factors determine a score for the property, which may entitle the client to a rebate on the mortgage rate. We are already implementing this system in all our residential mortgages and are slowly integrating it into our commercial real estate and corporate loans, as well.



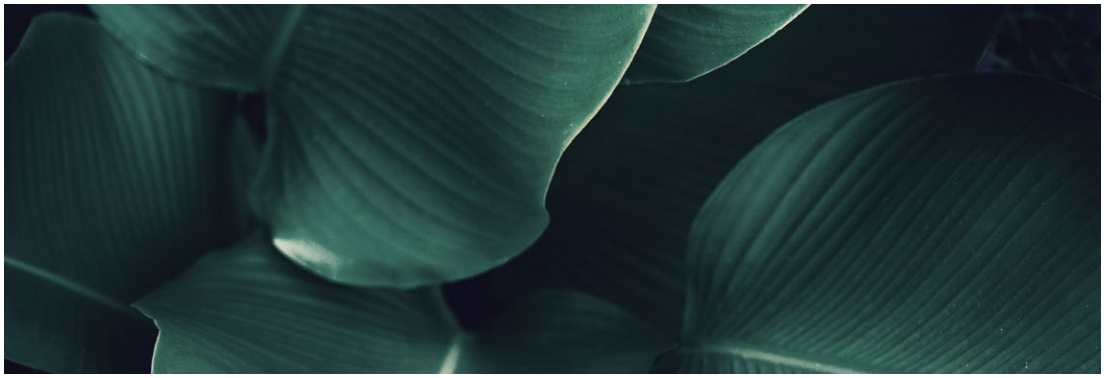
"We have created an impact weighting factor, which is an impact score built on environmental, social, and territorial criteria."

What is your view on impact financing?

There are two key aspects. One is about understanding the impact of your investment, and that's what we are doing with the impact weighting factor. It's not easy, because you have to collect a lot of data from a diverse set of sources, and that needs to be baked into your entire customer-acquisition process. For now, we are scoring, but we haven't yet put in place strict rules, for example, to deny applicants credit based on a low impact score. We need to continue to measure the impact over time, review the targets we are setting, assess how we are meeting them, and the evolution of the score.

> **"We are talking about investments that are fully compliant with the definition of impact: intentionality, measurability, and additionality."**

The other part is investing with impact. This is much more focused. We are talking about investments that are fully compliant with the definition of impact: intentionality, measurability, and additionality.[1] When you're talking about listed assets, however, there is no additionality. Impact financing in that sense is more relevant to private equity, private debt, or non-listed assets. And, in that part of the sector, methodologies are quite advanced in terms of making sure that additionality is part of your investment.

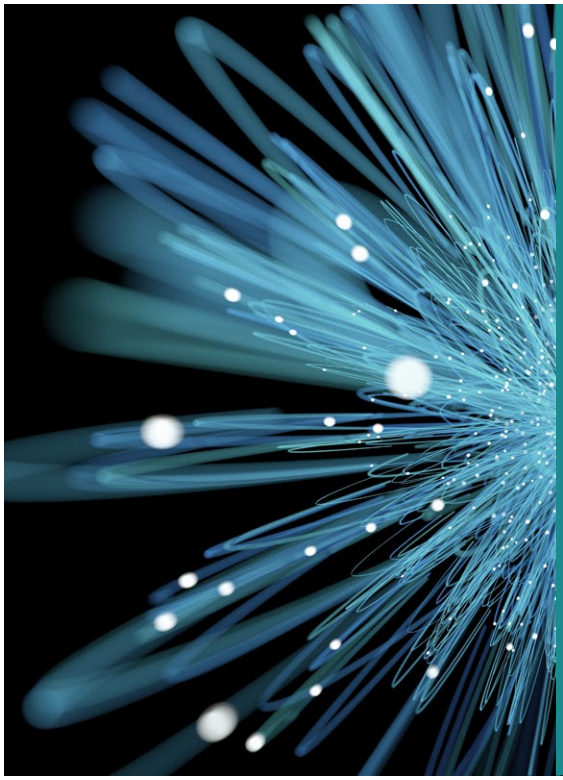


1. Additionality: Positive outcomes that wouldn't have been possible without the investment in question.

PUSHING SUSTAINABILITY FURTHER

From a sustainability standpoint, how do you see technology helping the financial services sector?

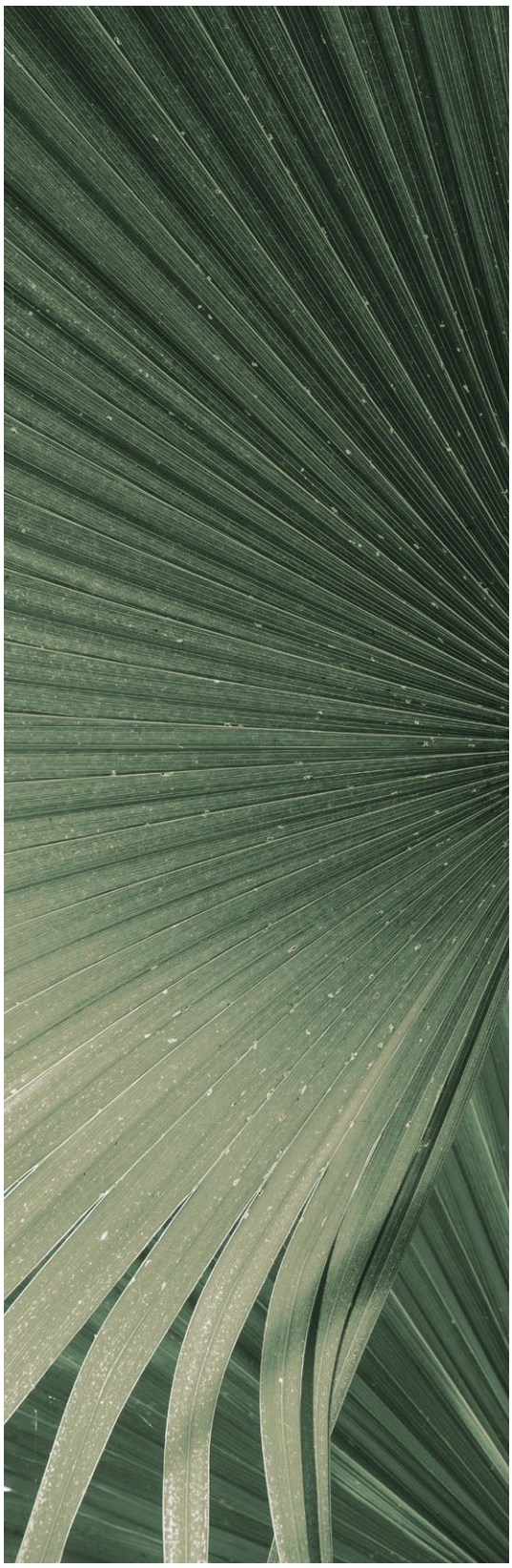
There are two main uses of technology for the financial sector. A big challenge we face is that we need to collect a significant amount of data to analyze the investment that we're proposing, be they green or social investments, measure the impact, and then report on it. Technology helps us to collect data from very diverse sources. The investment side in banks is much more advanced compared with the financing side. The other way in which technology can help us is through a range of innovations that help the environment. For instance, carbon-capture technologies.



"We need to collect a significant amount of data to analyze the investment that we're proposing, be they green or social investments, measure the impact, and then report on it."

How can financial services organizations bridge the gap between sustainability awareness and action?

It's important to bear in mind that the financial services sector is changing, from a world where you think in two dimensions – risk and return – to a world in three dimensions: risk, return, and impact. There's no magic bullet. If organizations are looking to shift their emphasis to the impact side, they either need to increase their risk or be ready to reduce their return. And that's a trade-off financial institutions are not ready to make right now. To be fair to them, on the risk side, regulations don't make it easy to go outside a defined framework. This is why we believe the only way to do it is step-by-step, looking at each financing decision in isolation, and finely balancing the structure. This is how we will engineer genuine impact.



"Financial services sector is changing, from a world where you think in two dimensions – risk and return – to a world in three dimensions: risk, return, and impact."

What is the role of the financial services sector in our transition to a sustainable world?

Basically, the finance sector fuels the economy. As such, it's very important that the sector embraces the transition. I think lots of progress has been made, but it can always be better. At the end of the day, the financial sector can't operate in isolation; it's very important that it receives support from policymakers, who will help it come into alignment with the ordered, systematic transformation of the economy across sectors. It's a collective challenge.

> **"Climate crisis will come; it's a question of when and how well prepared we are by then."**

If you had a magic wand, how would you accelerate our journey to a sustainable world?

I think the key to sustainability is systematic change. I would love to have this magic wand to create a detailed plan and execute it in an orderly manner. Ultimately, climate crisis will come; it's a question of when and how well prepared we are by then. We can let chaos reign or do our best to prepare a systematic response.

Adrienne Horel-Pagès,
Chief Sustainability Officer,
La Banque Postale

"Financial sector can't operate in isolation; it's very important that it receives support from policymakers, who will help it come into alignment with the ordered, systematic transformation of the economy across sectors."

PRAKASH ARUNKUNDRUM

Chief Operating Officer

Logitech

SUSTAINABLE, BY DESIGN

Logitech is a Swiss company which specializes in designing products for enhanced user experience. The company is a leading manufacturer of computing peripherals and software. It had a revenue of USD $4.54 billion in the financial year 2023. Logitech's products and engineering processes leverage a Design for Sustainability philosophy.

As Logitech's Chief Operating Officer, Prakash Arunkundrum focuses on operational and organizational effectiveness. His areas of responsibility include global manufacturing, worldwide supply chain, sourcing, customer experience, and quality. Prakash is also responsible for driving the strategy and execution of Logitech's environmental sustainability initiatives and advancing sustainability commitments across its worldwide operations and products. He also oversees corporate strategy and mergers and acquisitions (M&A). Prior to Logitech, he held senior positions at several management consulting and supply chain services and software companies. He is based in San Jose, California.

As chief operating officer of Logitech, how do your responsibilities transcend both operations and sustainability?

At Logitech, we have come to the view that operations and sustainability should coexist. Whenever you make something, you create a footprint; you sell something, you create a footprint; you use something, you create a footprint. So, how do we work on reducing this at all stages of the process, from development to manufacturing and operations? My team also runs new product initiatives, which look at end-to-end products and product development. Also as the general manager of our B2B business group, I have had the unique opportunity to follow a product from inspiration through design and engineering, sourcing, manufacturing, and ultimately delivery to our enterprise or channel partners, where we have take-back and recycling plans for their end-of-life products.

Prakash Arunkundrum,
Chief Operating Officer,
Logitech

"At Logitech, we have come to the view that operations and sustainability should coexist."

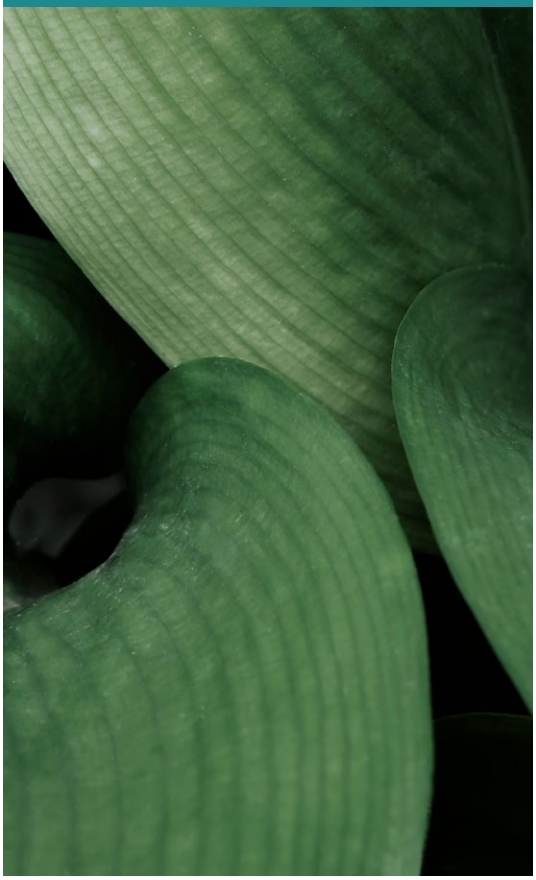
SUSTAINABILITY AND LOGITECH

How has Logitech's sustainability journey progressed in recent years?

Sustainability is embedded as a named value at Logitech – in products, in design, in operations, and even in marketing. We've been publishing sustainability reports for over 15 years now. We formally set a goal to be part of the Paris Accord in 2019 – 20. And we hope to achieve our goals much sooner than 2050.

The first component is primarily around reducing the emissions we create. With each generation of new products and innovations, we try to reduce the carbon footprint. Next, we decided that we were going to be transparent with our customers on our carbon impact. As part of that, we carbon label our products, breaking down the carbon footprint.

"Sustainability is embedded as a named value at Logitech – in products, in design, in operations, and even in marketing."



The third component is the direct adoption or purchase of renewable energy and energy credits, locally, in the same markets. The fourth component is really rethinking our business model. How do we make it more sustainable? How do we create a circular supply chain? How do we bring products back in-house for repair and refurbishment? How do we extend the life of our products?

The key goal has been to progress on these dimensions and inspire others in the value chain to do more, be it with our ecosystem partners, our suppliers, or with customers.

How have you created a culture of sustainability at Logitech?

The biggest advantage we have at Logitech is that our employees care about sustainability. But leaders also have to make clear that it is top of the organization's priorities, as well as setting out a roadmap that includes what risks they are willing to take to get there.

An organization must not only understand the pathway along its sustainability journey but also how to implement it. Hence, we at Logitech

came up with the philosophy of pervasive sustainability, which means it is part of everyone's job description to consider sustainability. The goal is if you are an engineer and you're trying to look at an alternate product development feature, you should consider sustainability as part of the process.

If you have a new product in the roadmap that you as a product manager are trying to introduce, you're going to look at cost, schedule, and user experience, but also at CO_2 emissions as part of your product development efforts. It's a metric that we use to inspire, rather than punish.
The goal is to be able to add more features while simultaneously reducing footprint. This is part of our Design for Sustainability approach.

"An organization must not only understand the pathway along its sustainability journey but also how to implement it."

"(CO_2 emissions) is a metric that we use to inspire, rather than punish."

DESIGN FOR SUSTAINABILITY

Can you help us understand the philosophy of Design for Sustainability?

Design is about imagining what the user experience should look like when you buy a product. The best technology disappears in the foreground – you don't even know that it exists. That is the goal of good design.

When applied to sustainability, it means thinking about what design decisions can we make at every point of the lifecycle. Design for Sustainability influences both the product itself and the user experience, through hardware and software features, respectively.

When applied to sustainability, (good design) means thinking about what design decisions can we make at every point of the life-cycle."

As an example, we have installed 'sleep mode' in several conference room video collaboration devices. Sleep mode fundamentally reduces the energy load, like with a mouse for a computer. You don't want to be waiting for a long time for the mouse to wake up. But, equally, you don't want it to be drawing power when nobody's using it. These are examples of Design for Sustainability that we are weaving into our products.

What is the role of data in building this design mindset?

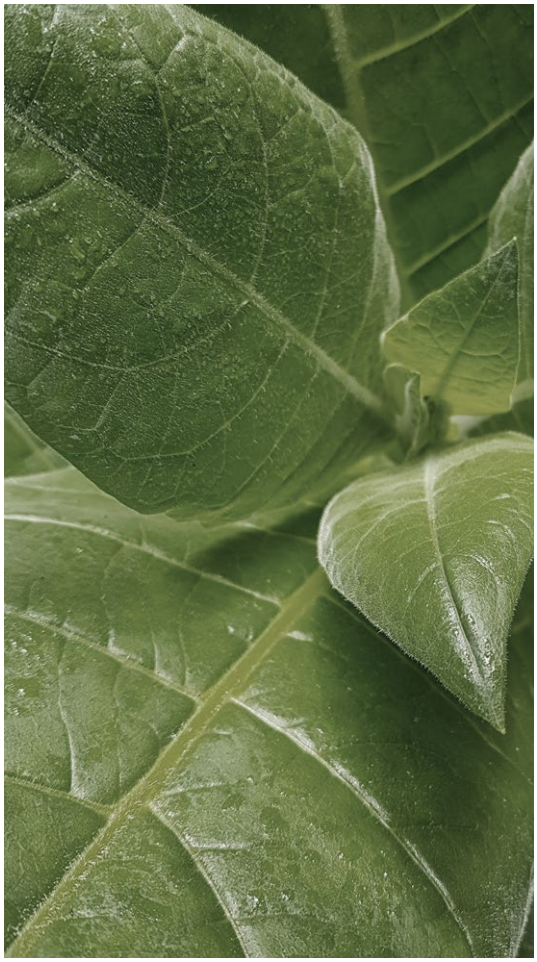
The biggest question that comes up in this mindset is data and understanding of trade-offs. For example, if we want to have a cable of a certain length, do we have the data to understand the emissions impact? You need that data to feed into the design process.

But you need to know what the data is so that you can actually track that. We have a team of people in the sustainability team that builds this data competence and works with the engineers to share such trade-off data. This is the key capability for Design for Sustainability, and it also underpins the carbon labeling methodology.

You are one of the pioneers of carbon labeling in the electronics industry. Can you help us understand the concept further?

An average consumer is not going to try to understand our design and manufacturing processes or decisions. We took inspiration from calorie labeling. If you think about your average food product, consumers know roughly what portion of their daily calorie consumption it constitutes. With this universal reference, they understand what it means from a measurement perspective.

Additionally, the more detailed the life cycle assessment (LCA) data collection, the more we can improve the product. We were the first in the industry to do it across all our products, and my hope is that we can inspire other people to do the same. We have 42% of our products already carbon labeled and, by the end of 2025, it should be most products.



"The more detailed the Life Cycle Assessment (LCA) data collection, the more we can improve the product."

DESIGNING FOR A CIRCULAR ECONOMY

What is your approach to repairability?

Repairability needs to be a key focus area for the industry. One of the core things about repairability in tech is, that unlike an automobile, which you can take to a local mechanic, there isn't local service for an electronics ecosystem.

There are two sides to repair. The first side is how to make sure the product doesn't require repair for the longest time possible, which is a core emphasis for Logitech. The second side is, when repair is required, how do you make it more straightforward? The answer is: either through a direct relationship with Logitech or through authorized third parties. To that end, we collaborated with iFixit, an online store that provides repair parts. So, now, if a scroll wheel doesn't work, you can go to iFixit and find the repair guides, original equipment manufacturer (OEM) parts, and tools to fix it yourself.

The third thing we are working on with our enterprise customers is a program to take back old tech, and either refurbish or recycle it.

We're also working on doing take-backs with retailers, such as Best Buy. It's a multi-pronged effort.

> **"Repairability needs to be a key focus area for the (tech) industry."**

How do you take the supplier ecosystem with you on your sustainability journey?

A few years ago, we engaged with every one of our suppliers to discuss sustainability, and how we expected them to start measuring and reporting progress. Our intent was to help them think about measuring and reporting their emissions.

We then either connected them to local renewable energy sources or encouraged them to consider renewable energy certificates. We set up a buyers' club, so that they can access renewable energy to offset the amount of emissions they create in a particular year.

In the past three years we conducted workshops challenging them to innovate with sustainability in mind. We said: "I'm buying this from you. How can you produce it with lower emissions?" This approach has resulted in several new innovations for our products; for example, low-carbon aluminum, which we receive from various suppliers.

We also co-innovate with our suppliers. Sometimes, there are innovations in materials or improvements to their processes, which they haven't done for reasons of cost, time, or simply because we haven't asked them.

Our principal focus over the coming years is to redesign the electronics ecosystem and how we make and source products, material, and components. We want to change everything, from the ground up.

Prakash Arunkundrum,
Chief Operating Officer,
Logitech

"Our principal focus over the coming years is to redesign the electronics ecosystem."

PROF. SUSAN HOCKFIELD

Neuroscientist and Author,
President Emerita

MIT

VALUE CREATION THROUGH SYNTHETIC BIOLOGY

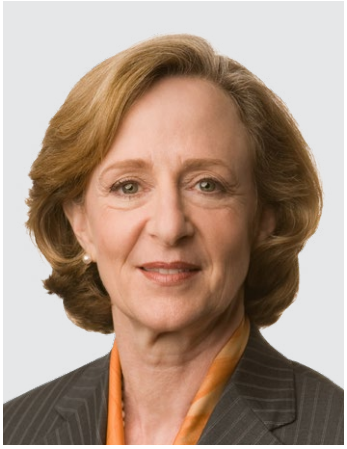
Susan Hockfield is Professor of Neuroscience and President Emerita at the Massachusetts Institute of Technology (MIT). She was the 16th president (2004-12) of MIT, and the first woman and the first life scientist to lead the institute.

Professor Hockfield's research focuses on the development of the brain and on glioma, a form of brain cancer. As a biologist, she pioneered the use of monoclonal antibody technology in brain research, identifying proteins through which neural activity early in life affects brain development.

She also helped shape national policy for energy and next-generation manufacturing, and in 2011 was appointed by President Barack Obama to co-chair the steering committee of the Advanced Manufacturing Partnership (MIT AMP).

In 2020 Professor Hockfield received a Science Communication Award from the American Institute of Physics for her book, The Age of Living Machines (2019). She is the recipient of several other prestigious awards, including the Charles Judson Herrick Award from the American Association of Anatomists; the Golden Plate Award from the Academy of Achievement; and the Amelia Earhart Award from the Women's Union.

The Capgemini Research Institute spoke to her about the role of synthetic biology in building sustainable solutions.

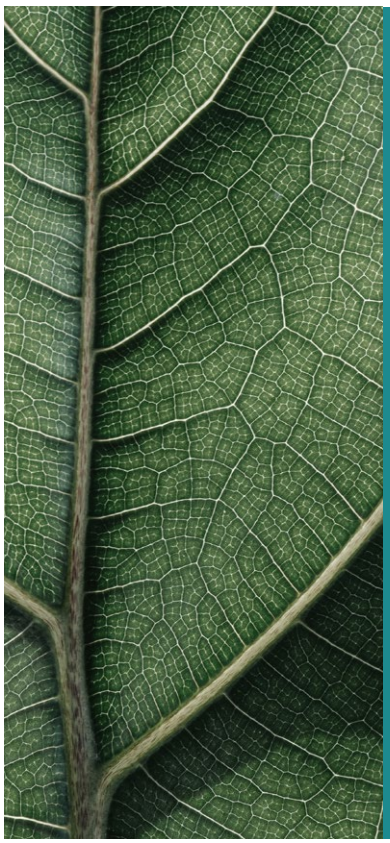


Prof. Susan Hockfield,
Neuroscientist and Author,
President Emerita at MIT

What drew you to a career in the life sciences, and in synthetic biology in particular?

From as early as I can remember, I always had to take things apart to understand how they worked, leaving a litter of parts behind me. I had a curiosity about how things work in the living world and learned how to take them apart to understand how living organisms work.

In my junior year in college, the opportunity to use electron microscopes to understand the different parts of cells just blew my mind. Shortly after finishing college, I started work in a medical school laboratory, where I felt a sense of belonging from the very first day. While I was doing my PhD in neuroanatomy, I had the great fortune to work at the National Institutes of Health (NIH), which had a fascinating multidisciplinary group of anatomists, physiologists, pharmacologists, psychologists, and clinicians, all thrown in together with the shared ambition of understanding how the brain perceives pain and to find ways to alleviate it.



"From as early as I can remember, I always had to take things apart to understand how they worked, leaving a litter of parts behind me."

DECODING SYNTHETIC BIOLOGY

The field of synthetic biology is complex and rapidly evolving. How would you explain its significance to a lay person?

Nature is brilliant at solving technical problems. Our role is to recognize nature's solution and adapt it to our needs. Synthetic biology is one such powerful biological tool now available to us. Genes can be reconfigured, not just in cells and cultures, but in living organisms. It is an opportunity not only to understand the different areas of biology, but also to manipulate those areas to improve human health.

Future innovations will be an amalgamation of these biological tools with physics and engineering. My particular interest is in using the different parts of biology synthetically to build things that, while not actually living themselves, use the components of living things.

> **"Nature is brilliant at solving technical problems. Our role is to recognize nature's solution and adapt it to our needs."**

> **"Future innovations will be an amalgamation of these biological tools with physics and engineering."**

VALUE CREATION THROUGH SYNTHETIC BIOLOGY

In *The Age of Living Machines*, you talk about the convergence of biology and engineering. How do you see new value being created by the large-scale adoption of synthetic biology across industries?

There is a desperate and urgent need to scale the technologies we have available to us today in order to avoid being overtaken by the needs of an increasing global population. Advancements in physics, engineering, and life sciences have resulted in several interesting innovations in synthetic biology. For instance, a startup called Aquaporin[1] uses water-channel proteins[2] found in living cells to build water filters for use in residential settings and, hopefully, soon in industry. Nanotechnology has assisted the development of slow-release drugs[3], allowing controlled doses to be administered for diabetes, cancer therapies, etc. In another application, synthetic nanoparticles[4] can help for early detection of tumors or specific diseases by emitting signals in the urine.

"There is a desperate and urgent need to scale the technologies we have available to us today in order to avoid being overtaken by the needs of an increasing global population."

1 Aquaporin is a Danish biotech water-purification firm founded by Peter Holme Jensen, headquartered in Copenhagen.

2 US physician Peter Agre won the Nobel Prize in Chemistry in 2003 for the discovery of 'aquaporin' proteins, which allow water to flow in and out of living cells.

3 US chemical engineer Robert Langer is credited with the development of the technology that forms the basis for slow-release drugs.

4 MIT professor, inventor, and entrepreneur Sangeeta Bhatia is credited with designing the first synthetic nanoparticles.

THE ROLE OF SYNTHETIC BIOLOGY IN ACHIEVING SUSTAINABILITY GOALS

What role do you think synthetic biology can play in helping organizations become more sustainable?

My own view is that biological systems and parts are, by their very nature, sustainable. Synthetic biology constructs without contaminating the environment.

For example, usage of water-channel proteins for water purification is a step towards identifying sustainable solutions. Similarly, scientists have used genetically engineered viruses to build sustainable batteries. I believe using biology from the outset is likely to lessen the environmental impact more than when using chemistry alone.

"Scientists have used genetically engineered viruses to build sustainable batteries."

SYNTHETIC BIOLOGY: THE ETHICAL CONUNDRUM

How can governments, academics, and organizations work together to assuage ethical concerns around synthetic biology?

When gene engineering first emerged in the mid-1970s, scientists recognized the associated potential dangers. This led to the establishment of the Asilomar Conference[5], in which participants signed a pact to remain within clearly defined scientific boundaries. This constituted a remarkable collaborative commitment to protecting the world.

Cutting-edge biological research was previously limited to a small group of people within a small set of countries. Now, however, it is widespread. This does mean it may be difficult to achieve another Asilomar-like conference success, especially as we cannot even reach a consensus on existential issues such as nuclear arms. We need to set strongly enforced perimeters but, unfortunately, we do not have strong international agreement.

Are the dangers of synthetic biology greater than the dangers of climate pollution, nuclear war, and other existential crises? They are different, and, like current technologies, should be regulated to protect humanity and our ecosystem.

5 In February 1975, the International Congress on Recombinant DNA Molecules, popularly known as the Asilomar Conference, was held in California. Led by Paul Berg, David Baltimore, Sydney Brenner, Richard Roblin, and Maxine Singer, the conference attracted almost 140 attendees, including scientists, lawyers, journalists and government officials. It is often considered to have been the first step toward the formulation of public policies that address biohazards. https://www.nature.com/articles/455290a

What are your thoughts on the challenges around the application of gene engineering in life sciences?

We can't discuss gene engineering without raising the pluses and the minuses, which actually shift as you think about – and develop – them. We have identified the genes for some diseases, and we agree it is okay to eliminate those genes if that can be done safely. But what constraints should be placed on modifying embryos in terms of IQ, height, etc., once the associated genes are identified?

Similarly, genetic engineering of plants has gotten a bad name. Why would we not want a virus-resistant cassava to help solve hunger problems in third-world nations, for example? Or why would we not want to harvest more than 150 bushels of corn per acre, which would be a major lifesaver for many?

In gene engineering, it is important to think about what kind of organisms we are creating, the possibility of propagating them, and how to control their use.

"We can't discuss gene engineering without raising the pluses and the minuses, which actually shift as you think about – and develop -– them."

WOMEN IN SCIENCE

As the first woman and the first life scientist to become president of MIT, what do you see as the key to attracting more girls and young women to science?

In a perfect scientific world, gender would not be relevant – but we're not there yet. Besides the more evident limitations, there are also many more subtle barriers. For example, men often tend to group together, unconsciously leaving women out. This kind of self-segregation happens all the time and is a significant part of the problem. Such informal networks often convey information that travels around among men, with women left off the mailing list.

> **"We must encourage women all along the way but also provide opportunities for them to have fabulous experiences."**

We must encourage women all along the way but also provide opportunities for them to have fabulous experiences. We need to give them the confidence to do unusual things, and to instill support for other pioneering women. Women must amplify each other's voice.

A recent MIT study showed that it is very rare for a woman to be part of the founding group of any company. We have started a program[6] to encourage women entrepreneurs to walk the path of company creation. It brings women into the entrepreneurial sphere, providing them with the encouragement and funding that allows them to get started. But, if you look at the numbers for venture-capital investments in companies, less than 4% of VC dollars go into women-founded companies, which means that it is just harder to get funding if you are a woman.

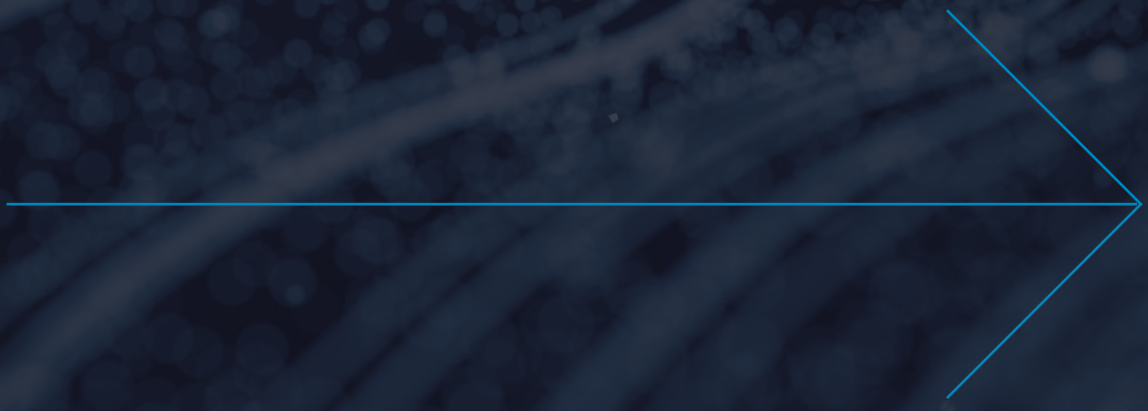
"LESS THAN 4% OF VC DOLLARS GO INTO WOMEN-FOUNDED COMPANIES."

6 Future Founders Initiative, a joint collaboration of MIT faculties, led by Dr. Sangeeta Bhatia, Dr. Susan Hockfield and Dr. Nancy Hopkins, to encourage female entrepreneurship, especially in biotech.

Prof. Susan Hockfield,
Neuroscientist and Author,
President Emerita at MIT

"We have started a program to encourage women entrepreneurs to walk the path of company creation."

Perspectives from Capgemini



WHY SOFTWARE IS THE NEW COMPETITIVE DIFFERENTIATOR

Jiani Zhang, EVP and Chief Software Officer, Capgemini Engineering

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BUSINESS, MEET PLANET: LEVERAGING TECHNOLOGY, DATA AND ENGINEERING FOR A BRIGHTER FUTURE

Vincent Charpiot, EVP and Head of Group Sustainability Business Accelerator, Capgemini

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Jiani Zhang
EVP and Chief Software Officer,
Capgemini Engineering

WHY SOFTWARE IS THE NEW COMPETITIVE DIFFERENTIATOR ACROSS INDUSTRIES

Software is now a fundamental component of product development, innovation, and maintenance. Across industries, organizations are integrating software into their designs to drive a more intelligent, connected, and autonomous product ecosystem and accelerate innovation, revenue growth, and value.

Software is no longer an "add-on" to the product lifecycle and value chain. Rather, it's the key to staying ahead of the competition and unlocking new revenue streams. In short, software is the new competitive differentiator across industries.

EVERY COMPANY IS A SOFTWARE COMPANY NOW

It's been more than a decade since Marc Andreessen wrote his essay: "Software is eating the world." Despite this, the sentiment has never been truer. Our recent research report, The art of software: The new route to value creation across industries, shows that an overwhelming majority of organizations see a software-driven future for their industries. The report notes that as many as 1350 of the 1500 organizations surveyed (90%) are developing software-driven business strategies.

Not only is software the future of industries, but most organizations are also seeing software-driven benefits today:

- 86% of organizations generate new revenue streams based on software-defined products (including the roll-out of new services).
- 73% of organizations achieve faster R&D in existing products and services.
- 62% of organizations gain a competitive advantage (e.g., an increase in market share).
- 52% of organizations generate cost savings.
- 50% of organizations have seen an improvement in customer experience (e.g., higher NPS/CSAT score).

We also found that organizations are, on average, investing 18% of their R&D budgets in software initiatives, a percentage that we

"To transform into software companies, organizations must reconstruct their business models around software, resetting their revenue models, business processes, and organizational structures."

expect to continue to rise. This growing investment has impacted revenue models in multiple ways.

In order to increase software and digital revenue, organizations must transform how they handle customer contracts and payments. This will require them to integrate and scale leasing, micro-payments, on-demand, and subscription models to take advantage of software-based capabilities and features.

Further, to transform into software companies, organizations must reconstruct their business models around software, resetting their revenue models, business processes, and organizational structures.

All aboard the software bandwagon

In particular, industries that involve a high degree of mechanization (e.g., manufacturing and transportation) stand to gain by embracing software-driven transformation. The research shows that 90% of automotive organizations have generated new revenue streams by deploying software-driven products and services, while 59% of industrial and capital goods companies have cut costs by implementing a successful software transformation strategy.

Further, the report found that 67% of industrial and capital goods organizations, 66% of life sciences organizations, and 64% of hi-tech manufacturing organizations cite competitive advantage as a key benefit of software-driven transformation.

Low-cost airline EasyJet has invested in new aircraft software from Airbus that is designed to increase jet fuel efficiency. It is projected

that the software will enable the airline to save more than 98,000 kg of fuel per year per aircraft across its European network.

Experience-based industries (e.g., banking, retail, e-commerce) also stand to benefit from a software-centric approach. According to the report, 77% of banking and insurance and 75% of hi-tech organizations saw a reduction in R&D time required to market their existing products and services, while 59% of retail and 55% of banks and insurers have reduced costs as a result of software-driven transformation efforts.

"77% OF BANKING AND INSURANCE AND 75% OF HI-TECH ORGANIZATIONS SAW A REDUCTION IN R&D TIME REQUIRED TO MARKET THEIR EXISTING PRODUCTS AND SERVICES, AS A RESULT OF SOFTWARE-DRIVEN TRANSFORMATION EFFORTS."

HOW TO MAKE SOFTWARE-DRIVEN TRANSFORMATION A REALITY

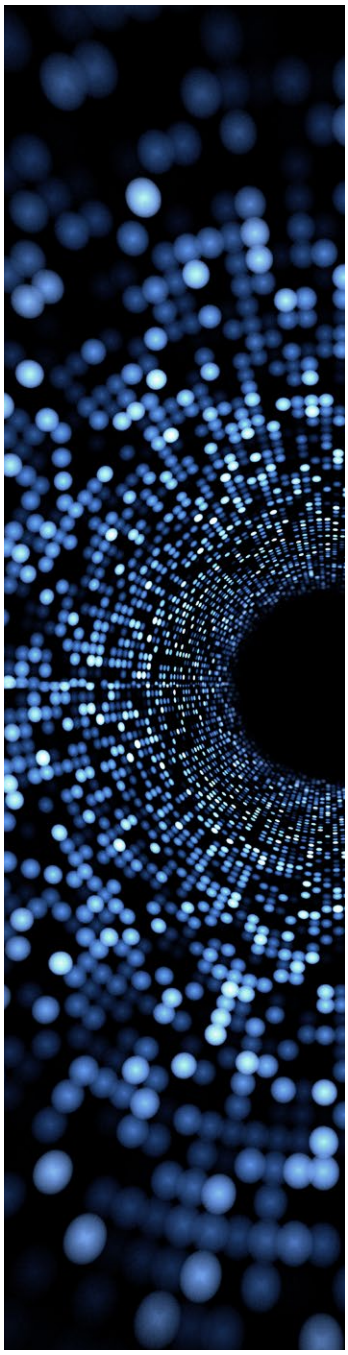
Drive from the top

Our research found that nearly 60% of organizations agree that software-driven transformation is now a board-level topic. However, only 40% have a comprehensive software-driven transformation strategy, incorporating timelines, roadmap, dedicated resources, and funding. In addition, 56% of respondents rank leadership-related challenges among the top-three barriers impeding software-driven transformation.

As well as the redesign of business models and engineering processes, software-driven transformation requires the redesign and creation of business models. In addition, organizations must optimize data analytics, boost cybersecurity, improve performance on sustainability, and harness the potential of their ecosystems.

Build a future-proof architecture

Software-driven transformation requires leadership to re-evaluate the entire business architecture. New software initiatives must be scalable and capable of interacting with other systems across the organization, such as communication channels, software stacks, computing infrastructure, hardware platforms, and analytics.



Organizations must build a centralized architecture that can be adapted to the unique needs of individual business teams. This architecture must be standardized, flexible, and scalable. Leaders should ensure the organizational roadmap is clearly defined, as the implications of this choice are far-reaching and long-lasting.

Leaders should consider several key factors when selecting a business architecture:

- **Design to common standards and using universally applicable solutions:** Organizations should select a system design that adheres to widely followed standards, as custom solutions increase uncertainty.
- **Flexibility and scalability:** Organizations should select a software solution that offers flexibility and interoperability across platforms (i.e., cloud, edge, on-premises). These solutions should be future-proofed and equipped to adopt new features.
- **Modularity:** Organizations should select a modular design that facilitates upgrades and troubleshooting and supports multiple design roadmaps, while avoiding overly modular design and unnecessary complexity.
- **Reliability and resilience:** Organizations should select architecture of proven reliability and strong uptime.
- **Testing and performance optimization:** Organizations should select a design that aligns with its testing and performance-optimization methods.

Build a digital-native culture and process

To become digital-native, organizations must rethink their structures and evolve their cultures. By repositioning software products at the center of their organizational structure, leaders can ensure accelerated time to market, increased scalability, and safety.

Building a software-centric business is not easy and requires the transformation of existing processes and methodologies in order to deliver the heightened standards of experience, quality, velocity, and scale associated with today's software. Organizations need to drive consistency in their tooling, optimize development KPIs, and continuously improve developer productivity through assets and automation.

Many organizations lack the necessary software engineering expertise to manage a successful transformation. The competition to hire new software talent is fierce – organizations must invest in programs to upskill their existing workforces with software expertise, as well as calling on their ecosystem partners to help bridge the gap. Software is the new framework in which organizations must learn to operate and appropriately skilled people are the key to driving the best outcomes in this new environment.

Conclusion

While software transformation may appear to be a daunting business initiative, it offers an enticing opportunity for organizations to unlock untapped value streams and become leaders in the new digital era.

Leaders should view software as a strategic asset for transforming their industry and evaluate how they can begin to augment their business, operations, and revenue models to begin that journey. Put software transformation high on your priority list for 2024. Start your planning now and evaluate how to incorporate software-driven transformation into your roadmap.

Vincent Charpiot
EVP and Head of Group Sustainability Business Accelerator, Capgemini

BUSINESS, MEET PLANET: LEVERAGING TECHNOLOGY, DATA, AND ENGINEERING FOR A BRIGHTER FUTURE

Sustainability is today a business imperative. This is increasingly clear to executives the world over – but the road towards real change is long and winding, with interconnected challenges. Meeting them will demand a mindset shift; we need to aim beyond immediate sustainability goals and weave the planet's needs into the very fabric of our approach, making the natural world a crucial stakeholder in the corporate narrative. And technology will help us navigate uncertainty as we work to create a better future for all.

Picture a landscape where the digital and the sustainable seamlessly converge, giving rise to technology as an ally in our pursuit of environmental goals. This is the setting of the eco-digital era™, where innovation drives exponential progress in sustainability. Organizations that effectively manage the transition by focusing on a few key areas will be able to meet their business goals while preparing for an inclusive and sustainable tomorrow.

"This is the setting of the eco-digital economy, where innovation drives exponential progress in sustainability."

Shifting the business model to unlock value

Today, 63% of executives can clearly see the business case for sustainability, versus 21% a year ago[1]. It's an impressive increase in just one year – but getting sustainable action off the ground will require commitment to this paradigm shift. In order to succeed, we must prioritize the planet's needs on par with the organization's objectives.

Many companies are already doing this. In fact, Capgemini's research has shown that "sustainability frontrunners," or organizations that successfully weave sustainability into all areas of their own operations as well as in their value chains, in part by leveraging digital technologies, also unlock additional value. We've seen that in terms of revenue per employee, such companies perform 12% higher than average, compared to 6% higher for less mature organizations and 12% lower than average for the least mature.

> **"Today, 63% of executives can clearly see the business case for sustainability."**

For companies starting their sustainability journey, part of the solution will be to leverage circular economy and sustainable design principles. With circularity, organizations operate within the limits of our planet's resources, building business resiliency and enabling the planet's self-regeneration. This could mean embracing product-as-a-service models or sharing platforms, or encouraging repair and maintenance, for example. Crucially, this shift will require organizations to consider long-term advantages rather than future costs and to invest in and scale digital technologies. In the long run, companies will reap many benefits, including reducing waste, extending the lifespan of products, and appealing to sustainability-conscious consumers.

1. A World in Balance 2023, Capgemini Research Institute, 2023

Realizing innovation with new tech and data

Technology will be key to unlocking value in sustainable business models. Three-quarters (75%) of executives across the globe believe climate tech will be indispensable to reaching their organizations' sustainability goals[2]. However, the cost of climate- and clean tech – such as renewables and biofuels – is a major barrier to adoption[3]. It's important, then, that organizations become empowered to leverage tools like AI, digital twins, and blockchain, which can reduce the development costs of climate tech while increasing efficiencies and speeding up innovation.

Alongside climate tech, smart use of data will also be essential to increase efficiency in a range of industries and prevent unnecessary emissions. As an example, in our work with OCAP (Organic Carbon Dioxide for Assimilation of Plants), Capgemini's innovative data platform helped accurately track, measure, and control the CO_2 distribution of their clients as they redirect CO_2 from heavy industry to greenhouses.

In the past year alone, we've seen businesses across sectors make great strides in adjusting their outlook toward sustainable practices. With each innovation, we can increase the accuracy of these tools and empower businesses to make data-driven decisions that optimize energy consumption and reduce their carbon footprint.

> **"Technology will be key to unlocking value in sustainable business models."**

2. Climate Tech, Capgemini Research Institute, 2023
3. Climate Tech, Capgemini Research Institute, 2023

Delivering impact for the planet, and for its inhabitants

Today, most executives can see how sustainable practices can help the business. However, too many organizations are still being weighed down by a belief that the sustainability transition is a costly threat looming over their path to success. By learning how to harness technology to drive innovation and value creation, these players can be empowered to deliver real-world change in a large array of domains.

Transversal topics such as energy usage represent a crucial lever to alleviate businesses' footprint. For instance, in 2022, we launched Capgemini Energy Command Centre (ECC) which during its first year, helped reduce energy consumption by 29% (compared to 2019) in our eight main campuses in India. This project actively enhances building energy and asset performance, implementing predictive condition-based maintenance measures that positively impact stakeholders and the environment.

New technologies will also be crucial in tackling biodiversity loss, a previously overlooked topic that is integral to a sustainable future. Our research reveals that 73% of executives see digital technologies, especially AI, as key for biodiversity preservation. Capgemini, in collaboration with Naturalis Biodiversity Center and Amazon Web Services, has already applied AI to combat biodiversity loss. Using machine learning, we analyzed insect sound recordings to monitor and support preservation efforts, addressing the challenges in tracking these vital ecosystem contributors.

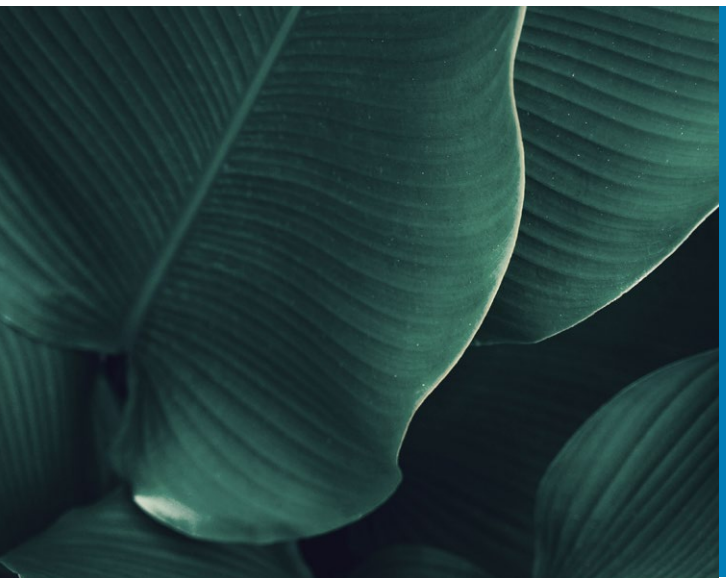
"Alongside climate tech, smart use of data will also be essential to increase efficiency in a range of industries and prevent unnecessary emissions."

Building ecosystems of responsible business

Climate, population, and planetary boundaries are just some of the elements that should influence organizations' business decisions and their supporting economic models. And to become truly future-proof, organizations must begin by understanding how the interaction of these complex factors will impact their technologies and assets. They should also recognize the opportunities in new and transformed relationships with other players within or outside of their industries – including startups, research institutions, and government bodies.

Technology not only predicts strategy outcomes but also aids companies in collaborating with broader ecosystems for sustainable change. For example, Capgemini's partner, BLOOM, used advanced social listening to uncover how a distrust between organizations and individuals threatens global sustainability efforts. To address this roadblock on the journey to sustainability, businesses should avoid overstating progress, focusing instead on implementing effective processes to measure and control impact, and foster transparent communication.

"Climate, population, and planetary boundaries are just some of the elements that should influence organizations' business decisions and their supporting economic models."



"Technology not only predicts strategy outcomes but also aids companies in collaborating with broader ecosystems for sustainable change."

Let's meet the planet's needs, together

Sustainability transformation is not just about meeting targets; it's about changing the way businesses operate, fostering a balanced relationship between technological advancement and environmental responsibility.

Technology will be the bridge to future-proofing our businesses. And with the right support, organizations and the global community can come together and harness these new tools to create benefits for everyone.

"Sustainability transformation is not just about meeting targets; it's about changing the way businesses operate."

Insights from the Capgemini Research Institute

THE ECO-DIGITAL ERA™
The dual transition to a sustainable and digital economy
P.145

A WORLD IN BALANCE
Heightened sustainability awareness yet lagging actions
P.150

THE ECO-DIGITAL ERA™

THE DUAL TRANSITION TO A SUSTAINABLE AND DIGITAL ECONOMY

For details on the research methodology and to read the full report, please visit: **https://www.capgemini.com/insights/research-library/the-new-digital-economy-research/**

The economy is undergoing a dual transition, delivering economic, environmental, and social value

Focus on economic, environmental, and social gains

Diverse talent

Scaling digital technologies

Digital platforms

New revenue streams

ECO-DIGITAL ERA™

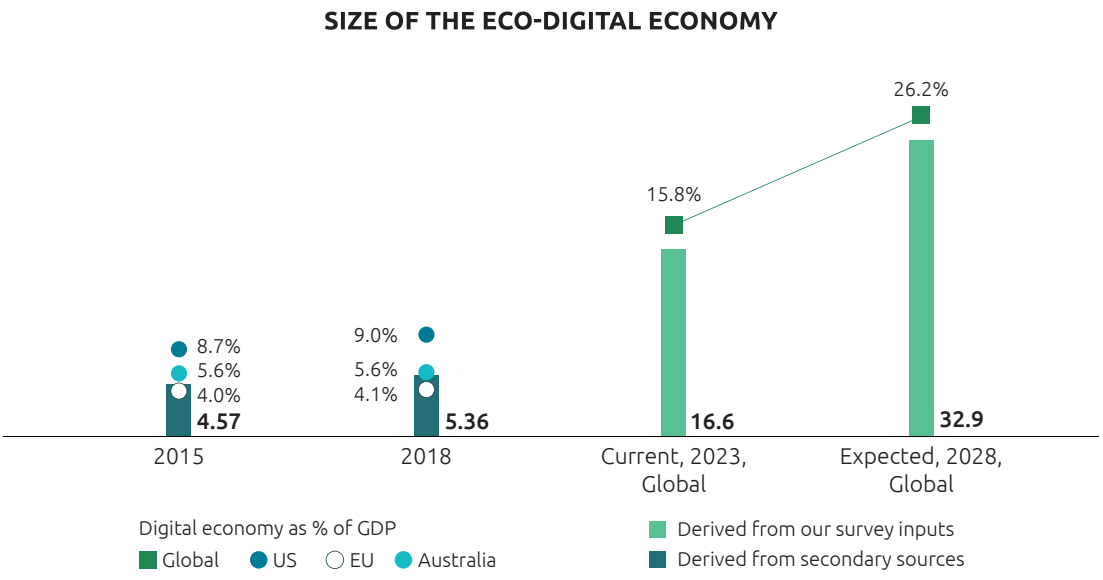
Collaborative ecosystems

Software-defined transformation

Exploring emerging tech (Gen AI, SynBio)

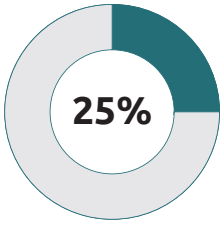
Sustainable business models

The eco-digital economy is expected to double in size over the next five years



Source: Capgemini Research Institute and Digital Value Lab at the Digital Data and Design Institute at Harvard, Eco-Digital Survey, May–June 2023; N = 1,505 executives, N = 150 executives who are digital leaders in their organizations; Capgemini Research Institute analysis.

Digital technologies contribute more to reducing emissions than their own carbon footprint, and are expected to achieve a net reduction in emissions in the next five years

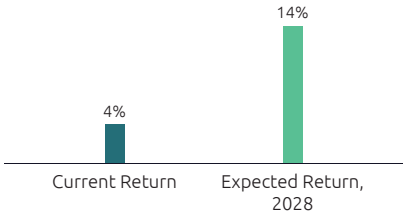


YET, ORGANIZATIONS HAVE ONLY HARNESSED 25% OF THE POTENTIAL OFFERED BY MAINSTREAM TECHNOLOGIES SUCH AS AI/ML, ROBOTICS, AUTOMATION

Digital investments as a share of revenue set to double in the next five years

DIGITAL INVESTMENT AS A % OF REVENUE, CURRENT VS. EXPECTED

ANNUAL RETURN ON INVESTMENT IN DIGITAL, CURRENT VS. EXPECTED

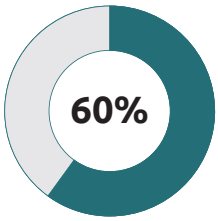


Source: Capgemini Research Institute and Digital Value Lab at the Digital Data and Design Institute at Harvard, Eco-Digital Survey, May–June 2023; N = 1,505 executives, N = 972 executives who are digital and innovation leaders.

Scalable adoption of mainstream digital technologies (e.g., data analytics, cloud) will unlock new revenue streams, drive cost efficiencies, and accelerate sustainability efforts

Nearly half of organizations are also developing a strategy to harness the potential of emerging technologies such as generative AI, edge computing, digital twins, synthetic biology, etc

Digital investments as a share of revenue set to double in the next five years



OF ORGANIZATIONS BELIEVE THAT TECHNOLOGY CAN HELP THEM FAST-TRACK AND ACHIEVE SUSTAINABILITY GOALS

TOP WAYS IN WHICH TECHNOLOGY HAS HELPED ORGANIZATIONS BECOME MORE SUSTAINABLE

Reducing travel needs and enhancing collaboration through the use of AR/VR or collaboration tools	Monitoring, predicting, and optimizing energy consumption/emissions in manufacturing
Tracing the entire value chain and aligning participants on common goals	Product Life Cycle Assessments (LCA) using digital tools

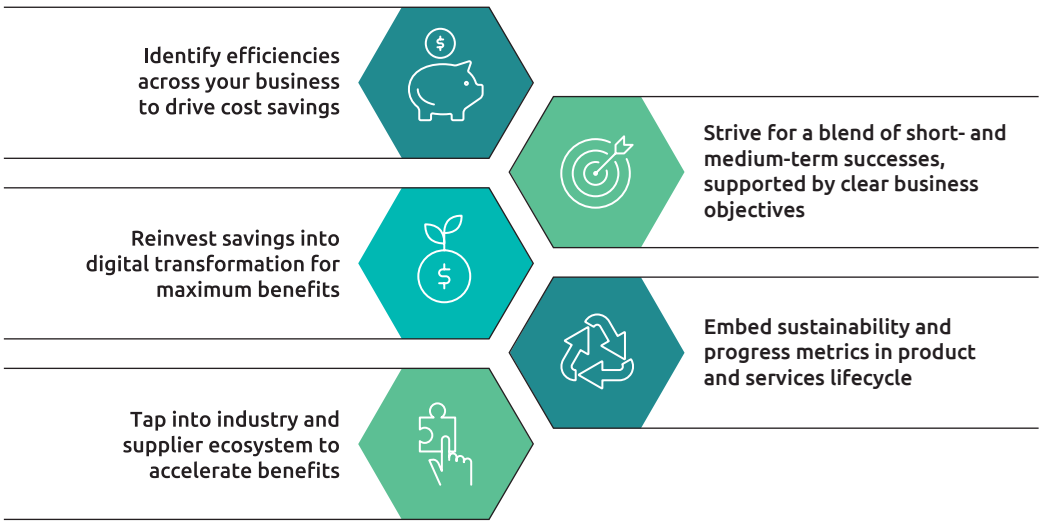
Significant benefits are in store for organizations harnessing digital tech

EXTENT OF BENEFITS FROM IMPLEMENTATION OF DIGITAL TECHNOLOGIES

	% benefits realized over last 5 years	% benefits expected to be realized in the next 5 years
Improved customer engagement and satisfaction	24%	36%
Increased efficiency in operations	24%	36%
Improved circularity (optimize waste management)	25%	36%
Decrease in GHG emissions	21%	31%

Digital technologies positively impact society by creating jobs, reducing bias, empowering small businesses, and offering various other benefits

How to harness the opportunities of an eco-digital era™



Source: Capgemini Research Institute and Digital Value Lab at the Digital Data and Design Institute at Harvard Analysis.

A WORLD IN BALANCE

HEIGHTENED SUSTAINABILITY AWARENESS YET LAGGING ACTIONS

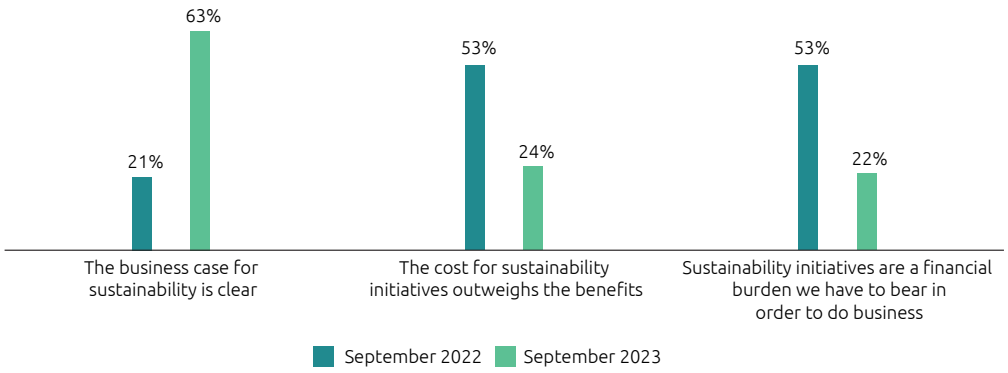
For details on the research methodology and to read the full report, please visit:
https://www.capgemini.com/insights/research-library/sustainability-trends-2023/

The sustainability business case comes into focus

More executives see sustainability as a growth opportunity

Over 60% of executives now say that the business case for sustainability is clear

% OF EXECUTIVES WHO AGREE WITH THE STATEMENTS BELOW



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 2,004 executives, 668 organizations; August–September 2023, N = 2,001 executives, 668 organizations.

Digital investments as a share of revenue set to double in the next five years

More executives see sustainability as a growth opportunity

- Extreme weather affecting every continent
- Costs from climate disasters being consistently high
- Increasing pressure from regulators and new standards coming into force (e.g., CSRD)
- The US Inflation Reduction Act (IRA) gains momentum
- Consumer protections for sustainability gain traction
- More organizations setting net zero targets and/or committing to/validating science-based targets
- More organizations motivated by regulation and revenue potential

Improved perceptions of sustainability have only translated into pockets of progress

The positive shift in sentiment has not translated to increased sustainability investment yet

In 2023, average annual investment in environmental sustainability initiatives and practices across industries represents 0.92% of total revenue, up from 0.91% in 2022

Sustainable product design and development have seen only limited advancement

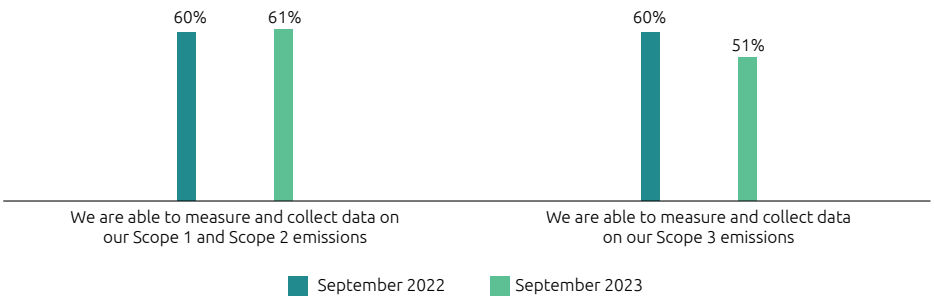
60% of executives say their organization reports a carbon footprint for every product/service they sell, virtually unchanged from 2022 (59%)

57% say circularity is a key component of their sustainability strategy compared to 58% in 2022

47% say they are designing products to serve their intended functions longer, down from 57% in 2022

Tracking Scope 3 emissions is proving challenging

% OF EXECUTIVES WHO AGREE WITH THE STATEMENTS BELOW*



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,001 executives in value chain functions; August–September 2023, N = 1,000 executives in value chain functions.

Tracking Scope 3 emissions is proving challenging

48% of executives say their organization uses a third party to help disclose their environmental impact, down from 54% in 2022

However, organizations have progressed in defining sustainability initiatives and redesigning business models

61% of executives say that their organization has a defined priority list of sustainability initiatives to implement in the next three years, up from 49% in 2022

57% say they are in the process of redesigning business/operating models to be more sustainable (37% in 2022)

Our research reveals that environmental sustainability is financially viable

We identified a set of frontrunners, who have progressed further on their sustainability transformation than the rest of the companies we surveyed. In 2023, only 8% of organizations in our survey is categorized as a sustainability frontrunner. From 2021 to 2022, frontrunners realized:

12% higher revenue per employee compared with the average

5% higher EBIT margin compared with the average

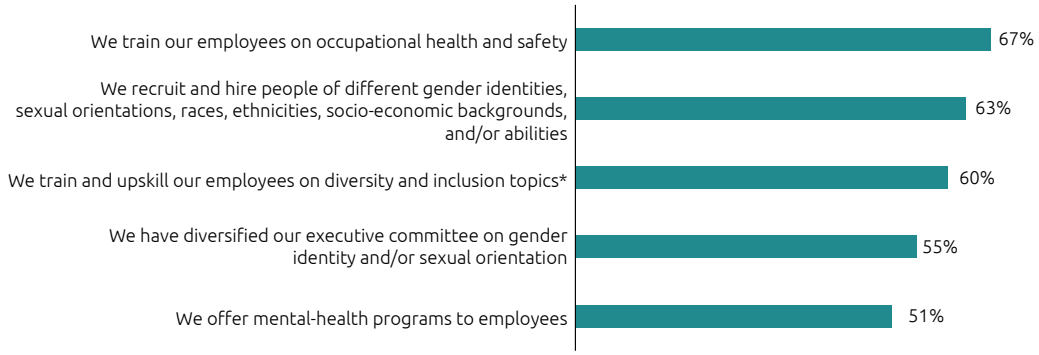
Social sustainability is moving up the corporate agenda

Social sustainability is becoming a key priority for organizations

56% of executives say that their organization is increasingly focusing on the social dimension of ESG

Organizations are putting most effort into social sustainability initiatives for their own workforces

% OF EXECUTIVES WHO AGREE WITH THE STATEMENTS BELOW (SEPTEMBER 2023)



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,001 executives in value chain functions; August–September 2023, N = 1,000 executives in value chain functions.

Organizations are not supporting workers in the supply chain effectively

38%

of executives say their organization restricts suppliers to those that pay a living wage

63%

of millennial consumers aged 25 to 40 expect organizations to only work with suppliers who pay a living wage

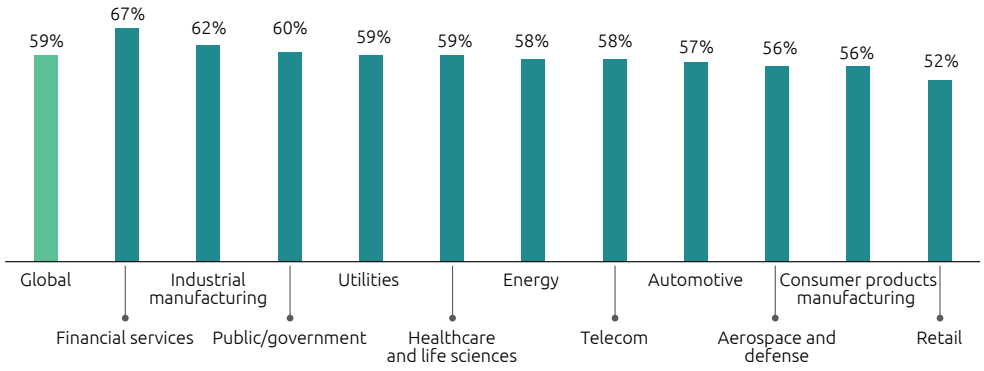
Accessibility and affordability require more attention

42% of executives say their organization makes products/services accessible to people with disabilities/health conditions/impairments

40% say their organization makes products/services affordable to local communities

Generative AI has promising use cases for sustainability

% OF EXECUTIVES BY INDUSTRY WHO AGREE WITH THE STATEMENT: GENERATIVE AI WILL PLAY A KEY ROLE IN OUR ORGANIZATION'S SUSTAINABILITY TRANSFORMATION EFFORTS (SEPTEMBER 2023)



57% of executives say their organization has started to take steps to mitigate the environmental impact of generative AI

Recommendations: How organizations can accelerate their sustainability transformations

To transform effectively requires enterprise-level co-ordination, functional involvement, and an overhaul of the operating model and business processes. Our 2023 research has led us to make six additional recommendations to last year's list:

1. Ensure sustainability is a boardroom priority
2. Embed social sustainability in the business strategy
3. Focus on quantifying Scope 3 emissions accurately
4. Embrace circular and inclusive design
5. Close the intention-action gap
6. Explore the potential of technology to achieve climate goals

We are grateful to all our guest contributors for sharing their experience and in-sights as well as to their teams and in particular Thomas Kurian (Google Cloud), Frank Loydl (Audi AG), Nadège Petit (Schneider Electric), Prof. Suraj Srinivasan (Harvard Business School), Eefje Dikker (Mercedes-Benz Group AG), Jim O'Neill, Bijoy Sagar (Bayer), Adrienne Horel-Pagès (La Banque Postale), Prakash Arunkundrum (Logitech), Prof. Susan Hockfield (MIT), Jiani Zhang and Vincent Charpiot for their contributions to the journal. We are also thankful to Anna Kowalczyk, James Barbour, Erin Kalidindi, Shonodeep Modak, Tobi Gerstberger, Ramona Schmidtner, Kelly Claus, Scott Lincoln, Alexandra Brant, Melanie Svecak, Louis Vidal and Marie Perrard for helping with the project.

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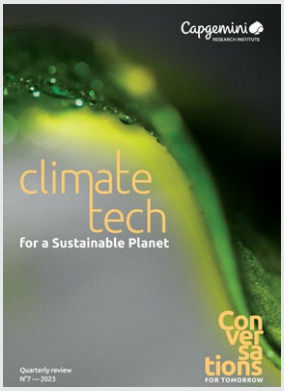
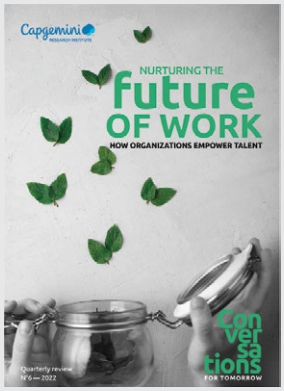
Discover more about our recent research



Conversations for Tomorrow #7: Sustainability and climate tech



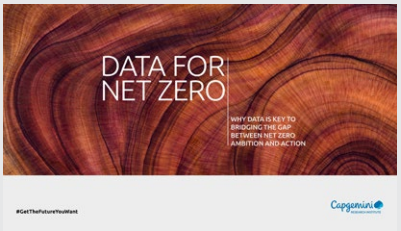
Conversations for Tomorrow: Nurturing the future of work – how organizations empower talent

Conversations for tomorrow: breathe in(novation): Uncover innovations that matter

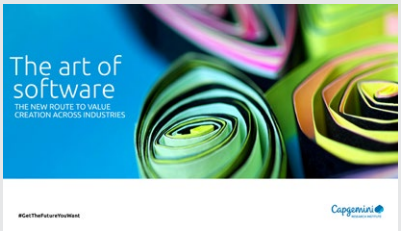
Conversations for tomorrow: The New face of marketing

Conversations for tomorrow: Intelligent Industry: The Next Era of Transformation

Conversations for tomorrow: The Future of Work Starts Now



Data for Net Zero: Why data is key to bridging the gap between net zero ambition and action



The art of software: The new route to value creation across industries

Climate tech: Harnessing the power of technology for a sustainable future

Conversations FOR TOMORROW

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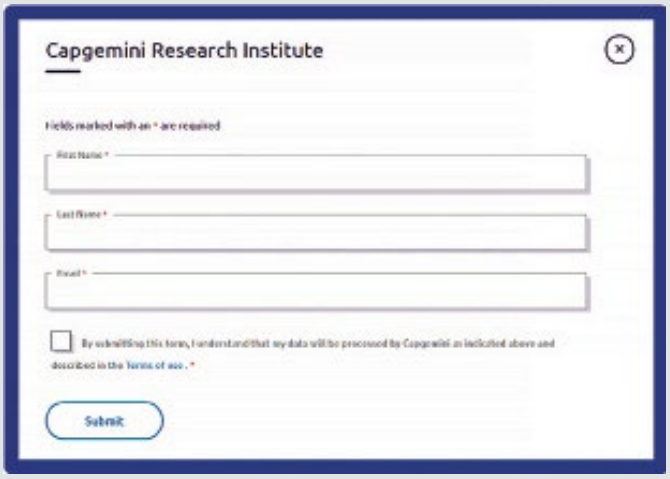

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Capgemini is a global business and technology transformation partner, helping organizations to accelerate their dual transition to a digital and sustainable world, while creating tangible impact for enterprises and society. It is a responsible and diverse group of 340,000 team members in more than 50 countries. With its strong over 55-year heritage, Capgemini is trusted by its clients to unlock the value of technology to address the entire breadth of their business needs. It delivers end-to-end services and solutions leveraging strengths from strategy and design to engineering, all fueled by its market leading capabilities in AI, cloud and data, combined with its deep industry expertise and partner ecosystem. The Group reported 2023 global revenues of €22.5 billion.

www.capgemini.com

About Capgemini Research Institute

The Capgemini Research Institute is Capgemini's in-house think tank on all things digital. The Institute publishes research on the impact of digital technologies on large traditional businesses. The team draws on the worldwide network of Capgemini experts and works closely with academic and technology partners. The Institute has dedicated research centers in India, Singapore, the United Kingdom, and the United States. It was recently ranked number one in the world for the quality of its research by independent analysts.

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