Why sustainable product design is *essential today*

Now is the time for businesses to consider the planet in every product

Capgemini

Sustainable product design is a *business imperative*

Sustainable product design is an often-overlooked lever that can help organizations achieve their sustainability targets. Our research shows that, despite increasing awareness around sustainability, most organizations are not currently prioritizing it in product design. Only 22 percent of respondents in our survey say that sustainability is a key component of their product design processes. As the need for radical climate action intensifies, organizations need to pay close attention to product design, given that an estimated 80 percent of the environmental impacts of a product are linked with decisions made at the design stage.

Product emissions can account for a major share of organizations' overall emissions. More than two-thirds (67 percent) of organizations in our research have seen a reduction in carbon emissions due to the implementation of sustainable product design strategies.

Sustainable design can be defined as "maximizing environmental, social, and economic benefits over a system's lifecycle, while minimizing associated social and environmental costs." This definition reflects the "triple-bottom-line" accounting framework, where the performance of a system is measured not only by the profit it generates, but also by positive impact on people and the planet.

Against a backdrop of rising raw material scarcity, driven by environmental and geopolitical factors, organizations also need to reduce their reliance on virgin materials and build supply chain resilience. Sustainable design strategies, such as dematerialization and designing for product durability, repairability, modularity, recyclability, and recoverability, reduce material usage and ensure that products and materials can be kept in use for longer. This shift to a circular economy decouples growth from the overconsumption of finite resources.

> "By adopting circular design principles, companies can not only minimize their environmental footprint, but also enhance resilience against evolving regulatory landscapes and market demands"

~ Teja Chatty, Sustainability managing consultant at Synapse, part of Capgemini Invent.

Furthermore, effective sustainable design is forward-thinking: it addresses future business risks, fosters innovative solutions, and keeps pace with evolving consumer needs. It means staying vigilant for opportunities to develop a point of difference in the market and lay the groundwork for long-term success.
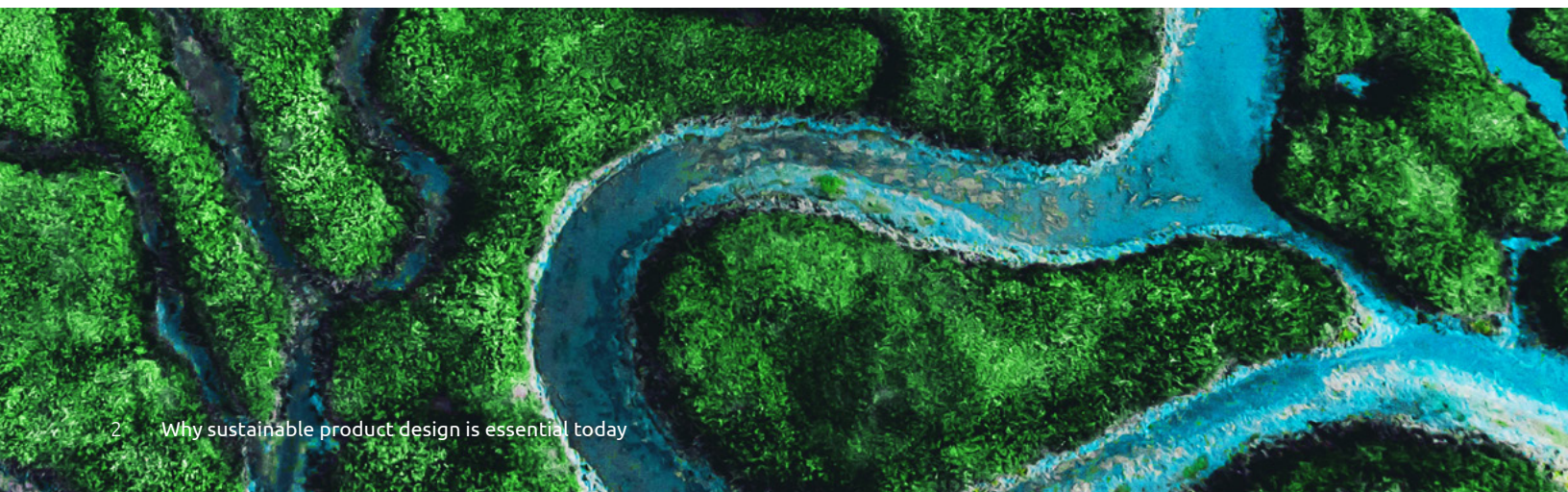
A circular supply chain is easier with the right partners

Capgemini research finds that organizations do not collaborate adequately with external stakeholders such as suppliers, contract manufacturers, or distribution and retail partners as part of the product design process. Collaboration with suppliers, for instance, is key to understanding the challenges associated with sourcing certain materials and identifying alternatives in light of manufacturing constraints.

Similarly, collaboration with distribution and retail partners is key to understanding and avoiding unintended consequences lower down the value chain (e.g., the removal of certain types of product packaging, while sustainable, may lead to more waste due to product damage or spoilage).

A holistic approach to ensuring that a product is sustainable across its lifecycle requires inputs from multiple internal and external stakeholders. Product design processes need to be closely integrated with the rest of an organization's value chain. According to Dr. Jonathan Chapman, Professor and Director of Doctoral Studies at Carnegie Mellon University's School of Design, "Design-led systems change requires a strategic way of thinking about a process, where you
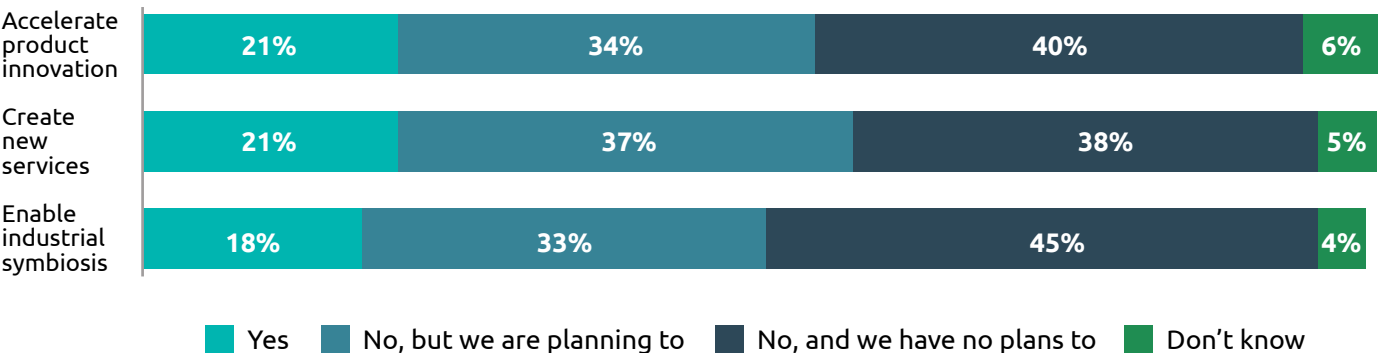
About the research

The Capgemini Research Institute surveyed 900 senior product design and engineering executives from large organizations across industries including consumer products, automotive, industrial manufacturing, aerospace and defense, high-tech, and medical devices to understand how far organizations have progressed with embedding sustainability in their product design decisions, and how data and technology can enable this process.

understand the complex nature of the problem space, and then work with different stakeholders to develop a vision of a future that you want to transition to."

Organizations can build more sustainable products by collaborating with stakeholders across the value chain to jointly determine sustainable design decisions, based on impact and feasibility, and invest in partnerships to build new competencies.

Is your organization creating new partnerships in the following areas to support its sustainable product design initiative?

	Yes	No, but we are planning to	No, and we have no plans to	Don't know
Accelerate product innovation	21%	34%	40%	6%
Create new services	21%	37%	38%	5%
Enable industrial symbiosis	18%	33%	45%	4%

Few organizations are creating new partnerships to support sustainable product design.
Source: Capgemini Research Institute, sustainable product design survey, April-May 2022, N=900 organizations.

How to embrace sustainable product design

Capgemini has identified the following actions that organizations need to take to design and deliver sustainable products:

Make sustainability a core design priority and emphasize the need for systems change

Organizations must define clear sustainability goals and objectives for product design teams, establish clear accountability for sustainable product design, and develop guidelines and tools to help product design teams evaluate trade-offs and alternatives. Adopting a data-driven approach is critical. Organizations need to measure environmental and social impacts across the product lifecycle to identify high-impact areas.

Establish processes and partnerships across the product value chain

Collaboration with stakeholders across the value chain and between teams to jointly determine design decisions, based on impact and feasibility, is critical to achieving sustainability. Organizations must set up cross-functional teams to accelerate sustainable product design. Also vital is investment in partnerships to build new competencies, and in services to enable an overall shift in business models toward circularity.

Manage costs through re-evaluating concepts and taking a long-term view

A mindset shift is required to urgently advance the sustainability agenda. Organizations should consider adopting a True Cost Accounting (TCA) approach that assesses product costs holistically, including environmental and social costs. Further, when evaluating investments in sustainable product design, organizations must take a long-term view that considers benefits, such as cost savings, reduced exposure to risks, increased revenues, and improved customer satisfaction.

Harness technology to support sustainable product design efforts

Advances in technology are opening numerous opportunities for sustainable product design. Two major technological trends are driving this: First, the merging of physical and digital worlds enabled by technologies such as IoT, AI/ML, and digital twins, which allows for increased material traceability, and enhanced design and simulation capabilities. Second, advances in the field of bio-innovation are enabling the discovery of biologically sourced or inspired alternatives for scarce or unsustainable materials and carbon-intensive processes.

Organizations must elevate their use of technology and investments in research and innovation and ensure that product design teams work closely with data and digital experts. When investing in technology, organizations must also account for the emissions resulting from the use of that technology.

Toward a future of sustainable products and brands

The circular economy aims to remove our reliance on finite resources, therefore reducing greenhouse gas emissions and their harmful effects. Circular design principles keep materials at their highest value for as long as possible and recirculate materials to another life after they are used. By adopting circular design principles, companies can not only minimize their environmental footprint but also enhance resilience against evolving regulatory landscapes and market demands.

Teja Chatty
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About Capgemini

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.

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