



THE CONNECTED

REVOLUTION

RETHINKING PRODUCTS
AND SERVICES



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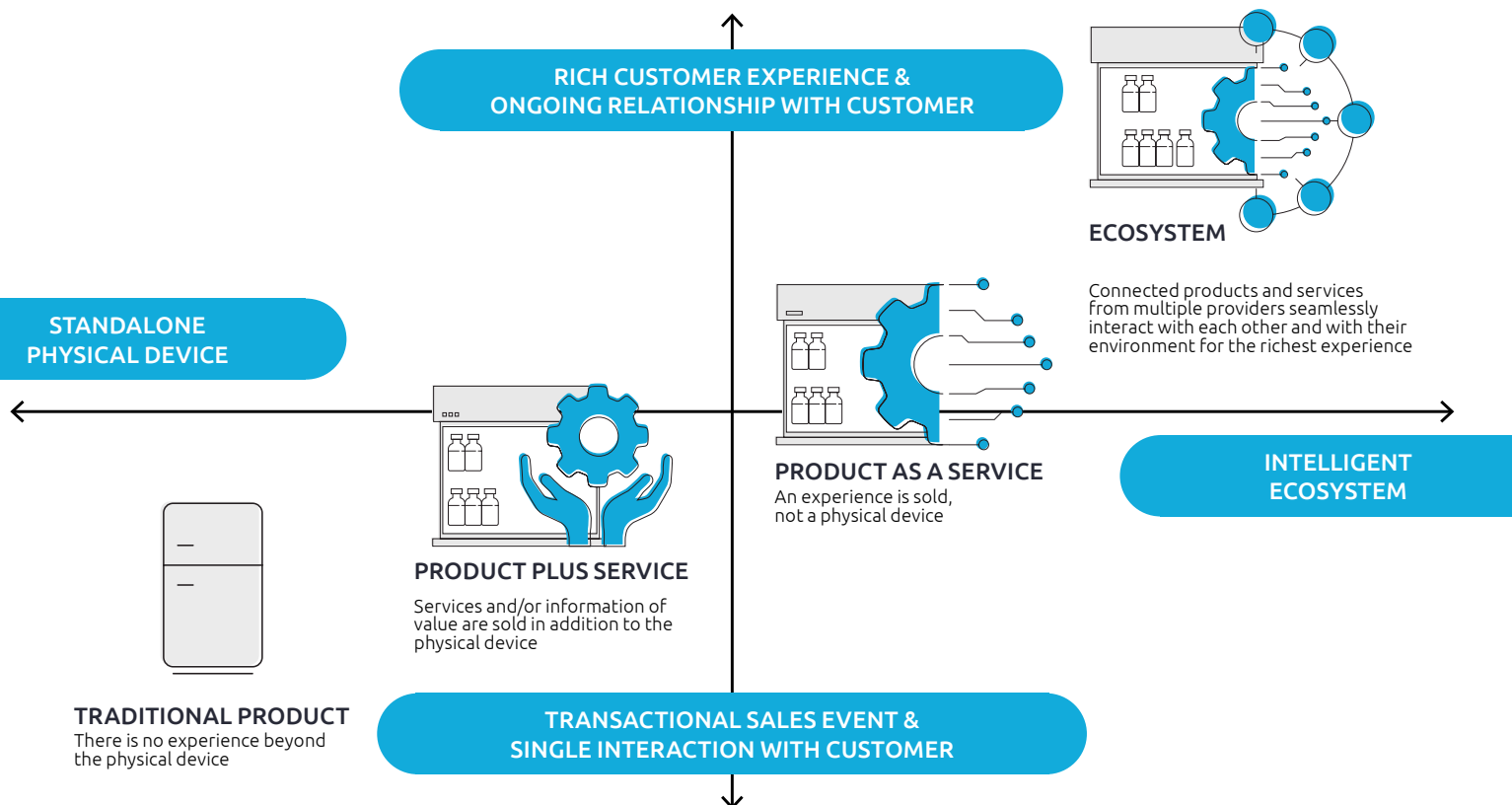
REDEFINING PRODUCTS

Toward a connected future

Products are being redefined. Devices and appliances increasingly offer ongoing customer relationships which extend far beyond the single transactional sale of the products. Products can now be developed to form part of a network of interconnected products and services that work together seamlessly to provide customers with an intelligent

and rich experience. This means that standalone physical devices are being replaced by intelligent ecosystems.

Accordingly, we can map the evolution of products against two axes: the intelligence of the ecosystem and the richness of the customer relationship and financial transaction.



Everything is becoming connected: cars, appliances, security systems, retail, building management, manufacturing, and even agricultural equipment. Connected products and services are creating new, profitable, and recurring revenue streams while driving customer loyalty – and they're achieving this through digital technology and AI, as well as data-driven analytics and insights.

Companies need to change the way they define, make, distribute, and support products. This means shifting to the sale of an experience, with the physical device being just one of the delivery components. Businesses that have taken advantage of fully connected products are realizing tremendous financial gains and are reporting improved customer experience, reduced cost of servicing, and accelerated research and development.

The global market for smart and connected homes is predicted to grow from \$158 billion USD today to \$262 billion USD in revenue by 2025. The global connected car market size grew from \$55.56 billion USD in 2020 to \$59.70 billion USD in 2021 and is projected to reach \$191.83 billion USD in 2028.^[1] The global connected medical devices market accounted for \$31.2 billion USD in 2021^[2] and is expected to reach \$181.9 billion USD by 2030.^[3]

^[1] Connected cars global market size 2019-2028, Statista Research Department, September 28 2022

^[2] Connected Medical Devices Market Size, Share, Analysis Report, Acumen Research and Consulting, June 2022

^[3] Capgemini Research Institute, Intelligent products and services survey, April–May 2022, N=1,000 respondents from unique organizations that have or are currently building visions and strategies for a move to intelligent products and services.



Almost 90 percent of organizations expect to receive revenue from connected products and services over the next 3 years, up from 35 percent of organizations currently offering intelligent services, according to a 2022 Capgemini Research Institute report.^[4]

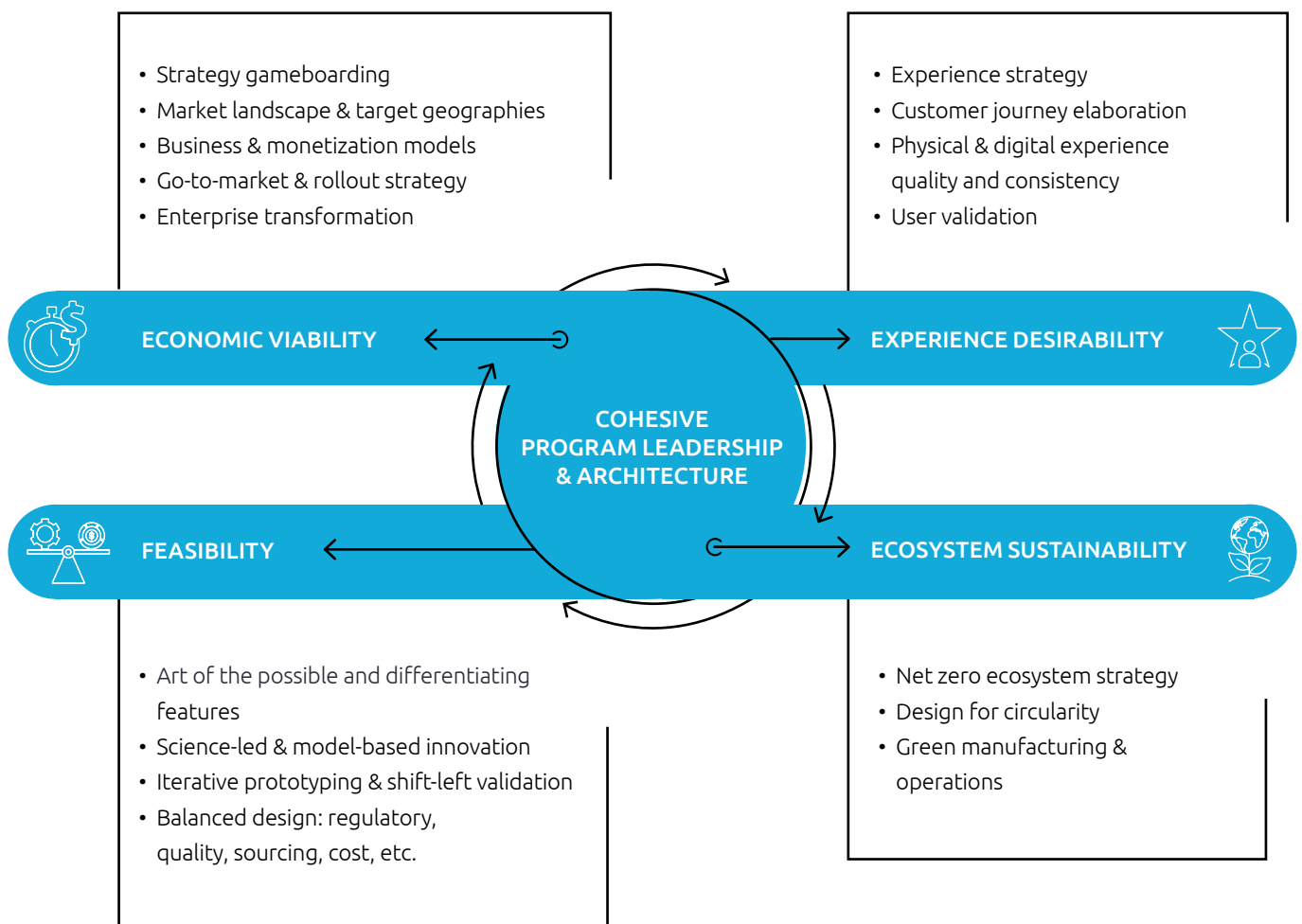
This transition from selling a product to selling user experiences is difficult as it requires new skills, business models, and operating processes. Organizations can find themselves facing challenges ranging from having to continually monitor and understand customer

preferences to lacking a secure system to protect the continuous flow of data while the product or service is being used by the customer.

Success will be realized through iteration across four core perspectives:

- User desirability
- Business viability
- Technical feasibility
- Sustainability

^[4] <https://www.capgemini.com/news/press-releases/intelligent-services-to-fuel-growth-in-the-next-3-years/>



USER DESIRABILITY

Will consumers love it?

Companies need to look for an opportunity that brings value to both their organization and their customers. It is important for businesses to focus primarily on what their customers value and resist the urge to get distracted by the latest technology or their own internal desires.

When it comes to connected products and services, there must be something that not only makes customers want to buy, but to share their data as well. And so the question becomes, what value proposition is valuable enough for the customer to both pay for the product and share their data?

Customers are willing to share their location with a smart thermostat if it means it will adjust their home temperature when they are away and anticipate your return time. This feature saves the customer money (turning off heating or air conditioning when away) and increases confidence in the product as it makes sure their house is at the right temperature when they get home.

To create a truly compelling customer experience, product designers need to introduce elements that go beyond mere functionality, to help form a strong emotional connection with the product and the digital features that make it connected.



SUCCESS CHECKLIST

- Determine user perceived value.
- Identify experience consistency: digital features extend and enhance the digital device.
- Periodically release product enhancements to keep users engaged and enthusiastic.

BUSINESS VIABILITY

The search for ROI

New connected products need to generate positive ROI, either through new revenue or cost reductions through efficiencies – or ideally through both. The product also needs to be able to viably operate – and for that, organizations need to be able to market, sell, deliver, and support the new offering.

Viability extends to total cost of ownership, including capital expenses of traditional product development activities and ongoing operational costs for product management activities and for the IT back end, such as the IoT platform and digital experience enhancements.

The total cost of ownership of the connected ecosystem must be considered throughout the development process.

Introducing a new connected product line may require a digital transformation journey to update the organizational structure, adding to expenses. To offset these costs, new monetization models such as subscription, data resale, or ecosystem membership fees should be considered.

Product developers also must consider the effect of long-term relationships with an IoT platform or cloud computing partner and the effect of multiple product models or lines using the same platform over many years.



SUCCESS CHECKLIST

- Develop a strategic and long-term road map for the planned connected product lines.
- Consider digital transformation and connected experience governance.
- Explore monetization models that could offset operating costs of the connected products.
- Select long-term partners that have the resources to provide the technology road map and staying power to meet the demands of your connected products.



FEASIBILITY

Art of the possible

Managing the complexity of connected products requires rigorous planning, design, development, and testing. The accuracy and reliability of the physical sensors, the latency of relevant data presented to users, and meeting the users' perceived value are some of the multidisciplinary considerations in creating a connected product.

Perhaps the most important considerations are interoperability and compatibility: a connected product must become part of the user context and integrate seamlessly with other components within this context. For example, a smart home product needs interoperability with the other components making up an automation scene for the user in their home.

All components must work together, from the data-collecting sensors to the embedded processor, power budget, physical form and environmental constraints, safety, cybersecurity, software and firmware, controllers, gateway, and the cloud computing and analytics. Additionally, bill-of-material cost optimization typically requires joint hardware and software

design optimization, while supply chain pressures and geopolitical events may introduce new constraints.

A successful connected product balances the demands and expectations of digitally savvy consumers with constantly changing technology in a way that guarantees security and protection of personal data.



SUCCESS CHECKLIST

- Future-proof devices by planning for a more connected world.
- Design with future supply chains in mind.
- Ensure cybersecurity by design to protect private data and communications.
- Comply with regulations such as radio frequency, privacy, and cybersecurity.
- Design operations processes and intelligent support & services to match the business and monetization models.





SUSTAINABILITY

Net zero product development and life

Sustainability must be considered and budgeted at every step of product development. Within the next 10 years, every product will need to be redesigned with an eye toward sustainability, impacting every aspect of product development and operations – the materials used to build the product, how the materials are shipped and stored, how they will be maintained and serviced. Companies will move beyond carbon footprint discussions to create sustainability footprints that are actionable and accountable across the organization.

Connected ecosystems can contribute to a more sustainable environment in multiple ways, including energy efficiency, resource conservation, waste reduction, and behavior change.

For example, connected ecosystems can:

- reduce energy consumption by monitoring and optimizing energy usage. For instance, smart thermostats can adjust the temperature and close connected blinds based on occupancy and weather conditions to save energy;
- optimize the use of resources such as water, food, and materials. For example, smart irrigation systems can monitor soil moisture and weather conditions to deliver the right amount of water to plants, reducing water waste;
- reduce waste by enabling better tracking and management of products throughout their life cycle. For example, RFID tags can track products from manufacturing to disposal, allowing for more efficient reuse, recycling, and disposal; and
- encourage sustainable behavior by providing feedback and incentives to users. For instance, smart energy meters can provide real-time feedback on energy consumption, encouraging users to reduce their usage.



SUCCESS CHECKLIST

- Conduct a life cycle assessment (LCA) to determine overall environmental impact.
- Identify points in product production, delivery, and operations with the greatest potential to adjust or eliminate use of natural resources.
- Determine environmental impact including carbon footprint costs as part of product pricing.



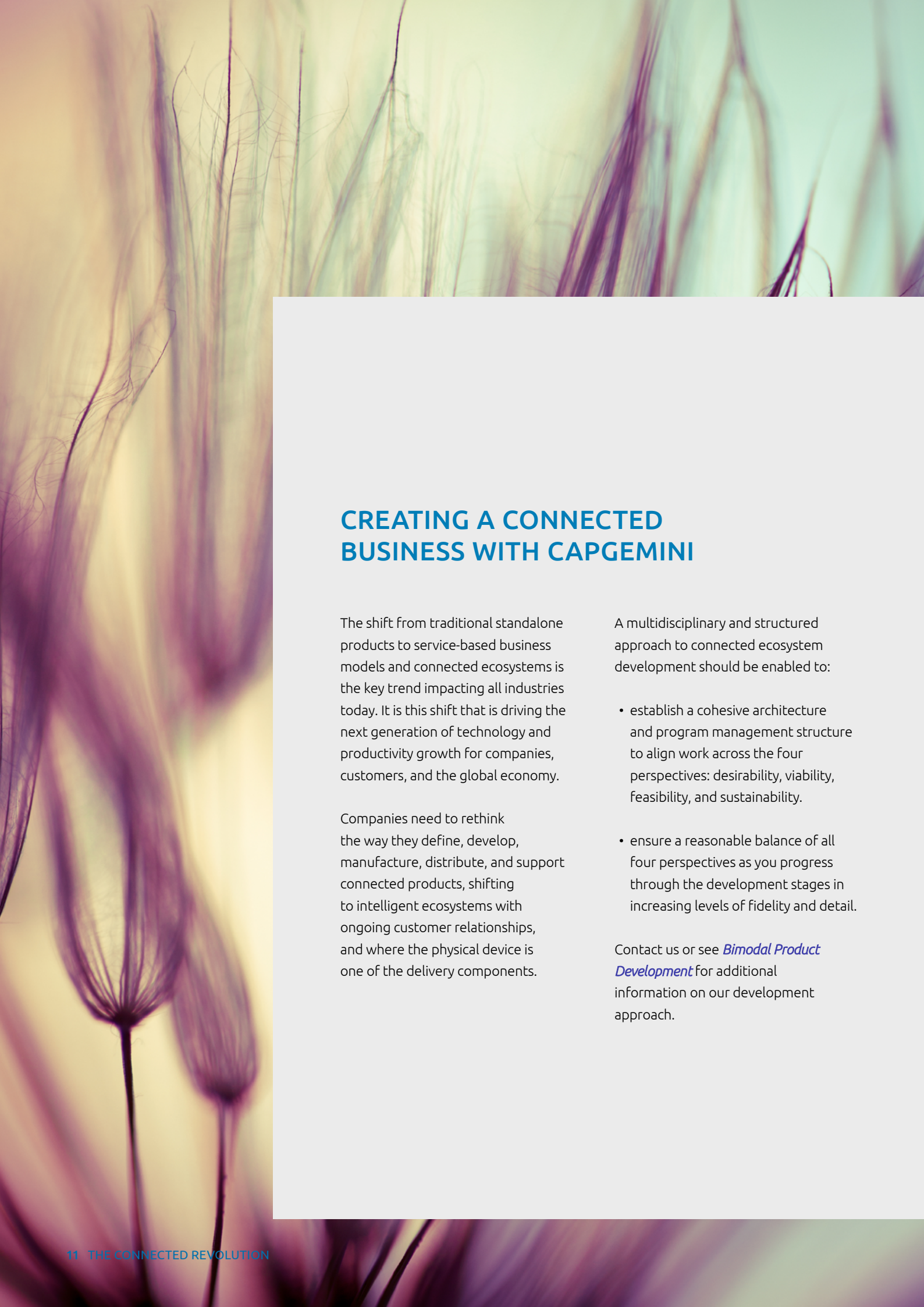
Because a connected product and its ecosystem contain many more moving parts than a traditional product, the sustainability of the overall system requires careful attention. It is critical to minimize the computing environment's electricity consumption and to optimize the dispatching of support parts and labor.

For example, the Capgemini Research Institute reports a 19% operational cost savings from green cloud architectures and 14% from device auto switch off.^[5]

Making optimum design choices allows products to consume fewer resources during their lifetimes, including minimizing energy usage and ensuring

a high degree of repairability. Along with the design, organizations also need to focus on the circularity of connected products. Conducting a data-powered life cycle assessment of the entire footprint of intelligent products – from raw material extraction, manufacture, and transportation to use and disposal – can help organizations make the most effective changes.

^[5] Capgemini Research Institute, Green IT survey, December 2020 – January 2021, N = 1000 organizations.



CREATING A CONNECTED BUSINESS WITH CAPGEMINI

The shift from traditional standalone products to service-based business models and connected ecosystems is the key trend impacting all industries today. It is this shift that is driving the next generation of technology and productivity growth for companies, customers, and the global economy.

Companies need to rethink the way they define, develop, manufacture, distribute, and support connected products, shifting to intelligent ecosystems with ongoing customer relationships, and where the physical device is one of the delivery components.

A multidisciplinary and structured approach to connected ecosystem development should be enabled to:

- establish a cohesive architecture and program management structure to align work across the four perspectives: desirability, viability, feasibility, and sustainability.
- ensure a reasonable balance of all four perspectives as you progress through the development stages in increasing levels of fidelity and detail.

Contact us or see [*Bimodal Product Development*](#) for additional information on our development approach.



About Capgemini

Capgemini is a global leader in partnering with companies to transform and manage their business by harnessing the power of technology. The Group is guided every day by its purpose of unleashing human energy through technology for an inclusive and sustainable future. It is a responsible and diverse organization of over 360,000 team members in more than 50 countries. With its strong 55-year heritage and deep industry expertise, Capgemini is trusted by its clients to address the entire breadth of their business needs, from strategy and design to operations, fueled by the fast evolving and innovative world of cloud, data, AI, connectivity, software, digital engineering, and platforms. The Group reported 2022 global revenues of €22 billion.

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Additional resources on connected products:

[The Business Value of Design/ frog](#)