

Food for Thought



How can collaboration and technology drive a more sustainable food ecosystem?

Editorial

On a global scale, the ways we grow, produce, source, transport, and consume food are inextricably tied to the future of our planet.

With one third of all food we produce going to waste,¹ there is great potential to rethink our food ecosystem for the better. As humanity's consumption rapidly outpaces our planet's available resources, our focus must shift to solutions which will transform our food production capabilities and consumption habits. This approach will foster greater resilience throughout the food value chain. It is the only way to make our food ecosystem truly sustainable and create long-term environmental and economic value.

This white paper by Capgemini and Microsoft explores the essential steps on the promising journey toward a sustainable future for food.

In our view, it must begin with production and extend through to every stage of the value chain; in other words, from farm to table.

Against a backdrop of climate change, food waste, food insecurity, and a shift in consumer consciousness about dietary choices, this paper offers a holistic exploration of how the food industry can seize opportunities to overcome these challenges.

Recognizing that no single organization can tackle these issues alone, our paper also champions the power of collaboration. Scaling and accelerating solutions will be made possible by a collective effort, one which leverages both human ingenuity and technological progress.

We at Capgemini, with our partner Microsoft, assert that tech, digital and data solutions have an essential role to play in driving the necessary systemic changes. By examining the interconnections within the food ecosystem,

we aim to highlight areas where technology can foster significant, lasting impact and where artificial intelligence can accelerate solutions to benefit the planet. When we consider that 21% of our freshwater is used to produce food that will never be eaten,² now is the time to scale up solutions that step by step will fuel positive change.

Through this latest installment of our ReThink series, we hope to offer fresh perspectives and inspire actionable insights about creating a more sustainable and resilient food ecosystem

Cyril Garcia

Capgemini Group Head of Sustainability Services and Corporate Sustainability

1. <https://www.wfp.org/stories/5-facts-about-food-waste-and-hunger>

2. <https://wedocs.unep.org/rest/bitstreams/11241/retrieve>

Index

The food industry has a lot on its plate

PAGE 4

Inviting the full value chain to the table

PAGE 10

Tech: a missing ingredient in the food ecosystem?

PAGE 20

Conclusion

PAGE 32

References

PAGE 33

Acknowledgements

PAGE 34



The food industry has a lot on its plate

Our global food system faces significant challenges, including reducing food waste and mitigating rising production costs. Environmental impacts are at the fore, from greenhouse gas emissions to deforestation and water scarcity. However, a growing number of producers, retailers, NGOs, policymakers, and consumers are driving a shift toward more responsible practices. Addressing these issues involves all stakeholders and at every stage in the food value chain.

The global food ecosystem in figures.

Sources: United Nations World Food Programme, United Nations Food and Agriculture Organization, We Are Water Foundation

One third of all food produced is lost or wasted – around **1.3 billion metric tons** – costing the global economy close to **\$940 billion** each year¹

- Up to **10%** of global greenhouse gasses comes from food that is produced, but not eaten²
- Food waste consumes **250 cubic kilometers** of water annually, equivalent to the average annual flow of the Nile³
- Saving **50%** of food currently lost or wasted each year could put an end to world hunger⁴

Food is a fundamental human need: a source of nourishment, enjoyment, and cultural identity. Yet, our global food system is facing paradoxes and challenges that threaten not only its sustainability but our collective well-being.

Waste not, want not?

One of the most pressing issues facing the industry is the staggering amount of food waste that occurs at every stage of the value chain. It stretches from crops left unharvested to overproduction in factories, unsold food in supermarkets and restaurant leftovers, all the way to the food lurking at the back of our fridges that will end up in the bin. A concerning amount of this precious resource is squandered.

All the more concerning when an estimated 735 million people worldwide are undernourished⁵, highlighting a stark disparity in access and distribution. This juxtaposition of waste and want underscores the urgency for transformative change in our food system.

The impact on our planet

This urgency extends to both people and our planet, highlighting crucial interdependencies between natural resources and the food value chain. The food industry is responding to its significant contribution to global greenhouse gas emissions, including carbon emissions from agricultural practices, land use changes, transportation, and food processing. Protecting biodiversity is equally high on the agenda, with agriculture frequently linked to deforestation, habitat loss, and species extinction. Water resources are also strained by agricultural practices. Irrigation accounts for a substantial portion of global freshwater withdrawals, and some of this for food that will never make it to our plates. Awareness of these issues has grown significantly in recent years and there is a broad industry consensus on the need for sustainable practices.

Furthermore, the food supply chain is vulnerable to disruptions caused by geopolitical conflicts, shifting international trade policies, climate change-induced extreme weather events or biodiversity depletion. These disruptions can lead to price volatility and food shortages, as well as exacerbating existing inequalities.



The rise of the conscious consumer

Against this backdrop, a noticeable shift is taking place in consumer consciousness. Individuals are becoming increasingly aware of the environmental and social consequences of their food choices. They are actively seeking out more sustainable options, embracing zero-waste practices such as reusable packaging, and reducing carbon-intensive meat consumption. Wellness is also a factor driving consumer decisions, with a greater emphasis on whole, unprocessed foods and a nascent interest in plant-based alternatives.

Growing appetite for transparency

With these new priorities in mind, consumers are demanding greater transparency from retailers and producers. They want to know more about where their food is coming from, how it's produced, and the environmental impact of their choices.

They expect businesses to be accountable for their practices and to offer products that align with their values.

However, while sustainability is unquestionably gaining traction as a commercial differentiator, it remains a niche concern. Price is still a dominant factor in purchasing decisions, and sustainable options are often perceived as more expensive. Bridging this gap and making sustainable food accessible to all is a crucial challenge for the food industry.

A call to action for the whole food ecosystem

Addressing the complex issues facing the food industry requires concerted action from all stakeholders. Each actor in the value chain – from farmers and producers to processors, retailers, distributors, and consumers – has a role to play in creating a more sustainable and equitable food system.

Food companies have an opportunity to lead the way by implementing sustainable practices throughout their operations, reducing waste, and sourcing responsibly. They can also educate and empower consumers to make more informed choices, providing clear and accurate information about the environmental and social impact of their products. As Sharon Bligh, Director of Health and Sustainability at the Consumer Goods Forum highlights, *“the consumer goods industry has a real role to play in driving healthier, more sustainable choices. The challenge comes in making these products accessible, affordable, and appealing to consumers.”*

Policy driving industry change

In addition to adapting to consumer expectations, food players will need to comply with new regulations coming into force. Policies like the EU’s Corporate Sustainability Reporting Directive (CSRD) and planned updates to the US Federal Trade Commission Green Guides demand broader, more accurate reporting on all aspects of sustainability.

Sophie Erhart, Coalition Manager at the European Sustainable Food Coalition, highlights the *“crucial role of regulation and policy in driving sustainable change within the food industry.”* According to Erhart, *“we need to ensure regulations help foster sustainability instead of being seen as an administrative burden.”*

1. <https://www.wfp.org/stories/5-facts-about-food-waste-and-hunger>
2. <https://www.fao.org/newsroom/detail/FAO-UNEP-agriculture-environment-food-loss-waste-day-2022/en>
3. <https://www.wearewater.org/en/insights/food-waste-an-unacceptable-squandering-of-water/>
4. <https://www.wfpusa.org/articles/8-facts-to-know-about-food-waste-and-hunger/>
5. The State of Food Security and Nutrition in the World 2023, Food and Agriculture Organization of the United Nations (FAO)



Microalgae: the protein of the future?

By 2050, the world's population is projected to reach almost 10 billion,⁶ putting immense strain on our current food systems. Diversifying our sources of protein by incorporating healthy, low-carbon and lower resource-intensive alternatives is capital.



Time to go green... or blue

What is Kyanos Biotechnologies' solution? Microalgae! To further support sustainable food practices, the pioneer in microalgae production sought to scale up their production of Aphanizomenon Flos Aquae (AFA). This blue microalgae is rich in nutrients, contains over 60% protein, and has active ingredients including vitamin B12. Yet challenges remained in optimizing their processes and accelerating their speed to market.

Letting nature take the lead

AFA previously grew only in a lake in Oregon in the US. Kyanos' mission was to take inspiration from the natural growth to create a patented cultivation process using biomimicry to recreate the algae's reproduction conditions in its natural habitat. Kyanos partnered with Capgemini to conduct an initial feasibility study for industrial production to enable rapid scale-up.

Use Case: Kyanos Biotechnologies

Optimizing water use

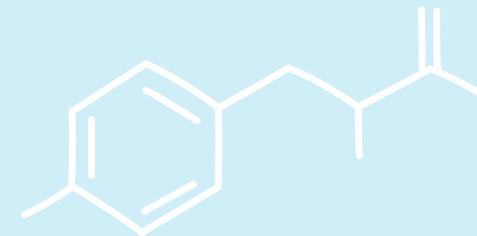
What Conscious of the environmental impact of water required for cultivation, Kyanos called upon Capgemini to model Kyanos' production plant. A life-cycle analysis on the data was able to identify opportunities to drastically reduce water consumption.

"We estimate that we can save 50% of the plant's energy consumption, thanks to industrial symbiosis, by reusing water from another plant to cover

our production needs, for example," says Pierre-Alain Hoffmann, Scientific Director, Kyanos Biotechnologies.

The food ecosystem thus includes a precious diversity of alternative models and innovative stakeholders powering its transition toward more sustainable practices

6. <https://www.un.org/en/desa/world-population-projected-reach-98-billion-2050-and-112-billion-2100>





Inviting the full value chain to the table

There is a consensus in the food industry of the need to address current challenges and create a more sustainable food ecosystem. To propel this change, isolated action from individual players will not suffice. Industry players at all levels of the value chain need to think big, act fast, and work together.

The need to create a more sustainable food ecosystem isn't new on the agenda. But the pressure for new solutions is becoming more intense with every passing year.

"We are seeing companies take action on sustainability credentials in areas like net zero, food waste reduction, plastic reduction, and health," says Kees Jacobs, Vice-President for Global Consumer Products & Retail at Capgemini. "The impetus is there and the industry is moving in the right direction. What we need to really drive change is for this action to take place on a broad scale, and fast."

It's clear that small-scale or sticking-plaster solutions are no longer sufficient, given the magnitude of the issues facing the industry. Initiatives aimed at transforming the food chain not only need to deliver an impact fast, but they need to be widely applicable – or easily scalable – as well.

Meeting these challenges will require vision, ambition, and creativity in addition to technical expertise and deep industry knowledge.

Everyone can have their share

The complexity and interconnectedness of the food system also necessitate collaborative efforts to achieve meaningful change at a significant scale. This starts within the supply chain, optimizing communication between farmers, producers, manufacturers, and retailers to share needs and find solutions. And for collaboration to truly drive change, players need to work together beyond their own supply chains, and with other companies in the same sphere.

For food players, this can sound alarm bells. Companies cannot risk sharing potentially sensitive commercial information with competitors, and business targets have to take priority. Yet collaboration on pre-competitive issues, such as developing common standards and investing in research, can benefit the entire

industry. Businesses can pool both resources and expertise to accelerate the development and expand the adoption of sustainable practices.

For Tom Rose, Head of International Operations at SPAR and Co-Chair of the Consumer Goods Forum End-to-End Value Chain Steering Committee, *"it's about differentiating between areas where we need to be competitive and areas where we can collaborate. As a retailer, in-store ranges, displays, and pricing give us a competitive advantage. Yet working together upstream to create the highest quality and most sustainable product is beneficial to the industry as a whole."*

A more collegiate approach also encourages businesses to focus on the triple bottom line – measuring performance based not only on profit, but also on people and the planet.⁷ The industry's shared goals have implications reaching far beyond financial results, such as reducing greenhouse gas emissions and improving water management.

Where the will exists to work together, companies can create a more level playing field, fostering innovation and accelerating the transition to a sustainable food system, without compromising their competitiveness in the marketplace.



At the European Sustainable Food Coalition, we have seen how by setting out foundational principles based on inclusivity we can ensure everyone is aligned on the pre-competitive nature of collaboration”, says Erhart. “Each player can clearly see the benefits that working together will have on their own business.”

What’s more, beyond the purely commercial sphere, the food industry is also closely linked to public policy and regulation. Collaboration between businesses, governments, and non-governmental organizations (NGOs) is crucial to ensure that sustainability is integrated into policies, regulations, and market incentives. Businesses play a vital role in informing policy making. In turn, governments can create an environment which enables sustainable practices through supportive regulations, incentives, and investments in research and infrastructure.

Partnerships are already bearing fruit

Partnerships between food companies and environmental organizations demonstrate the potential for businesses to work together to develop innovative solutions.

Several successful collaborations are already proving the power of collective action in the food industry. The 10x20x30 initiative was set up to rally 10 of the world’s largest food retailers to engage 20 of their suppliers to target, measure, and act to halve food loss and waste by 2030. The program is now being scaled up to involve 20,000 farmers and producers. Another example in the agricultural sphere is the Global Farm Loss Tool. The tool helps farmers identify and reduce waste, and showcases the potential of industry-wide collaboration to drive positive change.

“

The impetus is there
and the industry is
moving in the right
direction. What we
need to really drive
change is for this
action to take place
on a broad scale,
and fast.

”

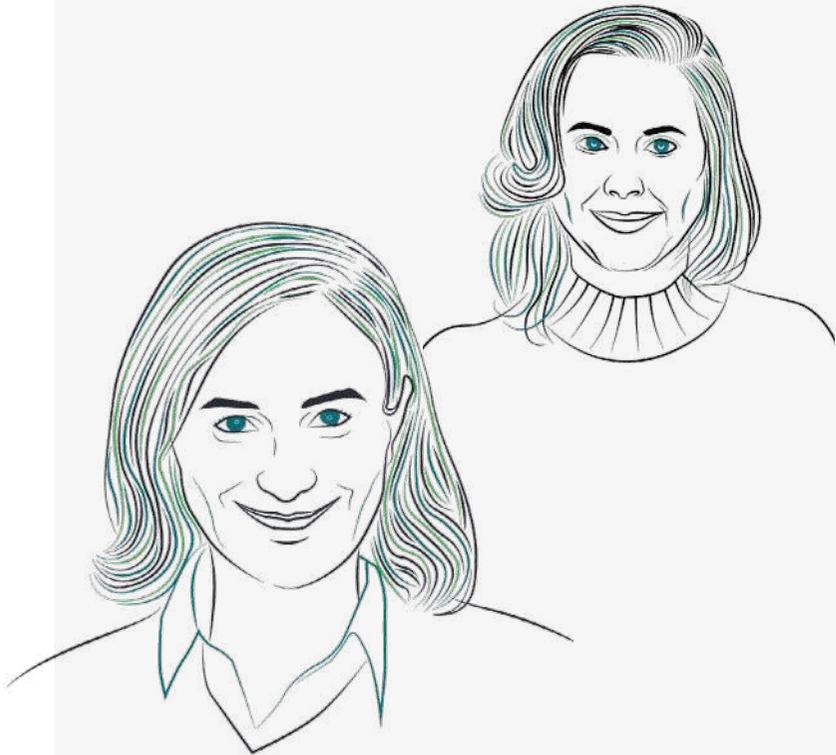
Kees Jacobs

Vice-President for Global Consumer Products
& Retail at Capgemini.

Speed, scale, and collaboration across the industry emerge as non-negotiables to create a more sustainable food ecosystem. By working together, the public sector, producers, suppliers, and retailers can accelerate progress, have a greater impact, and create a more resilient and equitable food system for all. Governments and policymakers play an equally critical role by creating a regulatory framework that incentivizes sustainable practices.

7. <https://www.hec.edu/en/faculty-research/centers/sustainability-organizations-institute/think/so-institute-executive-factsheets/what-triple-bottom-line>





Shaping the future of food with collaboration and technology

We sat down with Laura Gherasim, Director Sustainable Futures at Capgemini, and Nina Lund, EMEA Consumer Goods Lead at Microsoft, to discuss the pivotal roles of tech and collaboration in driving sustainability within the food industry.

Why is it so important to Capgemini and Microsoft to contribute to creating a more sustainable food ecosystem?

Laura Gherasim At Capgemini, our purpose is to build the future we want, and sustainability sits at the heart of that. We've set ourselves ambitious targets, including becoming carbon neutral by 2025, and developed a unique portfolio of services designed to help our clients build and deploy business viable sustainability solutions at scale.

As a consulting firm and technology provider, Capgemini is uniquely positioned to catalyze change and drive systemic innovation. We bring different actors together across the food value chain to tackle challenging issues. Our aim is to help teams move from "what would this look like?" to "how do we get there?" in order to accelerate the transition.

Moreover, we believe that access to safe, nutritious, and affordable food has a strong social component, and is fundamental for building a

fair and equal society. We see it as a critical daily topic that affects the health and wellbeing of our teams, their families, our clients and partners, as well as future generations.

Nina Lund Absolutely. At Microsoft, our mission is to empower everyone through technology, and that definitely includes tackling the challenges facing our food system. We're very much in favor of using tech to build a more sustainable future, and food production is a huge part of that.

Coming from the consumer goods world myself, I've seen the incredibly talented thinking and drive that most players in the industry have to fundamentally change and hold themselves accountable with hard metrics to cut down waste. That's where we believe technology, especially data and AI, can really make a difference for our partners.

Back in 2020, Microsoft made a serious commitment to become carbon negative by 2030 and erase our entire carbon footprint by 2050. And we're making good on that goal – our data

centers have been carbon neutral since 2012, and we're reinvesting \$1 billion USD into carbon removal technologies.

“
**At Microsoft,
our mission is to
empower everyone
through technology**”

“
Collaboration also
enables us to focus
on a full system
approach
”

Collaboration is a force for change. How are Microsoft and Capgemini teaming up to support players throughout the food value chain?

NL Collaboration is a must-have if we want to see real change in the food industry. The partnership between Microsoft and Capgemini is a great example of how this can work; we bring different yet complementary strengths to the table. We're also both global companies, with an immense geographic footprint and industry network between us. With the right mindset, there's an opportunity for everyone to thrive in the ecosystem.

LG I completely agree. Collaboration is the bedrock for driving change at the required scale and speed. Microsoft and Capgemini share a commitment to sustainability and innovation. By working together, we have the potential to scale up our impact.

NL Take the example of consumer goods. We partner with global companies who are serious about tackling food waste, and our combined expertise is enabling them to do it. Microsoft provides the secure cloud platform and powerful data analytics, while Capgemini helps them implement and use these tools effectively. The result? Executives have a clearer picture of their environmental impact and can make informed decisions to reduce waste.

LG For me, collaboration also enables us to take a systemic approach rather than small-scale, incremental changes. The food sector is at a point where it sees the need to step up beyond business model optimization and concentrate on unlocking transformative solutions by bringing all actors together. This approach is essential to tackle the scale and complexity of the challenges facing our food ecosystem. A more ambitious, radical, and faster response is needed.

How do you see the role of tech, data, and AI solutions in making the food value chain more sustainable?

NL Tech, data, and AI have a huge role to play in making the food value chain more sustainable, and possibly in ways that we haven't even thought of yet. We're already doing things that would have been considered science fiction only a few years ago.

LG Indeed, tech is a fundamental enabler in creating a sustainable food ecosystem. It enables business to gain a deeper understanding of what is happening across its value chain, on the ground – at community, farm, and even species level. This creates a platform to bring in different perspectives, listen to others, and engage the ecosystem in a much more meaningful way to drive action. It also enables consumers make better food choices and ultimately opens up the pathway for the disruptive and radical innovations that are needed.

For example, we're working with a major global consumer packaged goods company to provide broader consumer insights. AI can make incredibly accurate predictions of what consumers will want, where, and when. With better forecasts, they can produce and ship just the right amount of a product, reducing waste and saving resources.

NL To give another hands-on example, AI can analyze an image of, say, a banana, to determine how fresh it is instead of relying on best-before dates or subjective human judgements. This helps retailers make more precise decisions about pricing and inventory. Plus, consumers get fresher produce, and it helps reduce needless waste.

I also want to mention our vast ecosystem of SaaS vendors who work on optimizations in the face of climate risk and develop predictive as well as prescriptive techniques. Interoperability of data is key in this context, to get to business outcomes faster.

LG That's a great point. Tech can make a big difference in going beyond mitigation to enable adaptation..

Climate adaptation is often thought of at a supplier or farm level. Enabling organizations to work across the full value chain to build resilience in the face of climate change is therefore key.

At Capgemini, we've developed the Business for Planet modeling platform. Ultimately, it's a model of the world that enables businesses to plug and play different scenarios. For example, take a consumer goods company considering shifting their sourcing regions due to potential instability of supply. The modeling tool provides insights in light of the evolving regional dimensions to consider, including geopolitical landscape, technology adoption, or infrastructure development. What is really key is that it helps businesses understand not only the primary consequences of such a transition but also secondary and tertiary impacts on livelihoods and

“

Tech is a fundamental enabler in creating a **sustainable** food ecosystem

”

the environment, for example. This gives decision makers the opportunity to build a stronger business case, taking into account opportunities as well as tradeoffs. In turn, businesses can make more informed, strategic decisions, anticipate changes, and pivot accordingly.

NL And of course, it's not only about technology. It's also really important to remember the human element. There are people using this technology every day, and we need to bring them along on the journey. The best way to learn about new technologies like AI is to experiment and use them thoughtfully, and companies like Capgemini are ideally placed to support them in that.

And how can food industry players leverage digital solutions to demonstrate transparency?

LG As Nina said, people are at the center of this topic and this relates to consumers, too. What I see in my work is how disconnected consumers are from where their food comes from, how it was made, and by whom. Children now grow

up thinking food comes from a supermarket and are surprised to learn it grows in fields! This doesn't come as a shock; it's a byproduct of our modern way of life that we can only expect to be compounded going forward as urbanization increases.

So what's the role of digital solutions in all this? Solutions such as blockchain can create the traceability needed to better connect people with where their food comes from. This makes it easier for consumers to make sustainable food choices and shift their lifestyles. In turn, this creates the market demand needed to incentivize producers and businesses to continue inventing in this space for sustainable food.

NL I would add that the technology to achieve full transparency in the food value chain has been available for quite some time. However, connecting data – especially scope 3 emissions data – remains a significant challenge. This is where digital solutions come in.

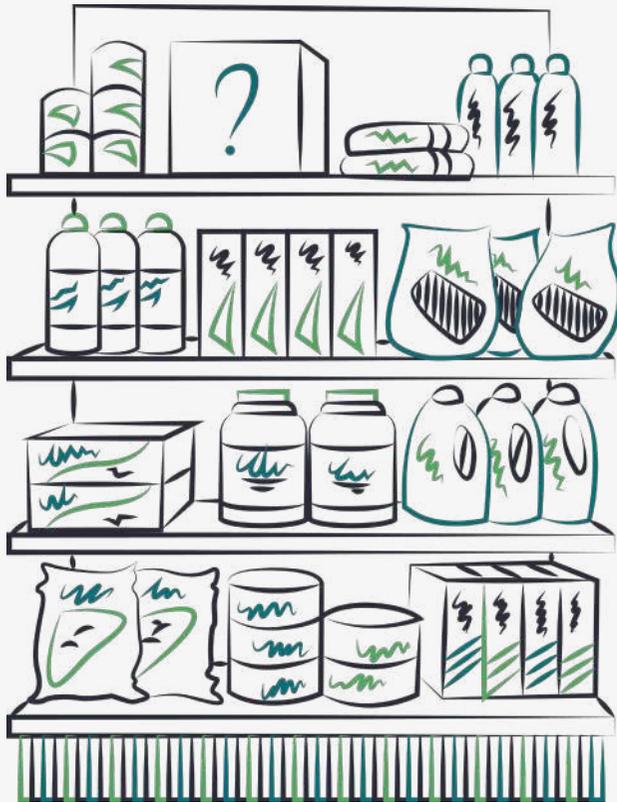
By embracing the right technology, food industry players can gain complete visibility into their supply chains, enabling them to track and trace every ingredient from its origin to the final product. This level of transparency allows for more informed decision-making, not only about sustainability but also about efficiency and risk mitigation.

My advice to these industry players is to cultivate a sense of curiosity about the data their sources can provide. Continuously ask questions about data security, reliability, and how it can be leveraged to build sustainable solutions. It's about using technology to not only meet consumer demands but also to drive positive change in the industry.

“

**It's about using
technology to not
only meet consumer
demands but also to
drive positive change
in the industry**

”



Tech: a missing ingredient in the food ecosystem?

Even with a consensus on the need for cross-industry collaboration, there must be enablers. Technology is one shoulder on which the food ecosystem can lean. New digital systems, alongside data capabilities like AI and machine learning, can and must be leveraged across the industry to incentivize more sustainable practices and improve transparency.

To meet the rising demands of a growing population while minimizing environmental impact, the industry must embrace digital and technological advances – particularly in data and artificial intelligence (AI).

That's because the global food production value chain is a multi-dimensional matrix of interconnected systems. Real-time data collaboration and logistics optimization are crucial for ensuring the efficient movement of goods, while connected supply chains enable seamless communication and collaboration between stakeholders at every stage of production. AI-powered inventory management systems can optimize stock levels, cutting waste and ensuring product availability.

Unpacking an abundance of data

Food producers and retailers generate huge amounts of data – far more than can be processed by humans, not to mention

translated into actionable insights. AI and machine learning algorithms can analyze this data in moments, identifying inefficiencies, bottlenecks, and pain points to enable faster, more targeted interventions and more informed decision-making.

Crucially, the value of this data extends beyond individual companies. Sharing insights across the entire value chain is essential, as each step is intrinsically linked to those before and after. The industry must work together and adopt standardized data-collaboration protocols to unlock the full potential of these technologies.

Moreover, digital solutions are not merely standalone tools. They complement and facilitate other hardware and engineering solutions. By integrating AI and data analytics with existing tech infrastructure, the industry can create a powerful self-perpetuating ecosystem which optimizes processes, enhances productivity, and drives sustainable growth.

In short, integrating tech, data, and AI in the food production value chain is not just a good idea, but an urgent need. By harnessing the power of data-driven insights, the industry can tackle challenges, drive innovation, and ensure a resilient and sustainable food system for the future.

Farming of the future

For farmers and producers, as the starting point of the food journey, data and tech solutions offer immense potential. *“Tech is the only way to speed up innovation and make agriculture more sustainable,”* says Laurent Martel, CEO of Bioline (InVivo Group). *“Farmers and producers are embracing solutions that can help enhance production. The key is in rolling out these digital solutions at scale in a way that is mutually beneficial to all players in the value chain.”*

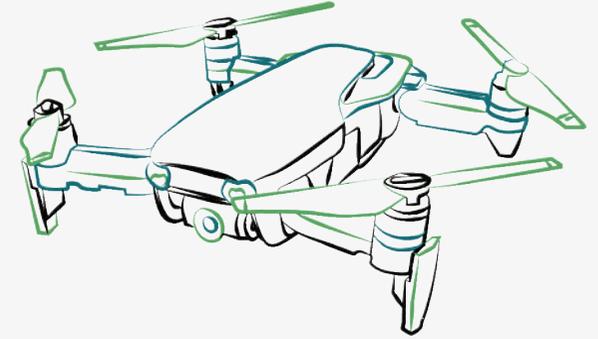
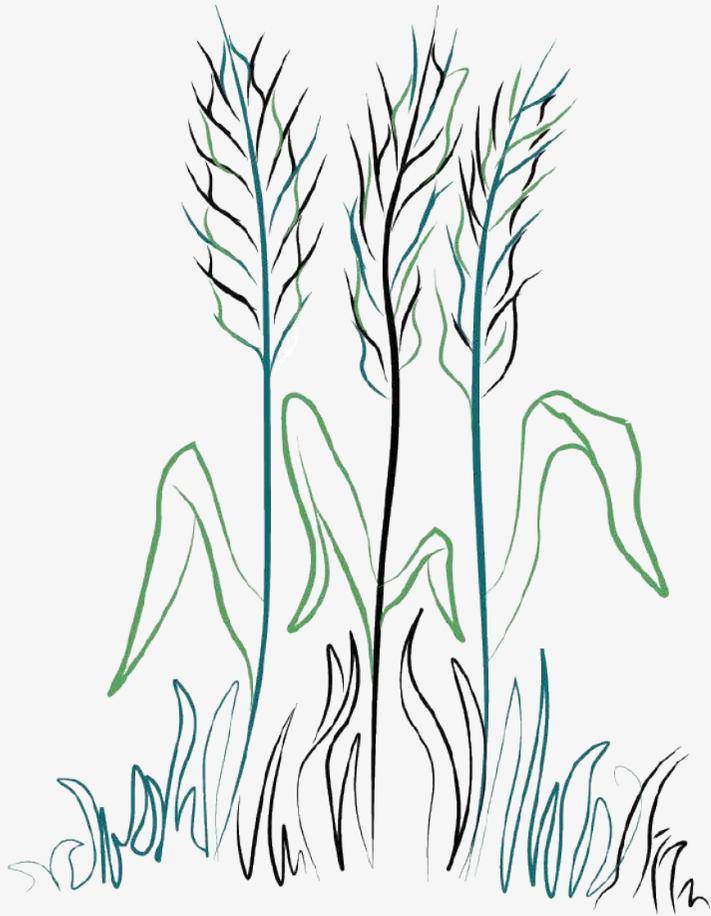
Digital tools are having a transformative impact in agriculture, optimizing production and minimizing waste at every stage from planting to harvesting. These applications allow for detailed field management and provide complete traceability, enabling farmers to demonstrate their sustainable practices. Precision farming techniques like crop spraying can reduce chemical use by up to 90%, addressing environmental concerns while improving yields.



However, challenges remain, including the impact of climate change on crops and the need to balance environmental concerns with market competitiveness. *“Solutions also need to be adapted to the local context,”* says Martel. *“Agriculture is dependent on so many geographical factors – from weather to topography – that there is no one-size-fits-all initiative.”*

Innovative collaborations between agricultural and other industries are showing promise. Initiatives like using treated mud as fertilizer and investing in green energy sources demonstrate the potential of circular economy principles and sustainable practices. As technology continues to advance, the agriculture sector has a golden opportunity to become more sustainable, efficient, and resilient.





“

Tech is the only way to speed up innovation and make agriculture more sustainable. Farmers and producers are embracing solutions that can help enhance production.

”

Laurent Martel
CEO, Bioline (InVivo Group)

Cultivating sustainable crop production with AI

With global demand for food projected to increase by up to 60% by 2050,⁹ the pressure is on securing food production. Small-scale farming provides much of the world's agricultural output, yet in several parts of the world, including Kenya, many such producers still rely on traditional methods.

Similarly, a lack of access to digital technology hinders their ability to optimize their farming practices and adapt to the challenges of climate change.

Transforming farming in Kenya Capgemini's involvement in developing a solution to this challenge began with a collaboration with Agrics, a Kenyan social enterprise providing farmers with agricultural resources on credit. Recognizing the untapped potential of Agrics' data, Capgemini partnered with them to develop the FARM



(Financial and Agricultural Recommendation Models) project.

FARM leverages AI and machine learning to analyze data from sources including satellite imagery and farmer-specific information. This data generates tailored recommendations for farmers, such as optimal planting times and crop choices, helping them mitigate risks and improve yields.

Use Case: Project Farm

Yielding bountiful results

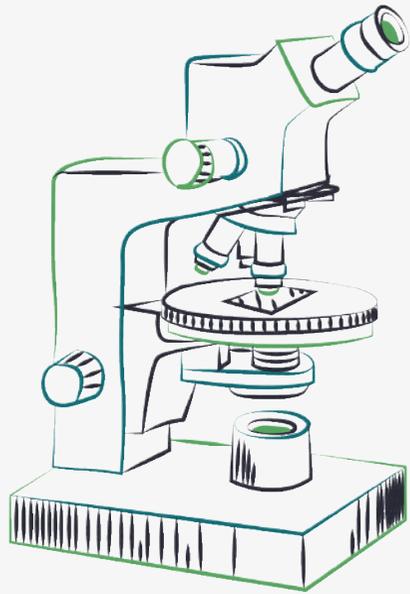
The FARM project has led to significant benefits for farmers. By providing localized and relevant information – for instance, sending SMS alerts about upcoming weather events so they can save their crops – it empowers them to make informed decisions.

Moreover, FARM offers insights into market trends and potential business risks, enabling Agrics to optimize their commercial strategies and better support farmers.



As Julian van Velzen, FARM Project Manager for Capgemini explains: *“We can use the latest technology – high precision satellite imagery, big data, machine learning – to help farmers to increase their yields and to give them a better life.”*

9. <https://www.inrae.fr/en/news/optimising-global-crop-yields-meet-growing-food-demand>



Food under the microscope

The demand for transparency in the food industry is growing. Increasingly ethical consumers have a hunger for information about their food choices. For retailers and producers, this means they need to be able to provide detailed and accurate information. This extends throughout the entire value chain, with each stage impacting the product's overall sustainability profile.

Data-driven solutions can help to address this challenge and overcome concerns about greater transparency in the supply chain. In particular, they're essential for conducting impact assessments, used to verify environmental claims and communicate a product's sustainability credentials to consumers.

Companies generate vast amounts of data, but this needs to be leveraged effectively and in a way that doesn't hinder a business' competitive interests. Industry-wide technology platforms and data ecosystems are able to anonymize and aggregate data, ensuring that only relevant insights are shared and businesses' sensitive information is protected.

Not all food is created equal

Looking more closely at product impact assessments, typically they rely on average results for a certain type of product. For example, all tomato sauces may have the same environmental impact score, regardless of

variations in production methods or ingredient sourcing.

For a business investing in reducing their scope 3 emissions, this may mean there is no recognition of their efforts in the impact assessment. By using primary data, like actual emissions from specific farms or factories, more precise assessments can be conducted that better reflect the impact of the product.

Leveraging primary data for transparent communication

SaaS platforms like inoqo are tackling the problem by using existing data available to retailers to reconstruct and analyze the environmental impact of food products. This is backed by a comprehensive database developed to support their assessments.

As inoqo's founder and CEO Markus Linder explains: *"There is a huge opportunity to leverage AI and data models to assess the impact of products*

at scale. Retailers can make an impact across tens of thousands of products by making this approach visible to consumers. It is about providing the right incentives to push the industry forward.”

For instance, a tomato sauce producer who invests in sustainable tomato farming practices can accurately quantify the reduced environmental impact of their sauce compared to competitors using primary data. They can then communicate this transparently and credibly to consumers.

Leveling the playing field

Collaboration between tech providers is equally important. By establishing standardized assessment methodologies, they can create a level playing field across the food sector. This ensures that everyone is working with consistent data and methodologies, leading to more accurate and reliable impact assessments.

By embracing data-driven solutions, fostering collaboration, and adopting standardized

assessment methodologies, the food industry can meet consumer demands, drive sustainability, and build trust throughout the value chain.

“
There is a huge opportunity to leverage AI and data models to assess the impact of products at scale
”

Markus Linder
Founder and CEO, inoqo

But one thing is clear: improving transparency requires a comprehensive, cross-sector approach.

Enabling retailers to be agile

In a context of significant food waste and loss, data-driven approaches are a beacon of hope to manage food resources more sustainably and empower businesses and individuals to make more informed decisions.

By leveraging advanced analytics and real-time data on sales trends, demand patterns, and product shelf-life, retailers and food businesses can optimize their inventory levels, reducing the risk of waste due to overstocking.

Technology also enables end-to-end traceability, allowing stakeholders to track food products from their origin to the point of consumption. This pinpoints bottlenecks and inefficiencies in the supply chain, highlighting areas where food is most vulnerable to spoiling or loss. Armed with this information, companies can implement

targeted interventions to streamline their operations – and again, reduce the risk of waste.

“Data is a tremendous tool for retailers,” says SPAR’s Rose. “Take our fresh food ranges in store. Using big data, we can review our ranges every day to identify which products are selling well and which aren’t so popular – enabling us to adjust our offer on the shelf to reduce waste. Previously we might have only been able to review the range once a month.”

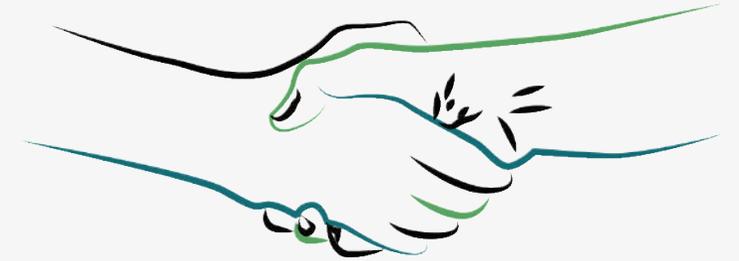
Data and digital tools can also help identify opportunities to make use of unsold food that is still safe for consumption. Digital solutions can alert retailers when food on the shelves is approaching its best before date, enabling them to use dynamic pricing to shift stocks. For unsold food products, retailers can draw on apps (like Olio or Too Good To Go) to connect consumers with leftover food at lower prices – cutting waste while building customer loyalty.

A sustainable model is a profitable one

For food producers and retailers, solving the issue of product waste is not just an ethical imperative: it also comes with a significant financial upside. By embracing innovative technology solutions, businesses can not only reduce waste but also improve their profitability and build up their customer base.

“In the food sector, and this is valid for every industry, we need to initiate big changes through new business models, which guarantee at the same time sustainability and profitability,” says Marie-Neige Couriaut, Sustainability Partners & Ecosystem Lead. “This is precisely what we try to leverage through high-quality data management and optimization.”

Data-driven insights lie at the heart of this opportunity. This greater visibility empowers them to identify inefficiencies, optimize inventory management, and make data-backed decisions that minimize waste throughout the supply chain.



Strengthening connections with consumers

Furthermore, technology enables food businesses to build stronger relationships with their consumers. According to the Consumer Goods Forum’s Bligh, “data is the foundation of everything we do. It gives us insights into what consumers are looking for and what they expect from retailers.” By leveraging data on purchasing patterns and preferences, companies can tailor their offerings to meet specific customer needs. This can foster customer satisfaction and promote loyalty.

Additionally, digital platforms can guide consumers in making informed choices about food products, promoting sustainable consumption habits and minimizing waste at the household level, as part of a wider sales and marketing strategy. As inoqo's Linder puts it, "why not advertise the product with a lower environmental impact?"

By ensuring that more products reach the end consumer before they spoil and sustainable products are promoted, companies can build a reputation for quality, significantly reduce financial losses, and improve their triple bottom line.

“

**We need to initiate
big changes through
new business models,
which guarantee
at the same time
sustainability and
profitability**

”

Marie-Neige Couriaut

Sustainability Partners & Ecosystem Lead at
Capgemini



AI: the recipe for retailer success?

Retailer-customer relationships are evolving fast, and businesses are conscious of the opportunities on the shelf. One such food retailer is looking to artificial intelligence (AI) to better support its customers and benefit the planet.

Combating food waste with AI
AI is supporting the retailer in better predicting demand and anticipating needs, aiming to reduce total food waste by more than 10%.

What about the products already in the supermarket? The retailer has developed a dynamic markdown initiative, using AI. The tool enables incremental discounts to a product's price throughout the day, based on shelf-life – making them more attractive to consumers. This initiative already saves 250,000 kilos of food per year.



Creating a seamless and conscious customer experience
With support from Microsoft, the major supermarket chain has rolled out various customer-oriented initiatives powered by AI and Generative AI, notably Microsoft Azure Open AI.

The retailer's mobile app takes into account customer preferences to send tailored weekly meal suggestions. Customers can add the ingredients to their shopping list, saving them time and the headache of deciding what's for dinner.

Use Case: Retailer

Leveraging Generative AI, customers can also scan a page in a cookbook and automatically add the list of ingredients to their shopping list.

The retailer now also has its eyes set on tackling food waste in the home, with a tool that provides recipe suggestions based on photos taken of food to be used up. This continued collaboration with Microsoft demonstrates the potential for retailers to revolutionize their relationship with customers and drive sustainability across operations and end product use.



Conclusion

We have seen in this white paper that the food ecosystem is composed of a plethora of voices.

Each player in the value chain has its own unique set of challenges and its own priorities. Yet the urgency to act for people and the planet is what unites the industry, governments, and ultimately all of us as consumers.

Experts we've engaged shared the common need for coordinated action. It is only through deep collaboration across the full value chain that we can drive change at the required speed and scale. This transcends competitiveness and involves farmers, producers, consumer goods companies, retailers, consumers, NGOs, public bodies, and tech companies.

Easy as pie? Not so much. Yet it is our conviction that tech is the missing part of the puzzle. Using data-driven solutions and AI we can enable food players to make their operations more sustainable, more efficient, and equally more profitable. And we're just at the beginning. With technology advancing at the speed of light, there's no telling how we can further support the food industry in the coming years.

We hope this white paper sheds light on the business case for a sustainable food ecosystem. Sustainability isn't just a challenge, it's an opportunity. An opportunity to engage a world of consumers open to adjusting their ways of purchasing and eating. An opportunity to optimize supply chains for maximum efficiency. An opportunity to cut food waste to a minimum and reap the benefits. An opportunity to produce more sustainably for future generations.



It's time to rethink the way the food ecosystem functions, and to do that we need to get the whole food value chain around the table.

References

Food Waste Index Report 2024. Think Eat Save: Tracking Progress to Halve Global Food Waste. The latest edition of the United Nations Environment Programme's Food Waste Index Report depicts the state of global food waste – a failure for markets, the environment, and people. https://wedocs.unep.org/bitstream/handle/20.500.11822/45230/food_waste_index_report_2024.pdf

The State of Food Security and Nutrition in the World 2023. Produced by the Food and Agricultural Organization in partnership with other United Nations bodies, the report explores food security indicators and global trends impacting agri-food systems. <https://openknowledge.fao.org/server/api/core/bitstreams/620611b1-fd72-4b98-aead-9216f4af5ddd/content>

European Union Farm to Fork strategy. Part of the European Green Deal, the Farm to Fork strategy aims to accelerate the transition to sustainable food systems. It focuses on sustainable food production, consumption, processing and distribution, and preventing food loss and waste. https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en

Food systems need to be more sustainable. Engaging global stakeholders can help. The World Economic Forum delves into the need for global collaboration to tackle the effects of climate change on food security and the importance of public-private cooperation. <https://www.weforum.org/agenda/2022/08/food-systems-need-to-be-more-sustainable-engaging-global-stakeholders-can-help/>

Creating a sustainable food future. A menu of solutions to feed nearly 10 billion people by 2050. The World Resources Report is a five-course meal of solutions for a sustainable future for the food ecosystem. With a focus on agricultural production, it outlines a series of means to reduce emissions using technology. https://research.wri.org/sites/default/files/2019-07/WRR_Food_Full_Report_0.pdf

Collaboration and sustainable agri-food supply chain: a literature review. An examination of literature on sustainable supply chains and collaboration in the agri-food industry demonstrates a gap in research placing social aspects at the same level as economic and environmental issues. https://www.researchgate.net/publication/303499252_Collaboration_and_Sustainable_Agri-Food_Supply_Chain_A_Literature_Review

Acknowledgments

We would like to thank everyone who contributed their insights and helped shape the direction of this third ReThink white paper:

- Sharon Bligh, Director of Health and Sustainability, Consumer Goods Forum
- Marie-Neige Couriaut, Sustainability Partners & Ecosystem Lead, Capgemini
- Sophie Erhart, Coalition Manager, European Sustainable Food Coalition
- Jordan Friedman, Consumer Products, Retail, and Hospitality Manager, Capgemini
- Cyril Garcia, Group Head of Sustainability Services and Corporate Sustainability, Capgemini
- Laura Gherasim, Director Sustainable Futures, Capgemini Invent
- Pierre-Alain Hoffmann, Scientific Director, Kyanos Biotechnologies
- Kees Jacobs, Vice-President for Global Consumer Products & Retail, Capgemini
- Markus Linder, Founder and CEO, inoqo
- Nina Lund, EMEA Consumer Goods Lead, Microsoft
- Laurent Martel, Managing Director, Bioline (InVivo Group)
- Lindsey Mazza, Global Retail Lead, Capgemini
- Jean-Baptiste Pichon, Vice President, Agribusiness, Capgemini
- Aurobindo Saha, Global AI & Data Engineering Cloud Architecture Leader, Insights & Data, Capgemini
- Tom Rose, Head of International Operations and Co-Chair of the Consumer Goods Forum End-to-End Value Chain Steering Committee, SPAR
- Julian van Velzen, FARM Project Manager, Capgemini

Contributors

- Bethany Hampton, Senior Consultant, Hollis & Bean
- Monica Defrances, Project Director, Hollis & Bean
- Ricardo Bellman, Director Partner Marketing Advisor for Retail & Consumer Goods, Microsoft
- Bridget Pietsch Blaise, Consumer Products & Retail, Global Marketing Lead, Capgemini
- Kim Ayda Durum, Industry Marketing Director, Capgemini
- Kranti Gaikwad, Global Microsoft Partner Manager, Capgemini
- Emmanuel Lochon, Group Sustainability Solutions - Vice President - Marketing and Communication, Capgemini
- André Sammarcelli, Sustainability and Marketing Consultant, Permarketing
- Sapna Shode
- Amy Vener, Global Director of Marketing for the Retail Industry, Microsoft



Capgemini | Microsoft