A sustainable product ideation guide for food manufacturers

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PREFACE

Dear reader,

Over the past six months, I have been working on my graduation project. Diving into such a complex context has been a challenging, yet immensely rewarding experience.

As I close this final chapter of my graduation journey, I am also bidding farewell to my time as an Industrial Design Engineering student. I can look back at a time that has made a great impact on me professionally and personally. I am tremendously grateful for all the people I met, the courses I studies, the opportunities I took and everything that shaped me to be the person I am today.

Firstly, I am grateful for my supervisors, Sylvia and Ianus, for their invaluable guidance and support throughout my graduation journey. Your feedback, constructive criticism, and inspiring discussions were integral to the success of my project. I have also thoroughly enjoyed our past interactions within the faculty, for various events and organizations. You both have been and will continue to be an inspiration for me as I move forward in my career.

Secondly, I would like to express my gratitude to my client company, Accenture, the Netherlands, for providing me with the opportunity to work on this project. I would like to extend a special thank you to my company mentor Lotte, for our update meetings and sessions. I am also deeply thankful to the food of the future team for their participation in my research, interviews, creative and review sessions, which have been highly appreciated and have energised me throughout the project. Then, I would like to thank the Industry X NL team for our Friday afternoon drinks, events, and interesting conversations.

Thirdly, I am thankful for all the R&D food manufactures, food researchers and design students who participated in any way to this project, through interviews, creative and review sessions. It is through your valuable contributions that this project turned out the way it did.

Finally, I would like to acknowledge the tremendous support I have received from my friends, family, and everyone in-between. I thank my family, both in and outside of the Netherlands, for their role in shaping me into the person I am today. I deeply appreciate my friends from IDE and beyond, who have made my past years unforgettable with their companionship. I am especially grateful to those who supported me unconditionally during my graduation period.

With this report, my time at TU Delft has come to an end. However, my journey to continue learning and challenging myself will never stop, and I am excited to see what the future holds.

Enjoy the read!

EXECUTIVE SUMMARY

In most food manufacturing research and design (R&D) projects, sustainability is not considered until the scalability testing or production phase, when cost reduction is the objective or when many consumers directly request it. However R&D teams are highly focused on their predetermined goals at the beginning of the process. It is therefore crucial to incorporate sustainability as a criterion at the start of the project during the ideation phase for sustainable product development. Consequently, the current approach of food manufacturing R&D teams needs to change. Sustainability needs to be incorporated at the start of a project, during the ideation phase. This report consists of two main parts, research and design.

During the research phase, literature research and many interviews have been conducted to discover the food manufacturing context in detail: the drivers and barriers for food manufacturers in developing sustainable products, a review of the current ideation activities of food manufacturers, an analysis of the possible sustainability measures that they can take to create more sustainable products, and an exploration of the trends and developments within the industry (see chapter 2 for elaboration). With the found insights, four opportunity areas are discovered (see chapter 3), and one is chosen to form a design brief (see chapter 4).

Following the guidelines from the design brief, several brainstorming sessions were conducted during the design phase, and the sustainable food product ideation guide was prototyped (see chapter 5). The guide encourages users to think creatively and frequently about sustainability throughout the entire food product development ideation phase. The guide provides value by stimulating creativity, serving as a sustainability exercise, and enabling product development teams to take concrete steps towards the creation of sustainable food products. See chapter 6 for elaboration on the ideation guide.

Then, the ideation guide was evaluated in one pilot session and three review sessions with designers, Accenture consultants and Accenture experts (see chapter 7). Whereafter, the potential use cases of the ideation guide was discussed with various experts from Accenture in chapter 8.

Finally, this report concludes with an implementation plan for the ideation guide, which is designed to encourage food manufacturers to develop more sustainable product ideas, instilling a sustainable mindset that impacts everything they do. The guide offers significant value for Accenture and its food manufacturing clients. For Accenture, the guide offers the opportunity to attract new clients and initiate early-stage conversations about sustainability projects, as well as provide a standardised workshop format with a modular toolkit that saves time and is scalable. Eventually, the digital version of the guide could be developed into Accenture's own ideation platform for security and IP purposes. The guide provides a low threshold for food manufacturers to experience sustainable food product ideation sessions. It offers tailored workshops, new food product ideas, and concrete next research steps for the development team. Additionally, the digital version of the guide caters to remote employees and assists in integrating sustainability into their practices, helping to initiate company culture change.

READING GUIDE

The purpose of this reading guide is to aid readers in comprehending the structure and content of this report by presenting visual cues and explanations of abbreviations.

First of all, there are nine chapters in this report. The nine chapters are divided into two phases: research and design. Chapters from the research phase (chapters 1 to 3) are blue, and chapters from the design phase (chapters 5 to 7) are yellow. After each phase, there is a concluding chapter. Chapter 4 concludes the research phase, and chapters 8 and 9 finalize the design phase. Both have a shade of pink. See figure 0.1 for the chapter colour overview.

Each chapter starts with an overview page, which consists of various elements and has a gradient of the corresponding colour of the chapter (see Figure 0.2).

With the exception of chapter 9, each chapter ends with a key takeaways paragraph, also under the same colour cue.

Abbreviations
FotF = Food of the Future
GHG = Greenhouse Gas
PLC = Product Life-Cycle
PLA = Product Life-cycle Assessment
PLM = Product Life-cycle Management
R&D = Research and development
SDG = Sustainable Development Goals

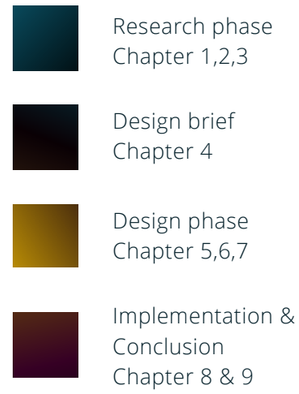

Figure 0.1 Chapter colour overview

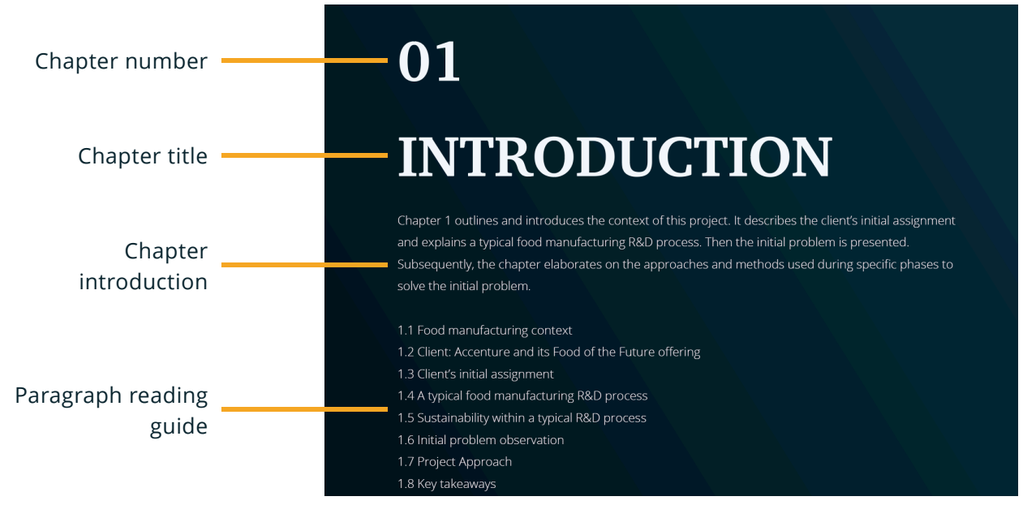

Figure 0.2 Elements of the chapter overview page

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01

INTRODUCTION

Chapter 1 outlines and introduces the context of this project. It introduces the client, describes the initial assignment and explains a typical food manufacturing R&D process. With these information, the initial problem is presented. Subsequently, the chapter elaborates on the approaches and methods used during specific phases to solve the initial problem.

Paragraph overview

1.1 Food manufacturing context
1.2 Client: Accenture and its Food of the Future offering
1.3 Client's initial assignment
1.4 A typical food manufacturing R&D process
1.5 Sustainability within a typical R&D process
1.6 Initial problem observation
1.7 Project Approach
1.8 Key takeaways

Paragraph 1.1

Food manufacturing context

Food production is responsible for approximately one-quarter of global greenhouse gas emissions (Ritchie, 2020). With the growing world population, the need for food will not decline in the coming years (Worldometers, 2023). Society calls for changes in the global food industry (Wunderman Thompson, 2022). Innovations towards sustainable products for both the body and the planet are desirable and inevitable for food manufacturers. This report is meant to help food manufacturers within the food supply chain to develop more environmentally sustainable food products, supported by Accenture, the client of this assignment.

Environmental sustainability

In 1987, the United Nations Brundtland Commission defined sustainability as "meeting the needs of the present without compromising the ability of future generations to meet their own needs." The sustainability referred to in this report is environmental sustainability. This involves meeting the resource and service needs of current and future generations while preserving the health of the supporting ecosystems (Morelli, J., 2011). According to the European Commission (2005), environmental sustainability is divided into greenhouse gas (GHG) emissions, ozone depletion, soil acidification, eutrophication, water use, land use, and toxicity to humans. In this report, environmentally sustainable products are referred to as those with a smaller GHG emission.

Sustainability development goals (SDGs) of the UN

The SDGs were adopted by the United Nations in 2015 as a global call to action towards ending poverty, safeguarding the planet, and ensuring universal peace and prosperity. Among the 17 goals, two are particularly relevant to the context of food manufacturing: SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action). These two goals recognize the pivotal role of responsible production and consumption practices in mitigating climate change and advancing sustainable development, particularly within the food manufacturing industry. They emphasize the significance of reducing waste and promoting sustainable practices across the food supply chain. (United Nation, 2015)

The packaged consumer food product

The 'product' referred to in this project is the packaged consumer food product. The food product is unique compared to most consumer products: the manufacturing of packaged consumer food products has way more limitations, especially on safety.

The food supply chain

The supply chain of the packaged food industry works as follows (Malik et al., 2018): First, the primary producer produces the raw material and sells them to the wholesale suppliers. The food manufacturers source the ingredients from the suppliers and then process them into packaged food products. After the distributor gets the food products from the manufacturers, they bring them to the retailers, such as supermarkets, where consumers finally purchase them. This project focuses on food manufacturers who make packaged food products (Investopedia, 2022). See figure 1.1 for a typical food product supply chain.

Paragraph 1.2

Client: Accenture and its Food of the Future offering

Accenture's aim for sustainability

The client of this project is Accenture and its Food of the Future offering. Accenture is a worldwide professional services company renowned for its expertise in digital, cloud, and security services. Sustainability is a core value and purpose for the company, and they have made it a priority (Accenture, 2023). The Accenture sustainability value promise stated (2023): "We embed sustainability into everything we do, with everyone we work with, creating both business value and sustainable impact, enabled by technology and human ingenuity."

Figure 1.1 A typical food product supply chain

Accenture works hand in hand with its clients to address the United Nations Sustainable Development Goals. The company aims to integrate sustainability into all aspects of its operations, working with all stakeholders to create both business value and positive environmental impact, utilising technology and creativity.

Novel offering: Food of the Future (FotF)

In pursuit of broadening its reach and addressing the challenges posed by the Sustainable Development Goals in the food industry, Accenture introduced an initiative known as "Food of the Future" in 2020. The purpose of this initiative is to assist clients in their transition towards sustainability and the development of innovative ecosystems within the agri-food sector. Given the novelty of the FotF offering, Accenture's recognition within the food industry remains limited at present. It is, therefore, crucial for Accenture to raise its profile in the industry and highlight the various assets and capabilities of Food of the Future. To this end, and also for many other assets and capabilities of Accenture, the company has established an Inspiration Centre in Eindhoven, where consultants bring clients to demonstrate the various projects that they are capable of executing. At the Inspiration Centre, a demonstration of one of Food of the Future's assets is presented to (potential) clients. This asset, like many other capabilities, assists Accenture Food of the Future consultants in helping their clients with many product lifecycle management projects. (Interviewee 3)

Paragraph 1.3

Client's initial assignment

The target group of this project is food manufacturers, who may potentially become clients or are existing clients of Accenture within the food manufacturing industry. A food manufacturer is defined as a business that engages in the creation of food products from ingredients or the manipulation of food crops or ingredients (Law Insider, 2020). The targeting group for this project is the research and development teams of food manufacturers who meet Accenture's client profile: with a revenue of at least 300 million per year and an in-house marketing and R&D department (Interviewees 1, 2 & 3).

The Accenture Food of the Future team wants to help food manufactures to improve the sustainability aspect of their products. Therefore, Accenture FotF has requested the development of a way to help these R&D teams create more environmentally sustainable products and for Accenture to sell more sustainability and food manufacturing-related projects.

Because many food manufacturers perform life-cycle assessments to evaluate the GHG emissions of their products, demonstrating their awareness of the environmental impact of their operations. See figure 1.2 for an example product life-cycle table. However, Accenture has observed that some food manufacturers would opt for minimal action towards environmental sustainability and choose to do green marketing rather than make their products more sustainable.

	pcu	Δ vs 2010	Raw Materials	Δ	Manufacturing	Δ	Transport & Retail	Δ	Consumer Use	Δ	Disposal	Δ
GHG	252.14	-4% ↓	79.10	-5% ↓	10.14	-43% ↓	158.12	0% ↑	1.55	-14% ↓	3.23	3% ↑
Waste	4.37	-3% ↓	3.62	1% ↑					0.75	-16% ↓		

Figure 1.2 An example of product life-cycle table

Paragraph 1.4

A typical food manufacturing R&D process

Prior to the identification of the problem, it is essential to gain an understanding of the prevalent research and development process utilised by food manufacturers. By doing so, it will be possible to pinpoint a more specific challenge and precisely define the parameters of the research. The term "typical process" refers to a methodology that is widely adopted by a significant proportion of food manufacturers within the industry.

A process with many stage gates

Through examinations of literature, interviews with Accenture consultants and research and development (R&D) team members of various food manufacturing companies, the general R&D process for Accenture's food manufacturing clients has been established. See figure 1.3 for an illustration of a typical food manufacturing R&D process. The process is characterised by a gated funnel structure and is initiated by the development of a strategic plan that encompasses the company's vision and core objectives. Following this, the identification of market opportunities guides the formulation of a set of requirements. Ideation is then initiated, with a common approach being the immediate generation of ideas (Gilbert & Prusa, 2021; Interviewee 12).

The various stages of screening take place concerning 1) legal feasibility regarding regulations on safety, allergens, and other regulatory specifications, 2) the technical feasibility of the formulation, 3) consumer researches on preferences with regard to taste, mouthfeel, and convenience, often through the use of a test panel, 4) financial viability reviews. Then scalability tests and consumer trials will be conducted. The product will then be developed, trialled, manufactured, and finally launched to the market (Gilbert & Prusa, 2021; Fuller, 2014; Brody & Lord, 2007). The sequence of the stages that product ideas undergo may vary among manufacturers, but the essence remains unchanged.

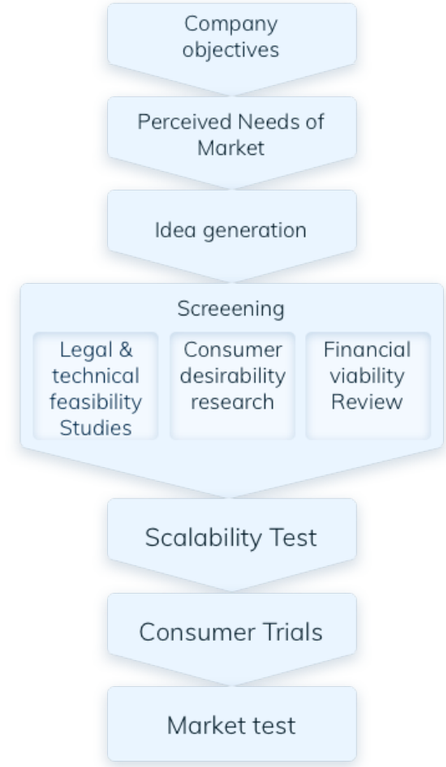


Figure 1.3 An illustration of a typical food manufacturing R&D process

Paragraph 1.5

Sustainability within a typical food R&D process

Having established an understanding of a typical food manufacturing R&D process, it is now appropriate to examine the sustainability aspect of this process in greater detail. This section aims to explore the current level of engagement with sustainability in food manufacturing R&D processes, and where in the process would be a good moment to introduce sustainability elements.

To accomplish this, four R&D experts were interviewed using the typical food manufacturing R&D process as a framework (refer to figure 1.3). A summary of the interview questions designed to provide insights into the role of sustainability can be found in appendix B. The interviewees were first asked to describe their R&D process, which was then compared to the typical food manufacturing R&D process. The results of the interviews confirmed that the process in the context of their experience was largely similar.

Involvement of sustainability
The interviewees were then asked about the involvement of sustainability during the R&D process. The results indicated that while social sustainability such as fair trade was touched upon in relation to sourcing. Environmental sustainability was not given much consideration. This was due to it being deemed a low priority, as stated by interviewees 7 and 8.

However, when the buyer requested a sustainable product, the level of engagement with sustainability increased during the ideation phase. This suggests that currently, sustainability is only considered in the R&D process when the consumer specifically requests it. The R&D process is goal-oriented and focuses on the parameters defined in the project brief. Thus if sustainability is not included from the start as a criterion, it is unlikely to be considered later in the project.

It is worth mentioning that during the manufacturing process, two interviewees noticed that the level of engagement with sustainability increased as manufacturers aimed to reduce their water and energy usage for cost-saving purposes. However, as the scope of this project does not include the sustainable usage of water and energy, this part of the discovery is left out.

Need for inspiration
The study also inquired about the moments when interviewees were most receptive to new ideas and inspiration, and it was found that the ideation phase was the most opportune time to introduce sustainability into the process. This was because the interviewees were more open to new ideas during this stage, which allowed them to react to changes such as shifts in market trends, new launches by competitors, alterations in consumer preferences, and regulatory adjustments. This phase is typically initiated at the start of a project to generate novel ideas. Additionally, the R&D team expressed a need for inspiration when confronted with challenges during the process, or when devising new product solutions, such as novel flavours. However, during the subsequent stages of the project, the R&D experts tended to be less open to new ideas, as they were highly focused on achieving predetermined goals.

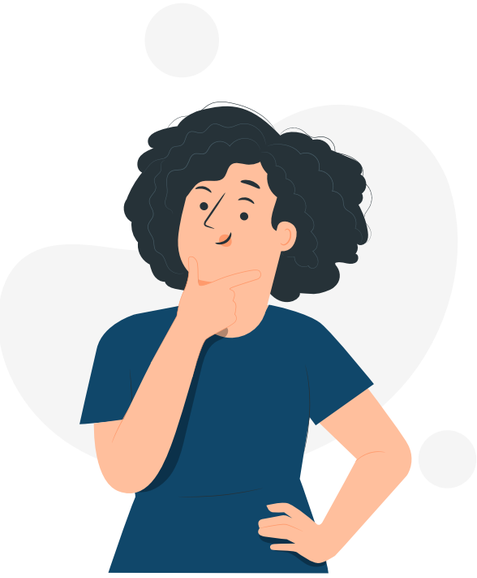
Paragraph 1.6

Initial problem observation

The initial problem is hereby observed. In the majority of R&D projects, sustainability is not considered until the scalability testing or production phase, when cost reduction is the objective or when a consumer directly requests it. R&D teams are highly focused on their predetermined goals for most of the process, making it crucial to incorporate sustainability at the beginning of the project during the ideation phase. Consequently, the current approach of food manufacturing R&D teams needs to change. Sustainability needs to be taken into account during at the start of a project, during the ideation phase.

How can sustainability be incorporated during the ideation phase of a project to help food manufacturing R&D teams with the development of sustainable products?

To answer this question, more research about the context is needed. The next chapter will investigate the food manufacturing milieu in more comprehensive terms, presenting the drivers and barriers for food manufacturers in creating sustainable products, an evaluation of their existing ideation procedures, the current measures for sustainable innovation, and an examination of the industry's emerging trends and developments. However, prior to this, the approach to the project will be outlined in the ensuing paragraph.



Paragraph 1.7

Project Approach

General structure of the approach
This project consists of two main phases: research and design. This project uses the double diamond approach from the British Design Council from 2005 as a guide. The process has two important actions: diverging and converging. Diverging is diving into a topic deeply while expanding people's thinking. Converging is making selections and choices. Both of the phases goes through one 'diamond', from diverging to converging. See figure 1.4 for project approach overview.

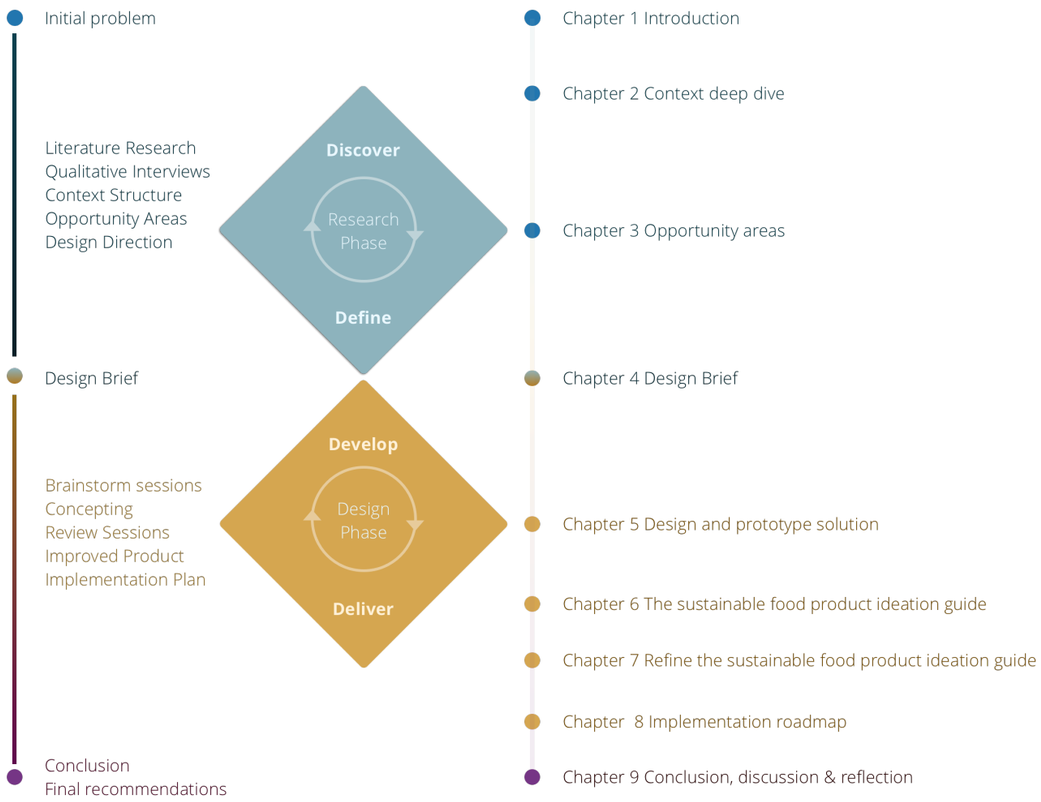


Figure 1.4 Project approach overview

Paragraph 1.7.1

The research phase approch

For the research phase, an adjusted version of the ViP method (Hekkert & Van Dijk, 2011) is used to meaningfully envision the future of the food manufacturing industry and create an overview to communicate the findings.

The ViP method
The ViP method guides the user to design the underlying idea of a product in detail before designing the product itself. It stimulates its user to structure the context in a way that makes complex situations digestible. Moreover, it helps the user to manifest what he or she wants people to understand, experience or do.

The research phase of this report is focused on the context level. Steps 1 to 4 of the ViP method (figure 1.5): domain, context factors, context structure and statement are adjusted and implemented.

The domain was established when the problem definition was set, literature research and interviews have been conducted (see appendix A for all interview overview).

Discover
The first diverging phase is called 'discover'. Literature research and interviews are conducted to gather information to answer the subquestions. Semi-structured interviews with Accenture consultants and literature research were done to determine the R&D process regarding when inspirations are needed and the involvement of sustainability. Simultaneously, interviews with a trend researcher, innovation managers of food manufacturers and literature research are done to understand the barriers and drivers for sustainable innovation for food manufacturers. This information is then converted into context factors according to the ViP method.

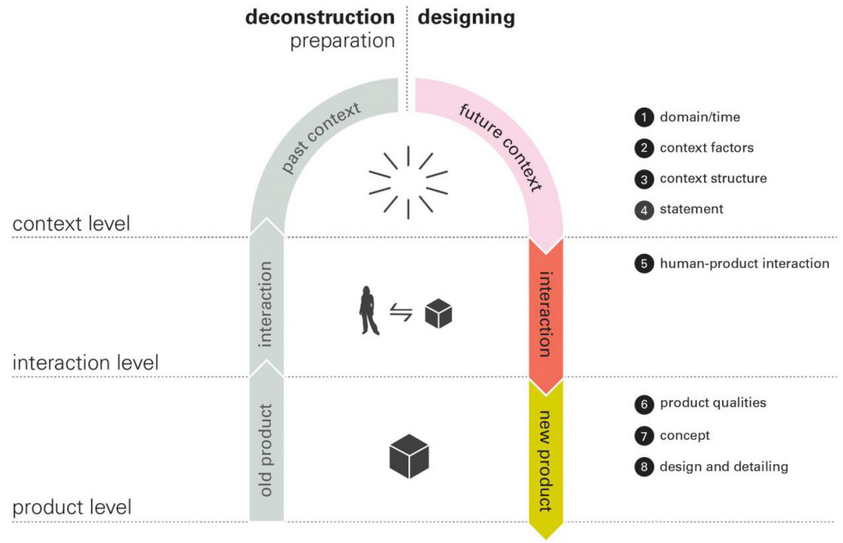


Figure 1.5 Overview of the ViP method

Define
During the Define phase, a clustering session is organised following the context structure method of ViP, with four designers to structure and simplify the discovered insights from past chapter. Then four opportunity area statements were written based on the guidelines of step four, 'statement' from the ViP method.

Then an opportunity evaluation session is held with four Accenture consultants from the Food of the Future team to discuss the four opportunity areas. After considering criteria from the client side and the research findings, recommendations for each area have been done. For the chosen area: sustainable ideation guide, a structured interview is held to understand the problem teams encounter specifically. With these insights, a product design brief is formed.

Paragraph 1.7.2

The design phase approach

Develop
During the 'develop' phase, loads of ideas are generated. Three brainstorming sessions were held separately with designers and Accenture consultants. Various ideas have been evaluated and combined. Then a prototype is made.

Deliver
The prototype is reviewed and tested with designers, and various employees from Accenture. The test is to validate elements of the sustainable food product ideation guide that works well and reject the part that does not. The result provides a final recommendation about how the ideation guide should be adjusted. At the same time, the implementation plan of the ideation guide in the organisation of Accenture is also discussed. A roadmap for implementation is made. Finally, the report ends with a conclusion and final recommendations for Accenture regarding the initial problem definition.

Paragraph 1.8

Key takeaways

The need for more environmentally sustainable products in the food manufacturing industry is growing. Accenture aims to integrate sustainability into all aspects of its operations. Its Food of the Future initiative aims to assist clients in their transition towards sustainability and the development of innovative ecosystems within the agri-food sector.

The current approach of product development of food manufacturing R&D teams needs to change. Some food manufacturers would opt for minimal action towards environmental sustainability and choose to do green marketing rather than make their products more sustainable. In the majority of R&D projects, sustainability is not considered until the scalability testing or production phase for only cost reduction purposes. Which is too late to have the most impact. At the same time, R&D teams are highly focused on their predetermined goals during most of the process, making it crucial to incorporate sustainability at the beginning of the project during the ideation phase.

Therefore, this report aims to assist Accenture in providing support to Food manufacturing R&D teams, to develop more environmentally sustainable products during the ideation phase.

This project consists of two phases, research and design. Following the guidelines of the double diamond approach from the British Design Council (2005), the research phase consists of two sub-phases: discover and define. The design phase consists of two sub-phases: develop and deliver.

02

DEEP DIVE INTO THE CONTEXT

The current approach of product development of food manufacturing R&D teams needs to change. A greater emphasis on sustainability ought to be given early in the R&D process, particularly during the ideation stage. For this purpose, a more profound comprehension of the contextual setting is necessary. Therefore, chapter 2 aims to answer the following questions:

What are the drivers for and barriers to sustainable innovation for food manufacturers?
What do the typical ideation activities of food manufacturers look like?
What are the current sustainability measures within the food manufacturing industry?
What are the trends and developments within the food manufacturing industry?

Paragraph overview

Paragraph 2.1

Drivers and barriers to food manufacturing sustainable innovation

Paragraph 2.1.1

Drivers for sustainable innovation within the food manufacturing industry

This paragraph aims to discover the drivers for sustainable innovation for food manufacturers. Therefore literature research is performed and interviews with sustainability and innovation managers of sustainability-driven food manufacturers have been conducted.

This paragraph discovers that companies generally want to become resilient to external changes while maintaining internal stability (interviewee 2, 12, 13, 14). This thought drives food manufacturers to innovate sustainably. There are drivers in five aspects: the climate itself, legislation and following regulations of governments, the consumer needs and wants, the consumer food product market, and the internal motivation of the food manufacturer.

Climate change and sustainability regulations

First, there is climate change itself. This harms current farming practices, the nutrition quality, and the safety of ingredients (European food safety authority, 2020). This change in climate drives the changes in politics. After the Paris agreement in 2015, more legislations and corresponding regulations have been set globally (Havard Business Review, 2021). E.g. the legislative framework for sustainable food systems (FSFS) proposed by the European Commission in 2021. All the European food manufacturers will have to adjust their approaches due to the new framework to be able to sell their food products within the EU.

Consumer call for sustainability

At the same time, consumer needs and wants are changing. More and more consumers are adding sustainability as a criterion when choosing a product. There is a louder and increasing voice of the youth growing due to the climate change (Winston & Harvard Business Review, 2021). Especially Generation Z is leading the revolution of a conscious lifestyle and influencing their parents and other members of their circles (Wonderman Thompsons, 2021). Pew research centre (2021) has found that this group experiences higher anxiety related to climate change than the older generations. In 2022, the GenZ'ers willing to spend 10% more on sustainable products increased from 34% in 2021 to nearly 90% (Petro, 2022). Moreover, 50% of millennials and 34% of Generation X are willing to spend more than 10% of the product price for a more sustainable product (First insights, 2020). The advent of social media has accelerated the spread of their thinking. This partially results in the popularity of vegan diets among youngsters (Wunderman Thompson, 2022).

Food market's sustainability transformation

The change in consumer needs and wants drives the change in the consumer food product market. The market size for sustainable food products is growing significantly. Take the alternative dairy market as an example. The global dairy alternatives market was valued at USD 23.2 billion in 2021 and is expected to grow at an annual growth rate of 12.5% from 2022 to 2030 (Grand view research, 2020). Biotech, such as cell-culturing of meat or other ingredients and the uprising of many sustainability-driven food manufacturing start-ups, also fuel the drive for food manufacturers not to be left behind by their market.

Food manufacturer's internal sustainability motivation

Last but not least, trend research has shown that there is also internal motivation for food manufacturers to innovate sustainably, but often related to other motivations (Zukunftsinstitut, 2022; Innova Marketing Insights, 2022). There is a rise in material and energy prices. To reduce costs, food manufacturers would decrease waste and cut on materials, energy, and water usage. At the same time, the COVID-19 pandemic and the conflict between countries have shown the fragility of a longer supply chain. Food manufacturers would shorten their supply chain to source more locally, in turn reducing risks. At the same time, there is the rise of sustainability-driven start-ups. These companies are often formed by like-minded people who have the internal motivation out of their personal life to drive sustainable businesses.

Conclusion of drivers for sustainable innovation

Consumers' perception of food is changing: it has become a wellness category and a reflection of personal value. With generation Z in the lead, consumers find sustainability more and more important when it comes to the selection of food products.
With the change in habits and the rise of awareness, consumers call for fundamentally sustainable food products rather than greenwashing or green claims.

Next to change in consumer needs and wants changes, climate change itself has a negative influence on farming, sourcing, processing and transporting. At the same time, governments have more strict legislation and policies regarding the sustainability of food products. All these, together with the uprise of sustainability-driven food manufacturing companies, the packaged consumer food market is in transition. The manufacturing clients of Accenture should want to stay up to date within the market

Paragraph 2.1.2

Barriers to sustainable innovation for food manufacturers

To discover the barriers to sustainable innovation for food manufacturers, the same research is conducted to discover the drivers.

There are five interrelated barriers for food manufacturers to innovate sustainably: consumer distrust, higher prices of sustainable products, sales uncertainty, difficulty in the traceability of sustainability data, and the 'wait and see' attitude of food manufacturers.

Higher prices of sustainable products due to higher production costs

The need for a traditional mass-produced food product is often higher than the sustainable options. Therefore, the production costs for the sustainable options are way higher than the already matured production lines (Kearney analysis, 2020). According to interviewees 13 & 14, the prices for sustainable products are higher than the 'regular' ones. Therefore, adding sustainability to the already complicated requirements when developing a food product is not wishful for food manufacturers. It delays the return on investment even more. Especially when the majority of the most sustainability-driven group: generation Z, are not working yet and do not have the purchasing power (interviewee 11).

Easier to claim green than make green

It is easier to claim green than make green products. Therefore, some food manufacturers would opt for minimal action towards environmental sustainability and choose to do green marketing rather than make their products more sustainable (interviewees 2, 3, 11).

Consumer distrust eco-labels

Generation Z is often very sceptical about whether a green claim of a company is sincere and backed by real evidence (JUV Consulting, 2021). In 2021, the European Commission reported that 42% of the green claims on the market are exaggerated, false or deceptive. Next to all the claims that food manufacturers make themselves, there is also an overflow of different eco-labels. Only on the eco-label index, there are 147 ecolabels to be found within the food category (eco-label index, 2022). Even consumers who care about sustainability are confused about what product to trust.

Difficulties in the traceability of sustainability data

Not only the eco-label is not strictly defined. The sustainability data of a product is also not 100% accurate. It is mentioned many times by the sustainability or sourcing manager of food manufacturers during interviews that traceability of their product is difficult. For instance, anyone can easily access the global average GHG emission data of one type of vegetable. However, e.g. the CO_2 footprint of tomatoes in the Netherlands is very different from one of Spain due to climate and farming differences. When a manufacturer switches between suppliers, it is difficult to calculate if the one is factually more sustainable than the other, because not everyone is tracing their emissions, and the same model does not apply to every supplier.

Uncertainty in sales results in a 'wait and see' attitude

The reasons mentioned above result in uncertainty about whether a product labelled sustainable would sell well and, therefore, a low expectation in return on investment. Thus there is less funding lying around to develop sustainable products. It is not surprising that many food manufacturers have a 'changes sounds expensive' mindset and a 'wait and see' attitude.

Conclusion of barriers to sustainable innovation for food manufacturers

Many consumers do not trust green-marketed products because of the overflow of eco-labels and greenwashing. Consumers want a product which is more sustainable and backed with facts. However, not all factual data within the chain are well-calculated. Many of those data are not accurate and are a global average. So, even when a food manufacturer switches to a more sustainable source, it might not be well documented to be communicated towards the consumer.
Many food manufacturers choose short-term profit within their comfort zone over long-term investment in sustainable products. They prefer to claim green rather than make green. Many food manufacturers must change the wait-and-see attitude, and the focus will switch from claiming green to make green products.

Paragraph 2.2

Current ideation process

To discover a typical current ideation process of food manufacturers, interviews are conducted with four R&D experts from food manufacturing companies, three sustainability-driven food manufacturers and one trend researcher who facilitates workshops for food manufacturers. During these interviews, the interviewees were asked about their general ideation activities, their goals of ideation, and the criteria for going into the next phase (see appendix G for the interview guide). This chapter describes several typical ideation activities and concludes with the pain points during the ideation activities.

Worth mentioning is that the sustainability-driven food manufacturers are all B-corporation certified. A B corporation certificated company demonstrates high social and environmental performance, makes a legal commitment and exhibits transparency (B-corporation, 2022).

Each company has its process and approach. There is no doubt that there are possible scenarios that this research does not cover. This research has found the ideation activities of food manufacturers in three situations:

1. During bi-annual or seasonal ideation events involving various departments.
2. Project-oriented small ideation sessions to generate solutions for particular project brief requirements.
3. All of the interviewed B-corps have ideation activities organised (spontaneously) by the product innovation managers to gather ideas at any given moment.

The involved department of ideation generation activities varies per project and per company.

Ideation events

This session happens before R&D receives any project brief or list of requirements. This session aims to generate possible directions for the coming period, get inspired about the new developments in the field and align the department. For this ideation event, many departments are involved, such as project, category, lab or innovation managers, and marketing, R&D, sourcing, and supply chain departments. Or external parties such as workshop facilitators, consumers or experts with specific knowledge about the to-be-discussed topic. Slides, post-its, markers and whiteboards are prepared.

During the session, the participants bring information such as the latest market trends and consumer needs reports to the sessions. Sustainability is merely one slide in the trend presentation. Sometimes the ideation goes top-down, starting with vision and goals, and sometimes it starts bottom-up with a product to be improved. This research has also found that the workshop facilitator and some innovation managers found that R&D often focus on limitations during deviation activities. On the other hand, the R&D employees find the ideas the marketing department provides during ideation activities unrealistic.

The session often ends with a list, and it differs per company on their structure and per product on what exactly is expected to be delivered to the next phase. However, the elements could include consumer needs to be fulfilled, unique selling points of the product ideas, cost prices, sketches, claims to be written on the packaging and sometimes a timeline of product implementation.

Every interviewee who had this type of session found it inspiring. However, a session involving so many people always costs much time to organise and is thus not flexible.

The project-orientated ideation activities

After the project brief is set and communicated, the R&D team will start brainstorming. This could happen in many different ways. Depending on a company's size, there are sometimes more people involved than only the R&D department. Sometimes they would look at their existing ingredient database and choose the ingredients based on the requirements from the project brief. At some companies, they have to think of a new drink flavour, and at some companies, they brainstorm new ways of incorporating vegetables into people's everyday diets. How broad and specific the session depends on the project brief and how the company works.

Other ideation activities

There are also more spontaneous ideation activities happening at various companies. Employees could drop ideas at two of the interviewed companies at any time by, for example, sticking a post-it on the idea wall. Many also organise ideation sessions whenever they see changes somewhere on the market just because there is time for it. Many of those sessions need to be more structured. Employees left feeling inspired, and changes were discussed on time. However, due to the nature of unstructured, spontaneous ideation activities, sometimes the session's goal remains unclear, the insights are unstructured, and no clear actions are followed at the end.

Pain points of typical ideation activities

The following pain points for food manufacturers were found during the ideation activities.

This research has found that during the ideation activities of a not sustainability-driven company, the environmental impact of their product is only mentioned at the start during a trend research presentation. Sustainability should have a more prominent place during the ideation sessions.

There are many types of ideation activities. A big session with many players involved is inspiring but costly in time. Moreover, less structured sessions are flexible and easy to set up but often do not have a clear goal or result. So a way to organise sessions flexibly, yet the structure is favourable. Because there are so many variations of who is involved and what type of project needs to be ideated, it is favourable to design a modular system of design guidelines so that people can choose their path fitting with their vision and goals.

This research also found that ideation participants of different disciplines have different expectations and sometimes friction on how the session should go. R&D teams possess a lot of essential knowledge of how a problem could be tackled, but they appear to be the least active and open-minded during the ideation activities. They often think of limitations rather than possibilities. This bothers the workshop facilitators and the marketing teams.

Conclusion of current ideation process

In general, non-sustainability-driven companies tend to only briefly mention the environmental impact of their products during the initial stages of ideation activities, particularly in trend research presentations. During ideation activities, R&D teams, who possess a wealth of essential knowledge of the possible solution ideas, may exhibit limited creativity and tend to think within the confines of constraints. Various types of ideation activities exist, depending on the organisation. Annual ideation events inspire and align ross-department points of view; however, organising such events can be challenging due to participants' busy schedules. Spontaneous ideation activities often lack structure and goals.

The subsequent paragraph will analyse and present the sustainability measures implemented by B-corporations in comparison to other companies interviewed in the food manufacturing industry.

Figure 2.1 Photo taken by Magnet.me (2020), Retrieved from Unsplash

Paragraph 2.3

Current sustainability measures within the food manufacturing industry

To understand food manufacturing companies' current sustainable innovation measures, literature research has been conducted. The annual performances of food manufacturing companies such as Unilever, Nestle, and FrieslandCampina in 2021 have been examined (Unilever, 2021; Nestlé Global, 2022; FrieslandCampina, 2022). Next to the interviews done with the Accenture consultants, two biotech start-ups (interviewees 9 and 10) have also been interviewed to get more understanding of how it is from the other perspective. On an operational level, the following measures have been taken: 1) sustainability visions and KPIs, 2) green acquisitions and disposals, 3) green claims and 4) collaborations with start-ups.

Sustainability vision
Many companies start sustainability with a vision based on the SDGs. They set KPIs on CO2 reduction. Unilever, for example, appointed their Climate transition Action Plans with a shareholder vote. These measures are sometimes too abstract to implement during specific processes, which makes them difficult to act on within an organisation (Mitra, R. & Buzzanell, P., 2017).

Sustainability vision implemented into everyday action
There are also companies which implement their sustainability vision in everything they perform. Examples are the B-corporation food manufacturers interviewed in paragraph 2.2.

The interview found the following three points:

1. The interviewed B-corporation employees have a sustainability-driven mindset in their personal life. Therefore, they understand the consumer with the same mindset very well, even without having to invite many consumers to the session. They use this mindset naturally in everything they do and how they ideate.

2. The company has sustainability as one of its 'pillars', which they implement while generating product ideas and choosing the products to be further developed. Their structure is built to select sustainable product ideas.

3. They organise more spontaneous ideation activities with each other. This sparks creativity and stimulates and challenges each other's thinking in sustainability.

Green acquisitions and disposals
Many food manufacturers also do acquisitions and disposals of product lines to achieve their CO2 reduction KPI (interviewees 1, 2, 3, and 10). They sell their product lines or brands with high Greenhouse gas emissions and buy smaller companies that emit less greenhouse gas. This way, the products with high CO2 emissions are still on the market, and solely the brand's owner has been changed.

Green claims
At the same time, food manufacturers make many green claims and often invest more than 80% of their budget on marketing. However, in 2021, the European Commission reported that 42% of the green claims on the market are exaggerated, false or deceptive. Solely the perception of the products has changed. The products themselves still emit the same amount of CO2. (European Commission, 2021)

Collaborations with start-ups
There is the rise of many small sustainability-driven food manufacturers. They are biotech companies that produce products such as vegan eggs or lab-cultured meat or sustainability-driven start-ups using vegetable waste as ingredients. Food manufacturing clients of Accenture sometime choose to collaborate with them to co-create sustainable new food products under the corporate's name.

Conclusion of current sustainability measures

Many food manufacturers have sustainability visions, so it will be valuable to help them to make those sometimes vague goals actionable during the ideation process. The interviewed B-Coperatons, for example, implemented this into everything they do. The mindset of their employees, product idea selection criteria and many spontaneous conversions are already sustainability-focused. Green acquisition and disposal of business work on company levels, but not broader than that for society. Green claims are often exaggerated and false. Consumers and policymakers are aware of this. Products need to be fundamentally improved on their GHG emission to make a positive impact and be accepted by the market.

Paragraph 2.4

Trend research of the food manufacturing industry

This chapter aims to complete a more holistic image of the future of food manufacturers. More literature research about the developments within the food manufacturing industry and related opportunities for food manufacturers is done.

The growing popularity of different types of plant-based diets
It is evident that in the future, more and more people will request plant-based food products (Statista, 2022). Many athletes and influencers adopt a vegan diet that includes only plant-based products (Future market insights, 2021). Many fine-dining restaurants are also positioning themselves as vegan restaurants (Wunderman Thompson, 2022). Many consumers adopt those diets (partially) and are now flexitarian (zukunfts institut, 2022). The vegan and vegetarian diets are recalibrating their focus from trying to substitute animal products to standing on their own merits (Innova Marketing Insights, 2022). The popularity of products from different cultures, which have been traditionally plant-based, is growing (zukunfts institut, 2022).

Localisation of food sources
The ingredients sourcing is becoming more localised (Innova Marketing Insights, 2022). There are two reasons food manufacturers do so (zukunfts institut, 2022): to meet consumer wants and reduce risks. While the ecological consequences of a reckless globalised food industry have come to their conscious, a consumer asks for localised and seasonal food. At the same time, there is also the movement to 'support your locals'. Next, the geopolitical crises between countries and the pandemic have shown the vulnerability of a long supply chain. To reduce risks, food manufacturers are finding ways to source locally. In the future, consumers could expect more food products from close-by farms.

Researches about cell-cultured ingredients
Cell-cultured ingredients are ingredients grown from cells harvested from an animal or plant in a favourable controlled artificial environment (Thermo Fisher Scientific, 2023). Next to cell-cultured meat and seafood, coffee is now also being grown in a lab (Wunderman Thompson, 2022). It is imaginable that in the future, almost all ingredients could be grown in a lab.

More personalisation of food
Many consumers wish for new food experiences (Innova Marketing Insights, 2022). Especially after the pandemic, the need for functional food (zukunfts institut, 2022) and wellness beverages (Wunderman Thompson, 2022) has been growing. Personalised healthy diet services have also become more and more scientifically supported. Companies gather DNA, blood samples and the microbiome of consumers to provide insights about their holistic health (Innova Marketing Insights, 2022). At the same time, consumers still value easy food made in snack forms to accommodate their now again fast-paced lifestyles (zukunfts institut, 2022).

In the past two years, there has been a massive growth in DTC (direct-to-customer) food and beverage businesses (Exploding topics, 2022). Food products have become and will become even more personalised for customisable nutrition, delivery and experiences.

Cancel culture: Consumers' expectations towards brands
Consumers nowadays ask for transparency (zukunfts institut, 2022) and expect the food brands to align and communicate their political, social and environmental values in digital and physical worlds (Innova Marketing Insights, 2022). When this need is not satisfied, a product line or a brand could be cancelled (Norris, 2021). Therefore, brands from now on need to align their vision, their products and their way of communication. So, if a brand announces that they have a specific sustainability vision, it should also reflect this in its product. And not only market the fact that they have a sustainability vision.

Conclusion of trend research
There are many developments within the food industry that will set the tone for the future context. More and more consumers are willing to eat fewer animal products and try plant-based ones. At the same time, the popularity of locally sourced products is growing. The consumer looks for a customised diet, delivery and experience of their food product. Last but not least, the growing presence of the cancel culture is urging food brands to align their products with their sustainability vision.

Paragraph 2.5

Key takeaways

Chapter 3 gathered insights about the current sustainability measures of food manufacturers, the trends and development within the food manufacturing industry, and the drivers for and barriers to sustainable innovation for food manufacturers. With these information, a holistic future context can be formed to discover opportunities for sustainable innovation in chapter 3.

On the right side, the key context factors of each paragraph of chapter 2 are summarised. They form the list of the context factors essential to the context structuring session in paragraph 3.1.

2.1.1 Drivers for sustainable innovation for food manufacturers

- Many negative effects of climate change on farming, sourcing, processing and transporting
- More and stricter sustainability regulations from governments, European Union and the United Nation.
- Consumer awareness for sustainability is rising
- Generation Z demanding sustainable products and influence the ones around them
- Food market's sustainability transformation
- Food manufacture's internal motivation when sustainability is their core business

2.1.2 Barriers to sustainable innovation for food manufacturers

- Higher prices of sustainable products due to higher production costs
- It is easier to claim green than make green
- Consumer distrust eco-labels and green claims
- Difficulties in the traceability of sustainability data
- Uncertainty in sales results in a 'wait and see' attitude

2.2 Painpoints from current ideation activities

- Sustainability is only mentioned at the start during a trend research presentation.
- A big ideation session with many players involved is inspiring but costly in time.
- Spontaneous ideation activities often lack structure and goal.
- R&D teams, who possess a wealth of essential knowledge to the possible solution ideas, may exhibit limited creativity and tend to think within the confines of constraints

2.4 Developments and trends within the food manufacturing industry

- The growing popularity of different types of plant-based diets
- Localisation of food sources for food waste reduction, transport costs, geo-political conflicts and the pandemic
- Many researches about cell-cultured ingredients
- More personalisation of food in ethic, nutrition, health, taste, use and delivery style
- Cancel culture: consumers' expectations towards brands

2.3 Current sustainability measures done by Sfood manfuactuers

- Companies are setting up abstract sustainability visions
- Many food manufacturing companies do green acquisitions and disposals
- Many food manufacturing companies make green claims
- Many food manufacturing companies collaborations with start-ups
- Sustainbility-driven companies implement sustainability into their everyday action
- Sustainbility-driven companies have sustainability-driven employees who think about sustainability pro-actively
- Sustainbility-driven companies select product ideas using environmental impact as a criterion
- Sustainbility-driven companies have many spontuneous conversations about sustainable trends

03

OPPORTUNITY AREAS

In the previous chapter, context factors are gathered consisting of the following topics: 1) the drivers for and barriers to sustainable innovation for food manufacturers, 2) the pain points of a typical ideation activity, 3) the current sustainability measures of food manufacturers and 4) the trends and development within the food manufacturing industry.

With the guidance from the ViP method's (Hekkert & Van Dijk, 2011) third step, 'structure context', the context factors will be clustered and placed in a matrix. The matrix divides the context into four opportunity areas. Thereafter, during step four of the ViP method 'statement', corresponding statements will be formed to describe the four opportunity areas.

Afterward, the four opportunity areas are evaluated on the wishes of Accenture food manufacturing clients. Then, a discussion about the consequences of working on each area is presented. Finally, paragraph 3.5 presents the recommended product or service offerings of the opportunity areas which were not chosen.

Paragraph overview

Paragraph 3.1

Context factor clustering

Set-up for context structuring
Four designers participated in the context structure session. Two of them were interaction designers, and two were strategic designers. This session lasted for two hours. During this session, the participating designers were asked to think out loud the whole time.
The researcher gave a presentation to the participants about the future context factors from the previous chapter. See key takeaways of chapter 2 for the list of context factors.

Clustering the context factors
After the presentation, the participants were provided with a working sheet on miro to restructure the context factors into clusters (see figure 3.1 for miro board to structure the context factors). The factors are written on post-its and colour coded. The drivers for sustainable innovation are green. The barriers to sustainable innovation are red. The pain points of a typical ideation activity are white. The current sustainability measures are yellow, and the trends and development within the food manufacturing industry are purple.

There are more post-its than the factors mentioned in the previous chapter. This is because the elements building up to each factor are divided into separate post-its. Extracting the various elements of each context factor makes the clustering activity clearer. Because elements from different factors could be interrelated with each other.

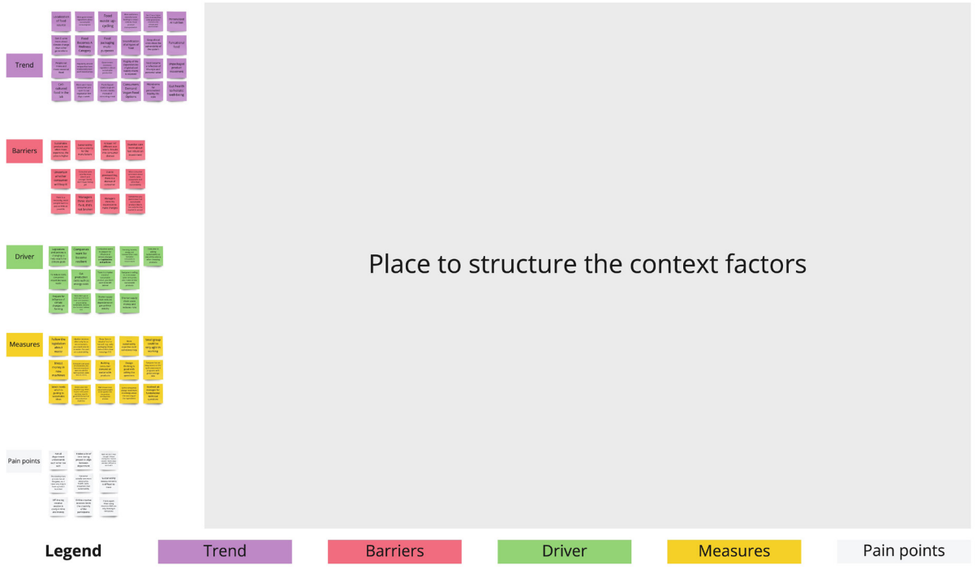


Figure 3.1 Miro board to structure the context factors

For example, the context factor 'Consumer distrust eco-labels and green claims' is divided into 'there is an overflown of green labels', 'there are a lot of false or exaggerated green claims', 'consumer distrust eco-labels' and 'consumer distrust green claims'. Or the context factor 'More personalisation of food in ethic, nutrition, health, taste, use and delivery style' is divided into 'ethical food personalisation', 'personalised nutrition', 'food for holistic health', 'food experience customisation' and 'direct to customer food delivery'.

To reduce the variety and complexity of the factors into a coherent structure that describes the main patterns in the context, the participating designers used their expertise to discover connections between the different factors. During this process, sometimes the same post-it is used more than once because it is related to more than one topic. Then they restructured the findings into clusters and gave the clusters rememberable fun names (see figure 3.2 for an impression of clustered context factors).

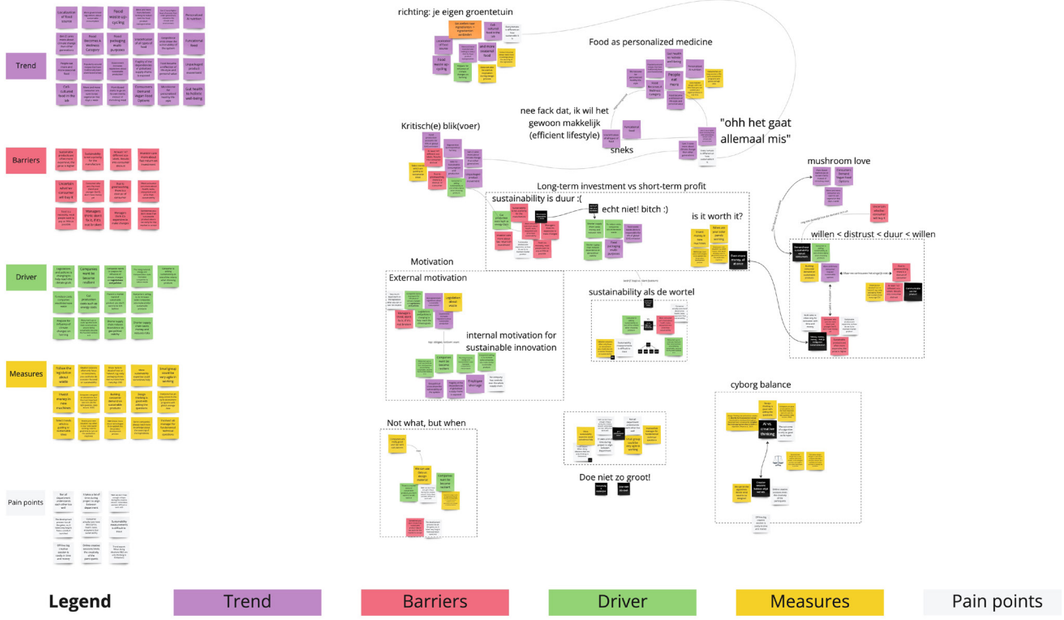


Figure 3.2 An impression of clustered context factors

The outcome of the structured clusters

The participants structured the following clusters (see table 3.1 for cluster names with short explanations).

Cluster name	Short explanation
Try to work agile	Food manufacturers should work more flexibly to adapt to changes and to communicate better.
“I just want everything to be easy”	Consumers wish for an efficient lifestyle.
The critical view of consumer	Consumers is setting higher standards for their food products and the organisations making them.
Upcoming strict sustainability legislations	There are more and stricter regulations coming for the food industry, and all parties need to comply.
Consumer trust & want dilemma	Consumer wishes for sustainable food products, but at the same time, they also distrust companies’ green claims.
Not what, but when	It is important to know when to do what and react fast.
Long-term investment vs short-term profit	The struggle between long-term sustainable investment and short-short profit.
Your own veggie garden machine	Consumer wishes to have everything customised.
Mushroom-love	Consumers are more open to trying new sustainable food products.
Company internal motivation	Many companies are driven by their internal motivations such as cost reduction, becoming resilient and personal ideals to be sustainable.
Food as personalised medicine	Perception of food has changed. You use it to alter your health and condition rather than to fill your stomach.
Sustainability is the root of everything that you do	Sustainable mindset of employees and of the company defines a company’s way of working. Which makes a company act sustainably rather than say ‘sustainability’.

Table 3.1 Clusters with short explanations

Paragraph 3.2

Clusters to Matrix

Dividing the opportunity areas

After naming all the clusters. The participants discovered that most of the clusters are referring to changes in the industry or in society. And many clusters seemed to refer to opposing forces.

First, there are two opposing ways to start a change, it can start with the change in the mindset of a person or an organisation, and it can also begin with how things are implemented practically. For example, practical changes include ‘efficient lifestyle’ or ‘try to work agile’. And ‘sustainability as the root of everything that you do’ or ‘company internal motivation’ are mindset changes. See figure 3.3 for step 1 of dividing the opportunity areas.

Then all the clusters are divided based on the other opposing force: whether the change is taking place for a consumer product or during the development processes. For example, ‘food as personalised medicine’ or ‘efficient lifestyle’ is focused on changes in consumer products. While ‘not what, but when’ or ‘long-term investment vs short-term profit’ is focused on the changes taking place during the development process. See figure 3.4 for step 2 of dividing the opportunity areas.

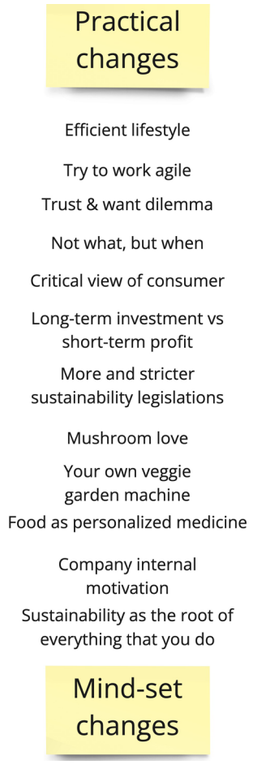


Figure 3.3 Step 1 of dividing the opportunity areas

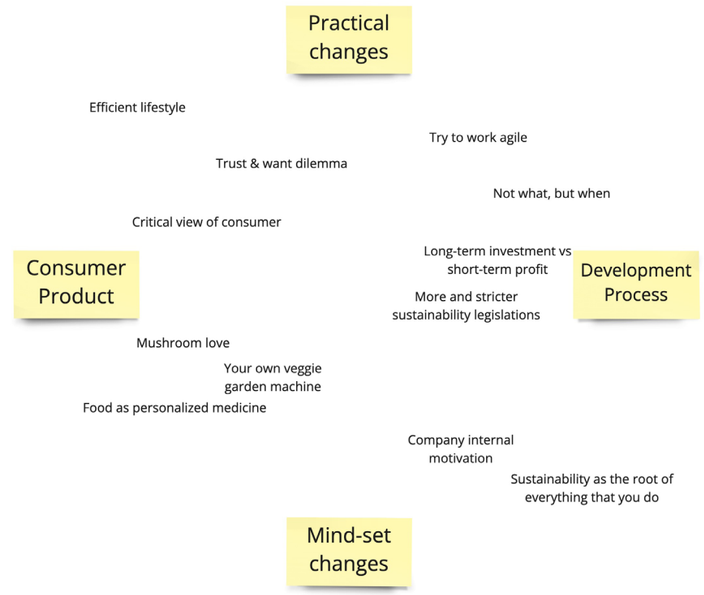


Figure 3.4 Step 2 of dividing the opportunity areas

To illustrate a clearer view of the domain, two axes have been drawn (see figure 3.5 for the matrix with opportunity areas). On the horizontal axis, the operating level of a change is shown. On the left side, changes in consumer products can be found. On the right side, changes on the development level can be found. On the vertical axis, ways to demonstrate those changes are presented. On the top side, implemental or practical changes are presented, and on the bottom side, the fundamental change in mindset can be found.

Now that the participating designers have placed the clusters in the matrix, four quadrants are formed with different context factor clusters. The researcher and the participating designers then discussed the name of each quadrant. Each of the quadrant is presented in the next paragraph.

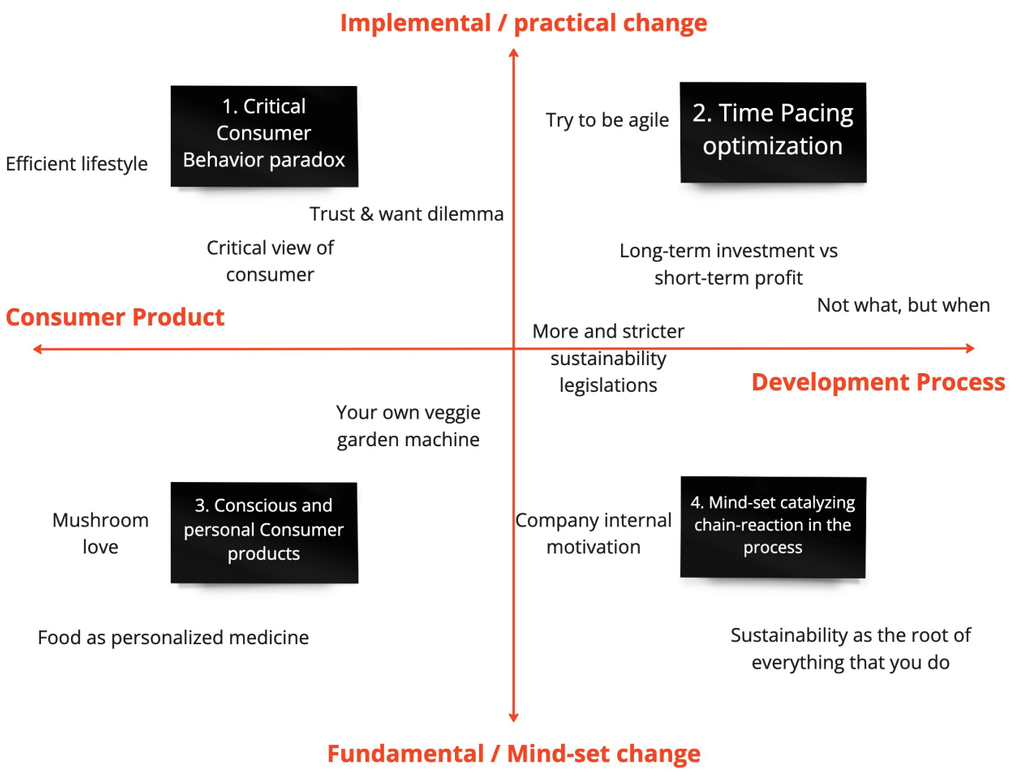


Figure 3.5 Matrix with opportunities areas in the future context of the food manufacturing industry

Paragraph 3.3

Matrix and the four quadrants

After dividing the future context of food manufacturers into four quadrants, it is time for step 4 of the ViP method: statement definition. The researcher combines the clusters of every quadrant into a story of what opportunity the food manufacturers have for the corresponding future context of the quadrant.

Quadrant 1 Critical consumer behaviour paradox
Within this quadrant, the implemental changes happen on consumer products. The consumer distrust and need for sustainable food products simultaneously grow. They want food that is efficient, sustainable and cheap. However, they only sometimes trust what the food manufacturers claim as sustainable. They found themselves in a paradox between their critical consciousness and their need for practicality, such as price and efficiency. There is an opportunity for food manufacturers to demonstrate their authenticity and trustworthiness. Food manufacturers can provide consumers with a way to jump out of the critical consumer behaviour paradox and enjoy their food products with enough transparent insights about sustainability and a clear conscious. Accenture can help its food manufacturing clients with the development of a system to calculate and communicate the environmental impact of their food products. Therefore, the statement for quadrant 1 is: the consumer distrust and need for sustainable food products simultaneously grow, and food manufacturers need to develop trustworthy products. See figure 3.6 for quadrant 1: Critical consumer behaviour paradox.

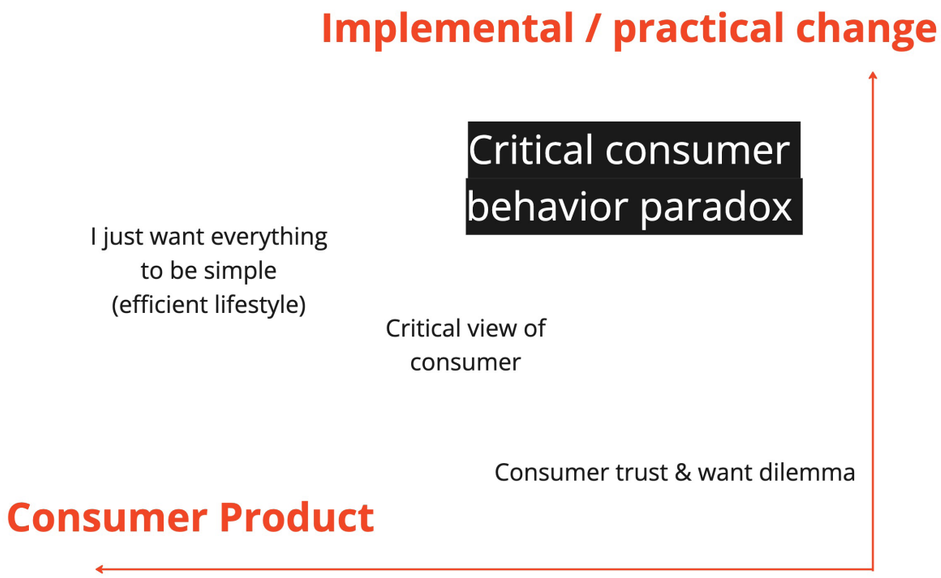


Figure 3.6 Quadrant 1: Critical consumer behaviour paradox

Quadrant 2: Time pacing optimisation

Within quadrant 2, implemental or practical changes are to be made in the development process of food products. There are many changes on the way, e.g. the upcoming legislation on sustainability, Generation Z entering the labour market and the change of the climate itself. Food manufacturers wish to become more agile and resilient to changes. They want to know all the possible outcomes before taking a step. Within this future context, compared to what product to develop, they want to know when to develop a product.

The food manufacturers need a way to help them be prepared and adapt to changes related to their products and predict when to launch which product. Therefore, the statement for quadrant 2 is: with more changes on the way, e.g. legislations on sustainability and the upcoming sustainability-driven Gen Z, it is important for food manufacturers to be prepared to adapt and know when to launch which product. See figure 3.7 for quadrant 2: time pacing optimisation

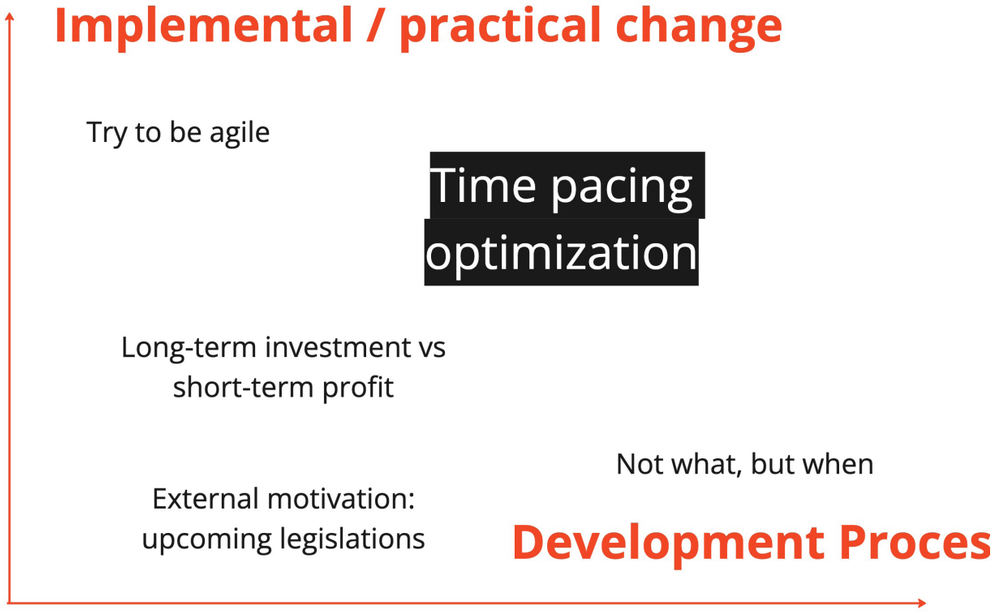


Figure 3.7 Quadrant 2: Time pacing optimisation

Quadrant 3: Conscious and personal consumer products

Within quadrant 3 (figure 3.8), fundamental or mindset changes are to be made to consumer products. Food has become a reflection of people's personal values and lifestyles. They experiment with functional food, personalised nutrition, plant-based diets and direct deliveries. All of these are becoming more and more varied on a personal level. Companies providing tests for micro-biome for food-related gut health or blood sugar and pressure test,s have also given the industry part of the tools to bring customised food to another level.

Within this future context, consumers want to have their food personalised on a nutritional, dietary, and ethical level and be delivered right to their doorstep. Food manufacturers could become part of an ecosystem which facilitates this development in consumer needs.

Therefore, the statement for quadrant 3 is: consumers take their personal preferences and sustainability goals on food into their own hands. Food manufacturers need to facilitate the customisation of the personal and conscious lifestyle of consumers.

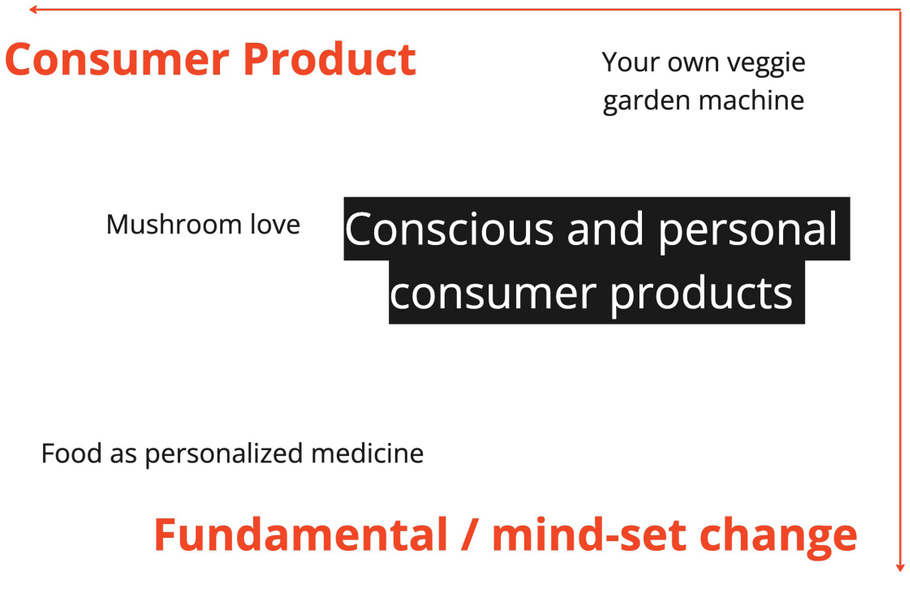


Figure 3.8 Conscious and personal consumer products

Quadrant 4: Mindset catalyses chain reaction in the process
Within quadrant 4 (figure 3.9), fundamental or mindset changes are to be made within the development process. The change in climate, regulation and consumer needs cultivate growth in the sustainable product market. More and more successful sustainability-driven companies are appearing, formed by like-minded people who are also sustainability-driven in their personal life. This drives everything that the company does. Their vision of sustainability aligns naturally with their products. This makes them naturally resilient towards changes related to sustainability and emits trustworthiness towards consumers.

At the same time, the abstract term of 'sustainability' is made more concrete for the goal- and detail-oriented R&D teams to develop sustainable products. More food manufacturers will want to learn their way of working and implement it with their own sustainability vision to develop sustainable products with the current developments on the market.

Therefore, the statement for quadrant 4 is: companies with sustainability as their core value implement it into every action they perform, and this catalyses the change in the industry. Food manufacturers need to be guided to follow this sustainability-centred way of working.

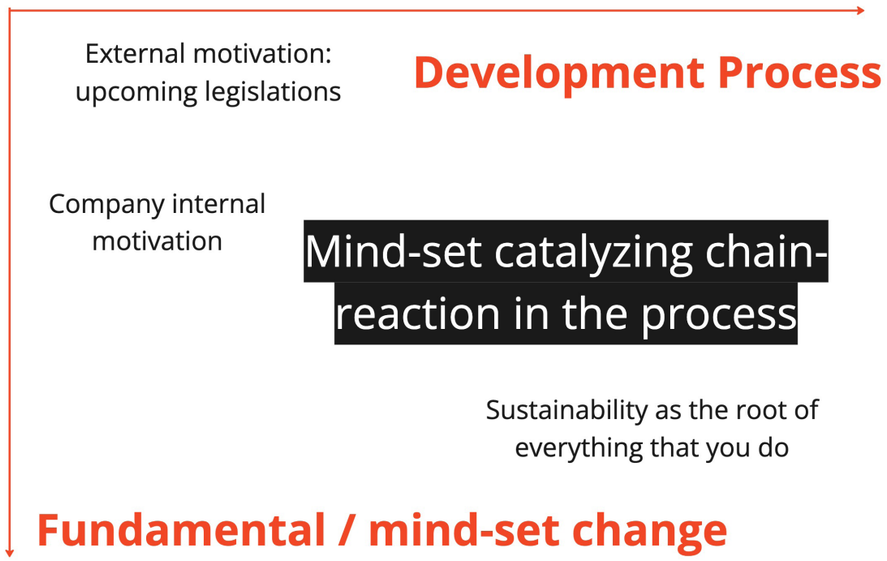


Figure 3.9 Quadrant 4: Mindset catalyses chain reaction in the process

Paragraph 3.4

Evaluating the four quadrants

Within this paragraph, first, the four opportunity areas are evaluated on the wishes of Accenture food manufacturing clients. Then, a discussion about the consequences of working on each area is presented.

Paragraph 3.4.1

Wishes of Accenture food manufacturing clients

Methods for criteria brainstorm session
A criteria brainstorming session is organised to find out the wishes of Accenture food manufacturing clients.

Four Accenture consultants of the Food of the Future domain participated in this session, which lasted for one and a half hours. During this session, the participating consultants were asked to think out loud the whole time.

To immerse the participants in the context of the food manufacturers, the research question, future context factors and opportunity areas were presented. They received a one-pager hand-out with the future context factors and the opportunity area statements (figure 3.10). Then the consultants were asked to put their feet in their clients' shoes to brainstorm what their clients find essential. These criteria are discussed during the brainstorming session.

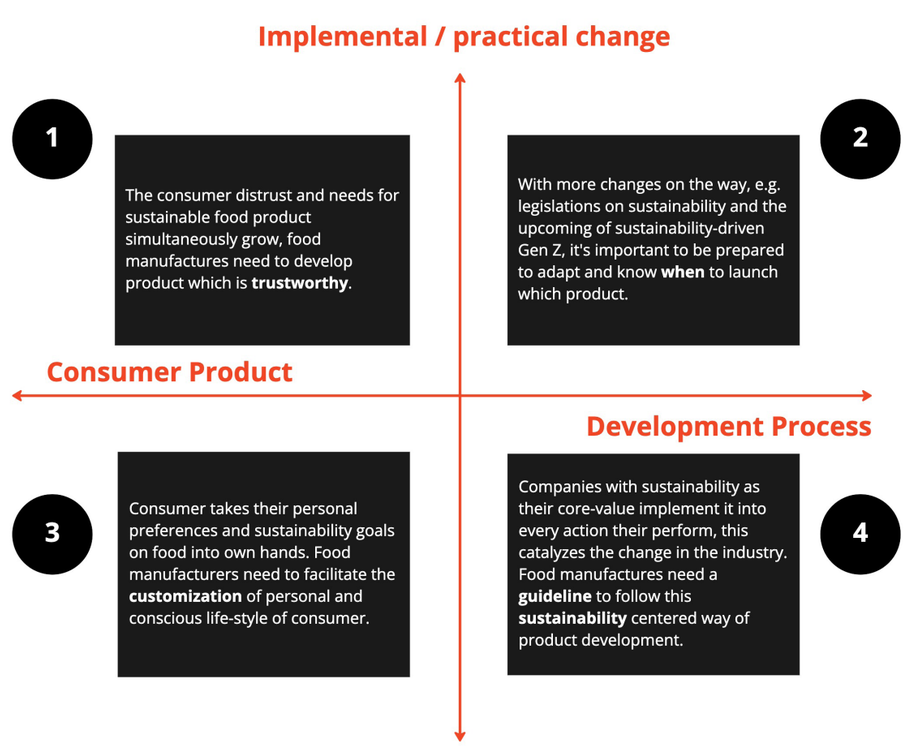


Figure 3.10 The four opportunity area with statements

Result criteria brainstorm session
After the brainstorm, the criteria were clustered, given a cluster name and ranked on their importance to food manufacturers. See figure 3.11 for the clustered criteria. Then the opportunity areas will be graded on a scale from one to five as an indication. Combined with each criterion's importance, the weighted criteria method (Roozenburg & Eekels, 1995) is performed to quantify the evaluation results of the opportunity areas.

The first three criteria, legal feasibility, consumer desirability, and business viability, are equally important. The rest criteria are ranked from most important to less important in the following order: 2) technical feasibility, 3) Fitting with long-term vision and strategy, and 4) accountability.

The participating consultant gave the four opportunity areas grades on a scale from 1 to 5 based on their experiences (see table 3.2 for the elaboration of the rating). The evaluation scores before the weighted criteria method are more or less the same: 20, 21, and 22 points out of 30 points. After the weighted criteria method, the differences are also not noticeable. Nevertheless, they all scored relatively high, 60, 61, 62, and 66 out of 90 points. The participating Accenture consultants said that all four opportunity areas are promising.

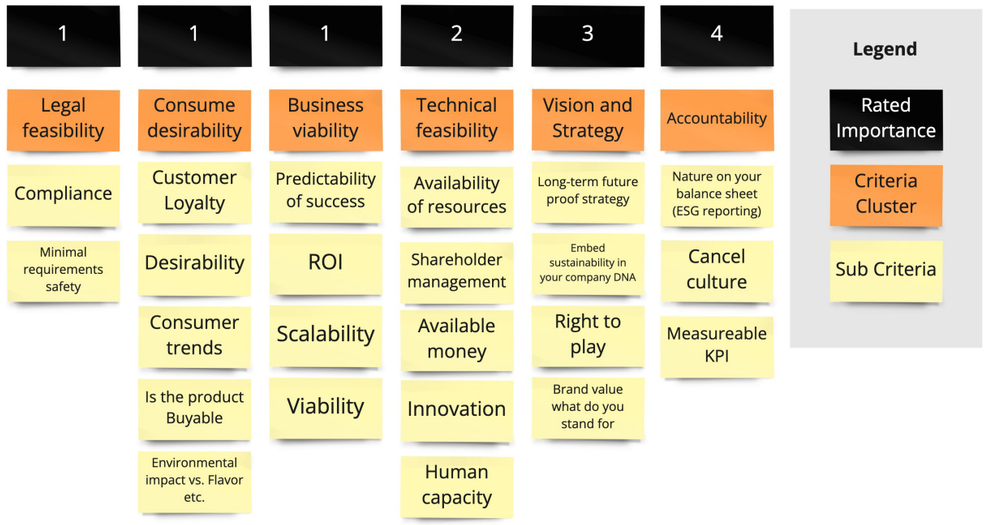


Figure 3.11 Food manufacturing clients' criteria and clusters

Conclusion of the wishes of Accenture food manufacturing clients
The food manufacturing clients of Accenture find legal feasibility, consumer desirability, business viability, technical feasibility, Fitting with long-term vision and strategy, and accountability important. All four areas are valuable. For each area, different products or services can be proposed to their food manufacturing clients, the next paragraph, the recommended product and service ideas can be found. It does not matter to the Accenture consultants which opportunity is chosen for the design phase of this project. In the next paragraph, each area's pros and cons are discussed, along with its potential to have its downside to be improved during the design phase.

Weight	Criteria	Q1	Q1 weighted	Q2	Q2 weighted	Q3	Q3 weighted	Q4	Q4 weighted
4	Legal feasibility	4	16	5	20	2	8	2	8
4	Consumer desirability	5	20	4	16	5	20	4	16
4	Business viability	2	8	3	12	4	16	3	12
3	Technical feasibility	3	9	4	12	3	9	3	9
2	Match vision and strategy	2	4	2	4	2	4	5	10
1	Ethical accountability	5	5	2	2	4	4	5	5
Total		21	62	20	66	20	61	22	60

Table 3.2 Weighted food manufacturer criteria

Paragraph 3.4.2

Opportunity areas evaluation

This chapter discusses the upsides and downsides of selecting each quadrant of opportunity areas for the design phase.

Quadrant 1 Critical consumer behaviour paradox (Q1)
On the upside, with the upcoming regulations about sustainability, food manufacturers have to report the greenhouse gas emission of their products. It is useful for food manufacturers to gather information about how much they emit. This area also fits very well with what consumer wants: authenticity and transparency, which helps the consumer to hold the food manufacturers accountable for their produced products. This area is feasible but has a high demand for the quality of the databases because not all varieties of ingredients are documented within easily assessable databases.

Nevertheless, on the downside, this direction does not help much as a business case per definition. Due to this extra feature, a product would sell better. So, further research needs to be done to confirm whether this is so. At the same time, it has little to do with a company's vision and strategy, which has a low potential to be fulfilled by design.

Quadrant 2: Time pacing optimisation (Q2)
With the change in regulations and consumer needs, a time pacing optimisation tool can help food manufacturers to become more resilient. It combines all the parameters of a food product and the required value of each criterion and converts it into recommended actions to take. Then resources will be allocated to the project best developed at that specific moment. This area increases the viability of a product.

However, this has little to do with a company's sustainability vision and strategy or its sustainability accountability. It focuses on efficiency and business viability. During the design phase, it could be adjusted to accommodate different sustainability visions and missions. However, the accountability aspect will not be fulfilled in this area.

Quadrant 3: Conscious and personal consumer products (Q3)
The area of customisation presents a favourable opportunity for accommodating individual consumer needs and desires. And sales tend to follow where there are needs and desires. Notably, customisation is often associated with premium segments, owing to its higher costs. The level of consumer involvement in customisation leads to increased product transparency and accountability, which are highly desirable qualities.

On the downside, this opportunity area may not adequately address regulatory and compliance issues, but this can be addressed through adjustments to the design parameters or limiting customisation options. Besides, this opportunity area may not significantly contribute to the company's overall sustainability vision and strategies.

Quadrant 4: Mindset catalyses chain reaction in the process (Q4)
Quadrant 4 aligns closely with the sustainability vision and strategy of food manufacturers, as the implementation of sustainability in all aspects of their operations can be achieved through a sustainability guideline. The adoption of such a guideline ensures that consumers will be less likely to hold food manufacturers accountable for not designing sustainable products. This opportunity resonates with consumer demands for more sustainable products.

On the downside, although a sustainability guideline may not inherently support all future changes in regulations and compliance, the most recent changes are specifically aimed at demanding the development of sustainable products and sustainable production methods by food manufacturers. Consequently, a sustainability guideline would align well with these changes in regulations and compliance and support the transition towards more sustainable practices. Moreover, it may not inherently support the feasibility and business case of products, but these factors can be addressed through the inclusion of relevant guidelines during the design phase.

Selecte quadrant 4
Eventually, quadrant four is chosen to be worked on for the design phase for several reasons.

First of all, there is an urgency from the climate and regulation perspective for food manufacturers to make positive changes as soon as possible. Many barriers will be taken away because the food manufacturers find regulation and compliance one of the most important criteria to follow when making decisions. It is favourable to choose an area with a product idea that can be implemented right away, which quadrant 4 is. All the other areas require more time, research and collaboration across disciplines to set up a minimal viable product of the data structure they need.

Secondly, the min-points of quadrant 4 are flexible to be fulfilled in the design phase of this project. Various criteria, such as how to accommodate consumer needs, business cases, and sustainably could be modularly added to the guideline.

Furthermore, a sustainable design guideline would cultivate a sustainable mindset among food manufacturers' employees. Sustainability would no longer be a fleeting trend presentation topic at the beginning of ideation activities. The impact of a product that encourages food manufacturers to adopt a more sustainable mindset would extend to all their future actions. Even a small suggestion, for example, thinking about how to recycle a product part, could have a positive environmental effect.

Lastly, the sustainable design guideline would also encourage R&D teams, who possess significant knowledge of possible solution ideas, to think creatively. This would enable food manufacturers to act concretely on their sustainability vision. Additionally, the sustainability design guideline would establish sustainability as a standard criterion in procedures.

Paragraph 3.5

Recommendations for the opportunity areas

Although during this project, quadrants 1 to 3 would not be worked on, there are possible ideas and recommendations for Accenture to consider working on through other projects.

Quadrant 1 Critical consumer behaviour paradox

For quadrant 1, critical consumer behaviour paradox, Accenture could develop a system with an extensive database of products' greenhouse gas emissions and sell this to food manufacturers, who put, e.g. a QR code on the packaging. Then the user could access the greenhouse gas emission database of the product through blockchain. Accenture would need access to those databases and data scientists for the back-end development of a product like this. And then, together with the food manufacturers, they could develop the packaging and the front end of the database interface. Just like that, consumers trust Oatly more because of how much CO2 they emit per milk. This could also make a product sell better. It is recommended to do further research about the feasibility of access to the databases, test the blockchain between the database and the front end and how users would experience the scanning of these products and whether it will positively influence the sales of a product and the image of a food manufacturing brand.

Quadrant 2: Time pacing optimisation

For quadrant 2: time pacing optimisation, Accenture could make a real-time roadmap software. This solution will include the past, current and possible future changes in regulations, consumers' needs and wants, technology developments, and competitor moves as context factors. At the same time, it includes company-specific portfolio data: which product the food manufacturer already has, its vision and strategy, and which product it still misses. With the combination of internal and external data, the AI will predict when is the best moment to launch what product. With backward calculations, it is also easy to be calculated when the R&D and marketing team should start their part of the work. This product could be easily modular and be added with more marketing and supply chain data. Then the sales channels and the supply chain planning could also be automatically planned. However, just like any other AI replacing human work, there will be side effects that need to be considered. AI can not replace human creativity; would the products stay original and human-centred enough? If AI were to replace the planning work of humans, how would this affect the ethic within the company and the product itself? It is recommended to conduct in-depth research about this area.

Quadrant 3: Conscious and personal consumer products

For quadrant 3, conscious and personal consumer products, Accenture could form a network of personalised food with food manufacturers, retailers, meal planners, wearable tech companies and laboratories for the microbiome, blood, and genetics tests. Consumers could get customised food fitting their nutrition plan and personal ethical values by filling in forms, conducting genetics tests, keeping on track of their microbiome and blood through periodic tests, and keeping track of their blood pressure and heart conditions through wearable technologies. It is recommended to research more broadly into this topic. Next to the technical feasibility and the willingness of different parties to participate, it is also essential to investigate how big the market for such a premium experience is, what the price would be for it to be viable and if and which consumers would be willing to subscribe.

Paragraph 3.6

Key takeaways

This chapter concludes the define phase of the report. Four designers participated in a cluster session, during which the context factors found in the previous chapter are structured into clusters flowing the ViP method (Hekkert & Van Dijk, 2011). Whereafter, all the clusters are placed into a matrix which forms four quadrants of opportunity areas: 'critical consumer behaviour paradox', 'time pacing optimisation', 'conscious and personal consumer products' and 'Mindset catalyses chain reaction in the process'

Together with four Accenture Food of the Future Consultants, a set of criteria is established which are significant for food manufacturers while making decisions in paragraph 3.4. Whereafter each of the opportunity areas is evaluated and Q4 is chosen.

The chosen quadrant Q4 is called 'Mindset catalyses chain reaction in the process'. There are several reasons: due to the urgency for food manufacturers to make positive changes in response to climate and regulation, quadrant four is favourable as it allows for the immediate implementation of a product idea.

At the same time, a sustainable design guideline would encourage the mindset among food manufacturers' employees to establish sustainability as a standard criterion, and encourage R&D teams to think creatively about it. The impact of a product that encourages food manufacturers to adopt a more sustainable mindset would extend to all their future actions.

04

DESIGN BRIEF

With the choice made in chapter 3, a design brief for the chosen quadrant is presented in this chapter. The design brief consists of the problem definition, design goal, design statement and design guidelines to follow in the next chapter.

Paragraph overview

Paragraph 4.1

Problem definition

More regulations for food manufacturers on greenhouse gas emission is coming. There is an urgency from the climate and regulation perspective for food manufacturers to make positive changes as soon as possible.

Many food manufacturers have a sustainability vision, which is often very abstract to act on. The R&D teams, on the other hand, are often very goal-oriented. So they need concrete sustainability-related goals added at the start of the project during the ideation phase to develop sustainable products. Otherwise, sustainability is barely taken into account during the R&D process.

Yet, the traditional approach to product ideation needs to be revised to prioritise sustainability as a standard criterion in procedures. It is now often only a topic at the end of a trend presentation during the ideation activity. It is imperative for food manufacturers to shift away from a "wait and see" mindset and work towards making their product portfolio more sustainable in line with their sustainability visions.

Although R&D teams possess critical knowledge of possible solution ideas, they may exhibit limited creativity and are often constrained in their thinking. Encouragement of more creative thinking is necessary to develop sustainable products.

While many types of ideation activities exist, organised ideation sessions require significant time to arrange and may be restrictive, while less structured sessions are often flexible yet lack a clear goal or outcome. Therefore, a modular, flexible, yet structured design guideline is favourable to allow individuals to choose their own path based on the project's requirements and those involved.

Paragraph 4.2

Design goal and design statement

Design goal
The design goal is to encourage food manufacturers to develop more sustainable product ideas, which does not necessarily mandate the selection of the most environmentally friendly product. But let them think about sustainability more. The primary objective is to instil a sustainable mindset that impacts everything they do. For instance, incorporating the idea of recycling product parts during ideation.

A sustainability-driven design guide for Accenture's food manufacturing clients should foster creativity around sustainability and generate sustainable new food product ideas. It helps the R&D team with much practical knowledge to participate creatively during ideation activities. The sustainable design guideline aims to cultivate a sustainable mindset among food manufacturers' employees, where sustainability is no longer a fleeting trend topic at the beginning of ideation activities. Sustainability will become a built-in stand practice during every step of ideation activities.

Target user
The product being designed is aimed at employees of food manufacturers who are involved in the development of new products, enabling them to follow the guidelines during the ideation phase to generate sustainable product ideas. The sustainability guidelines need to be tailored for food manufacturing R&D teams to incorporate into their standard practices.

Nevertheless, it is essential to note that the implementation of the new way of working into practice requires the assistance of Accenture consultants. the Accenture consultants are responsible for selling the implementation project to the food manufacturers and assisting them in the implementation of the sustainable guidelines.

Design statement
For food manufacturers who want to design more environmentally sustainable products, I want to guide their employees who generate product ideas to be more creative and help them generate sustainable product ideas by providing them with a structured yet flexible, sustainable ideation guide.

Paragraph 4.3

Design Guidelines

A list of design guidelines is formed, which the to-be-designed product must achieve. The guidelines are formed to reach the design goal.

1 To tackle food manufacturers' 'wait and see' attitude, the to-be-designed product should guide its users to think more about sustainability more in their practices.

2 To spark the creativity of food manufacturer employees who participate in product idea generation, the to-be-designed product should include ways to open the user's mind and help them to become more creative than before during the ideation session.

3 To accommodate the urgency rooting from sustainability regulations, the to-be-designed product should be implementable by Accenture as quickly as possible.

4 To generate sustainable product ideas, the to-be-designed product should guide the participants in finding more sustainability-related solutions for their problems than without the guide.

5 To provide a way to structure and guide their session, the to-be-designed product should provide clear steps during the ideation activity.

6 To allow participants to use it flexibly at any time, with various group sizes, the to-be-designed product should be modular and adjustable for each session.

7 To address the issue that sustainability visions are often too abstract to work on, the to-be-designed product should provide the R&D team with a clear list of research topics to work on.

Paragraph 4.4

Key takeaways

This chapter presents a design brief for the chosen quadrant from chapter 3, including a problem definition, design goal, design statement, and design guidelines.

The problem definition highlights the urgency for food manufacturers to shift towards sustainable practices due to upcoming regulations on GHG emissions for the food manufacturing industry. The traditional approach to product ideation needs to be revised to prioritise sustainability, and a sustainable design guide can cultivate a corresponding mindset among food manufacturers' employees.

The design goal is to encourage food manufacturers to develop more sustainable product ideas, instilling a sustainable mindset that impacts everything they do. The target users are employees of food manufacturers involved in the development of new products, and the implementation of the new way of working requires the assistance of Accenture consultants.

For food manufacturers who want to design more environmentally sustainable products, I want to guide their employees who generate product ideas to be more creative and help them generate sustainable product ideas by providing them with a structured yet flexible, sustainable ideation guide.

The design guidelines define how the to-be-designed product should look like. It should guide users to creatively generate more sustainability-related solutions, provide clear steps and is modular and adjustable to accommodate various groups and ideation sessions.

In the next chapter, steps are taken to design and prototype the tool following the design guidelines from paragraph 4.3.

Following the above-outlined design guidelines, the next chapter details the steps taken to design and prototype the tool for the sustainability guideline for food manufacturers.

05

DESIGN AND PROTOTYPE SOLUTION

During the project's design phase, initial ideas were generated through brainstorming sessions with designers and Accenture consultants. Concrete ideas were then formulated based on the design guideline and selected, combined, and adjusted.

Paragraph overview

Paragraph 5.1

Design phase approach

During the design phase of this project, the following activities took place. First, a short brainstorming session with five designers took place to generate initial ideas. Whereafter three Accenture consultants filled in the gaps with their ideas. Eventually, the researcher generated more concrete ideas based on the two sessions. During this session, the ideas are evaluated, selected, combined and adjusted based on the design guideline. Then the concept is worked out.

The concept will be reviewed in several sessions. The first one is with designers to review the readability, clarity, completeness, logic and the general smoothness of the process flow of the design. The second session will be held with Accenture employees from various backgrounds to simulate a multidisciplinary team to see if they think this product could be used in their own practices. The third round of review will be held with three experts from Accenture separately. Whereafter the product is further refined.

On the other hand, the experts provided their opinion on how the product should be used and several use cases for Accenture are generated by the researcher. The corresponding implementation plan is reviewed with experts from Accenture on its feasibility, desirability and viability.

Last but not least, with the gathered insights from the review sessions, improvements and final recommendations on the concept and the implementation plan will be presented.

Paragraph 5.2

Design execution

Ideation activity with five designers
Two strategic product designers and three interaction designers participated in this 45 minutes brainstorming activity. Ideas were generated around the question: 'How can food manufacturers be guided to generate sustainable product ideas?'. Whereafter, the researcher presented the participants with the opportunity area. A flip-over is placed on the table, and participants write their ideas on a post-it. While sticking it to the flip-over, they would speak out loud about what they had written. Other participants will be inspired by what they have heard and associate further with the ideas. See figure 5.1 for the ideas generated by the designers.

Ideation activity with 3 Accenture consultants
Three Accenture consultants participated in this session. The researcher presented the participants with the opportunity area and the ideas generated from the previous session of the designers as inspiration. Participants wrote their ideas on a post-it and attached them to a whiteboard next to the ones from the designers.

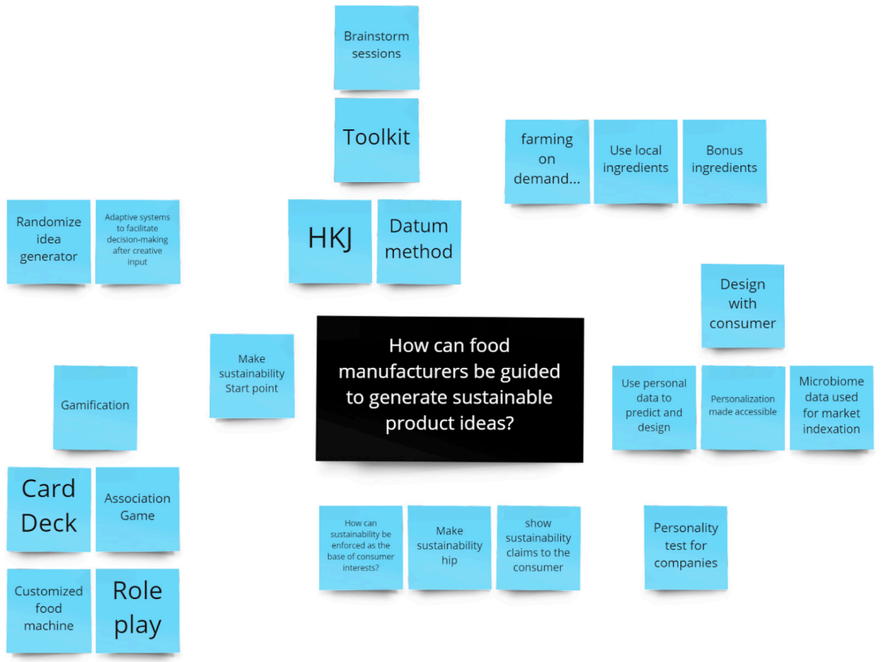


Figure 5.1 ideas generated by the designers

Combine all the ideas
The collated input was added to a Miro board, clustered and combined into a few ideas (refer to figure 5.2 for product ideas for the sustainability ideation guide). Some of these ideas needed to align with the design guideline. Ultimately, one idea stood out: a sustainability inspiration toolkit in the form of a card deck, which users can employ to design sustainable food products. Research by Roy R. and Warren J (2019) found, after reviewing 155 design card decks for various industries, that cards has been shown to facilitate the design process and enhance creativity, allowing designers to generate more innovative concepts.

In comparison to other options, this idea adheres the most to the design guidelines. Compared to an ideation randomiser or a campaign for consumers, it would be the most effective in stimulating sustainability-centred thinking among users and is likely to spark more creativity.

This is because it opens up users' minds in various ways and boosts their creativity, thereby providing flexibility in different types of ideation sessions. Additionally, it provides clear steps to generate sustainable ideas.

Moreover, a card deck is portable, encourages conversation and has the potential to inspire more people. Furthermore, it gamifies the ideation experience, making the session enjoyable and sparking creativity in the participants.

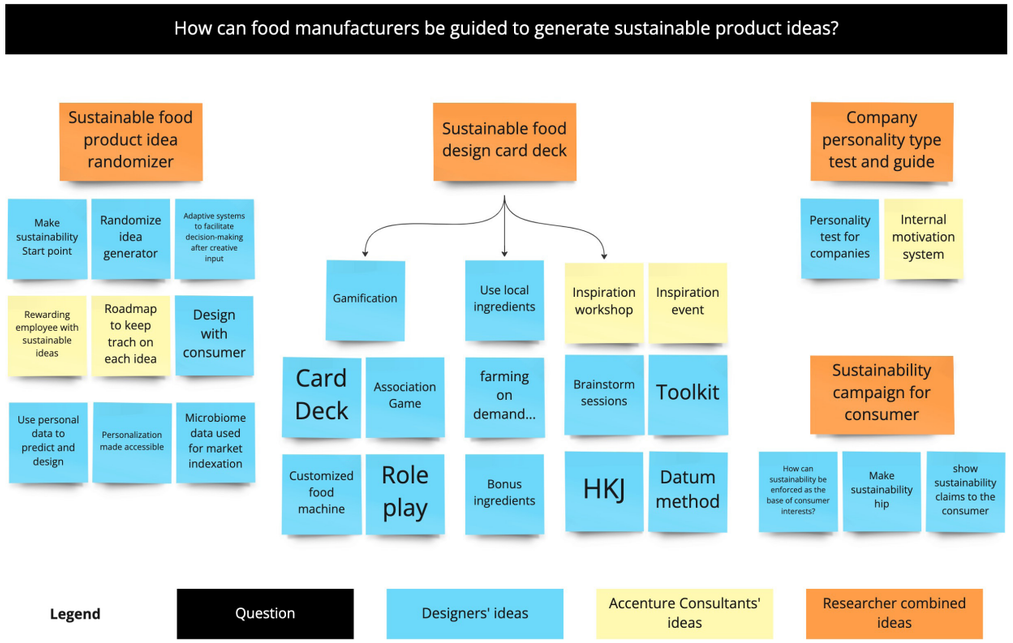


Figure 5.2 product ideas for the sustainability ideation guide

Paragraph 5.3

Concepting of the sustainable food product ideation guide

The centre of this card deck is the inspiration for sustainable solutions. "Companies address sustainability issues more effectively when they design their sustainability organisations to focus on each sustainability topic the company is prioritising instead of design for sustainability in general" (Mckinsey, 2021). Therefore, further research needs to be done about what sustainable topics and solutions can be done within the food manufacturing industry for each step of the product development process, which is influenced by product design. Eventually, they are converted into a cards deck with a keyword as a title, a few questions to spark conversation, and on the backside with related Accenture capability or older projects to give the readers an indication of what is possible.

A typical product life cycle
After comparing the typical product life cycles of Meyer et al.(2020), Bong et al. (2020) and Flanigan, L.K. (2013), a typical product life cycle for the card deck is formed. There are five steps taken into account: sourcing, process, packaging, retailing and consuming.

Current sustainability measures of each step
For each step, various sustainability measures are found by literature research which food manufacturers could take to improve their greenhouse gas emissions (see figure 5.3 for an overview of found sustainability measures).

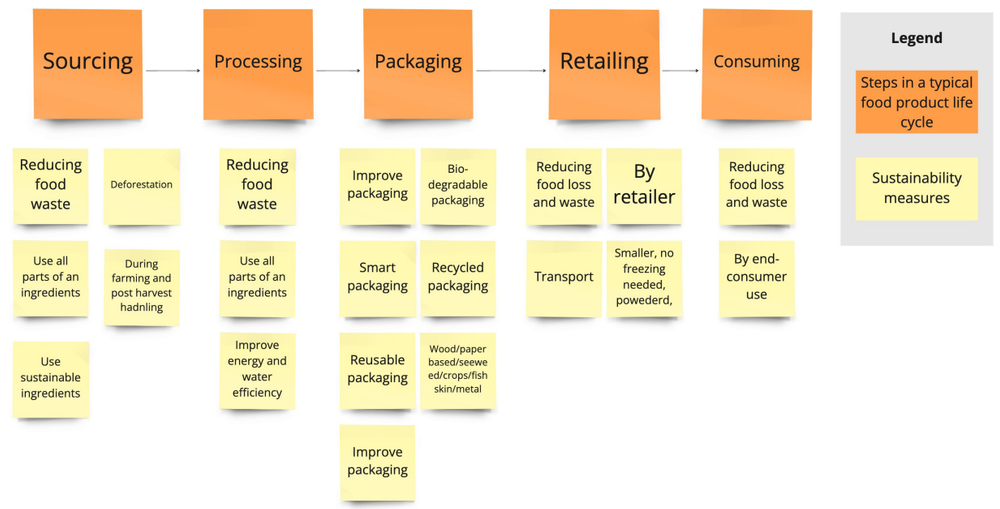


Figure 5.3 overview of found sustainability measures

Applying the Circularity Deck

The circularity deck is a tool to analyse, ideate and develop circular innovation ecosystems (Konietzko, J. et al., 2020). The researcher applies the Circularity Deck to the five steps to generate more ideas on how to make a food product more sustainable (see figure 5.4 for a picture of the process of applying the Circularity Deck).

Convert all measures into an overview

After the idea generation, all the measures were clustered, and the clusters were given names.

To ensure that the inspirations are also future-orientated, future context research results are added (see figure 5.5: an impression of sustainability measures overview with future context factors). The clusters are pink and the future context are in purple.

While clustering, it is found that many new technologies also help food manufacturers in new ways across the steps. Such as lab-grown ingredients or 3D-printed food, and they are clustered under new technologies.

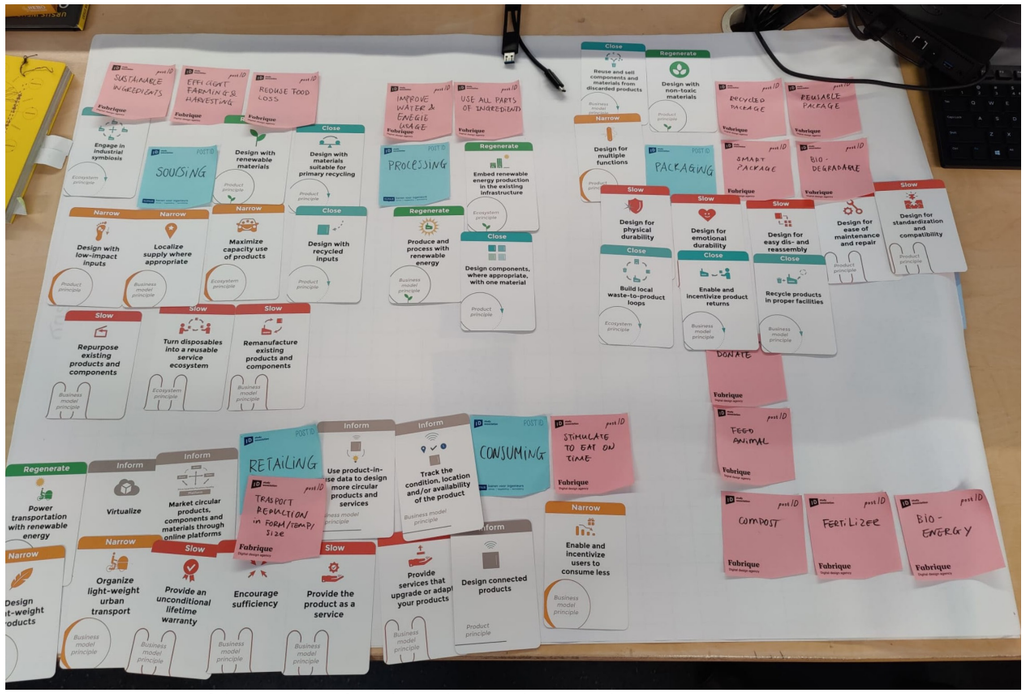


Figure 5.4 A picture of the process of applying the Circularity Deck

Scope of influence of food product design

Naturally, there are also measures that are not applicable to the food product design cycle, such as using renewable energy in a factory or types of vehicles for transportation. These fall outside the scope of influence of food product design. The type of energy source used by another company or the types of cooling system used by a supermarket, also falls outside of the power of the food manufacturing company.

These are excluded from the inspiration deck. Only measures within the scope of influence of food product design within the food manufacturing company, such as the ingredients of a product, the form in which this product is made, its packaging, and how it is used, are selected for the sustainability inspiration deck (see figure 5.6 for an overview of sustainability measures for food product design per step).

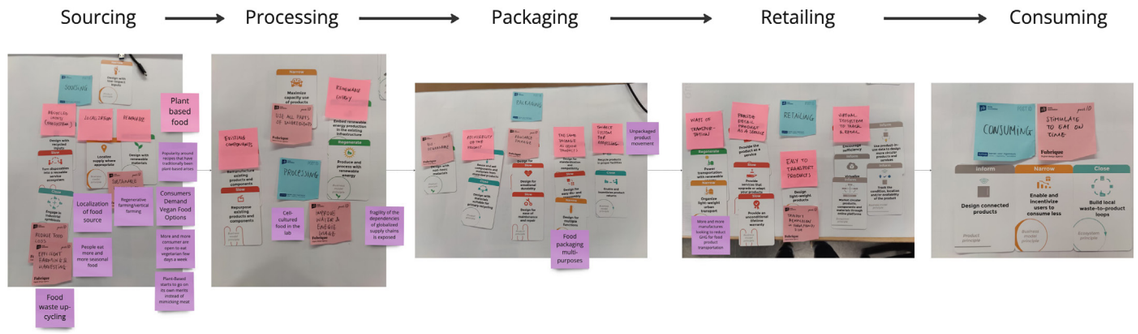


Figure 5.5 An impression of sustainability measures overview with future context factors

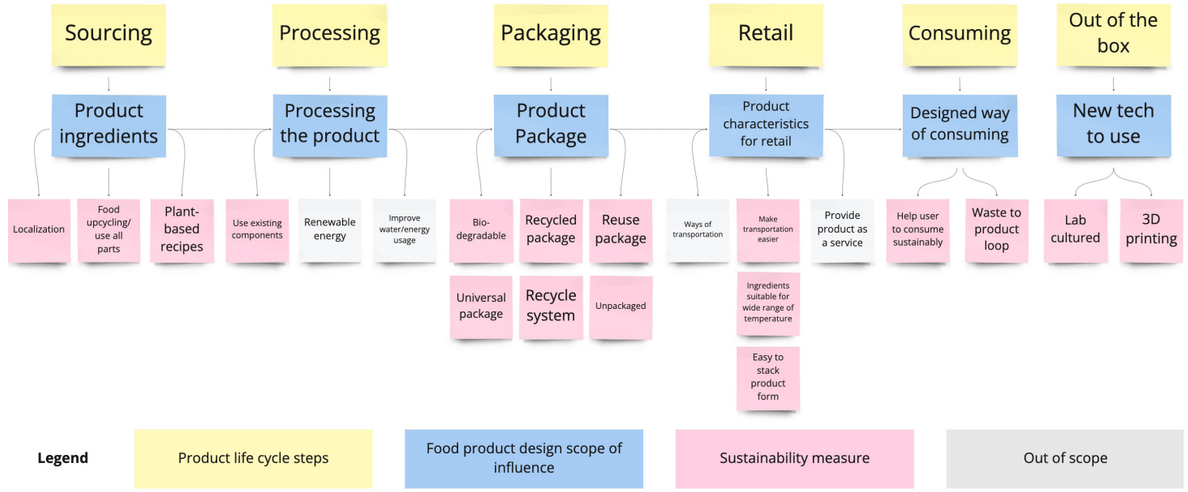


Figure 5.6 Overview of sustainability measures for food product design per step

The question at hand is how to create a card deck that incorporates various sustainability measures and is helpful for both food manufacturing product development teams and Accenture consultants. The researcher examined several design guides for inspiration, results from brainstorming sessions as well as drawing upon the researcher's own expertise. After multiple iterations, the decision was made to structure the ideation guide into four distinct steps (see appendix C for various iterations). The first step aims to stimulate user creativity, followed by a step that defines the problem and establishes a clear goal. The third step is dedicated to idea generation, where the core of the ideation guide is employed. Once ideas have been generated, the next step involves narrowing them down, with users selecting ideas based on their perceived value and ending up with questions about the sustainable concept. These questions can be divided amongst the team, leading to clear action plans for testing the feasibility, desirability, and viability of the idea.

Paragraph 5.4

Key takeaways

During the design phase of this project, the following activities were carried out. Firstly, a brief brainstorming session was conducted with five designers to generate initial ideas. Following this, three Accenture consultants provided additional ideas to fill any gaps. Subsequently, the researcher generated more detailed ideas based on the two sessions. Whereafter, the ideas were selected, combined and adjusted in accordance with the design guidelines. The ideas were: sustainable food product idea randomiser, sustainable food design car deck, company personality type test with guides and sustainability campaign for consumers. The sustainable food design guide in the form of a card deck fits the most with the design guidelines introduced in the previous chapter.

The core of the concept is the sustainability inspiration cards, which demonstrate the sustainability measures that food manufacturers could adopt while developing a new product. These measures fall within the scope of influence of product development, including sourcing, processing, packaging, product characteristics for retail and the intended way of consumption.

This concept was then developed further into four steps: Creativity Booster, Problem Definition, Break Free with Ideas and Narrow Down.

06

THE SUSTAINABLE FOOD PRODUCT IDEATION GUIDE

In this chapter, the sustainable food product ideation guide is introduced. The content of the guide is presented in paragraph 6.2. An example scenario of usage is explained in paragraph 6.3.

Paragraph overview

Paragraph 6.1

Introduction to the sustainable food product ideation guide

The sustainable food product ideation guide is designed to assist food manufacturers in creatively developing sustainable food products. It comes in the form of a card deck and is structured but also adaptable. This report focused on the physical version of the ideation guide. However, the ideation guide can simply be transformed into a miro board for online ideation sessions (see paragraph 7.5.2 for the digital version of the ideation guide on miro).

For whom is the sustainable food product ideation guide

This sustainable food product ideation guide is designed to assist food manufacturers in developing more environmentally sustainable products. Their employees participating in the idea-generation process are the main users. However, because the organisational structure of different companies varies, the participants are but are not limited to, employees from departments of R&D, marketing, project management, product category management, lab, or innovation managers. The number of participants required for each activity is indicated on each card, allowing for adaptation to the size of the team.

Working together with Accenture consultants and introducing the ideation guide, a contact point within the company is required. Ideally, the company should have a sustainability officer who has the most knowledge of the organisation's current and future sustainability goals and metrics. If a sustainability officer is not appointed, the innovation manager or the R&D manage can take on this role. This person can serve as an ambassador for sustainable design thinking and initiate sustainability ideation activities with Accenture. For the Accenture consultants to use this ideation guide, of course, there should be a manual for them to follow. The manual consists of the preparations prior to the session, the explanations of all the cards, and how to end the session (see appendix D for the text for the manual and see paragraph 6.3 for the example execution).

The general goal of the sustainable food product ideation guide

The overarching objective of the Creative Green Kitchen Guide is to facilitate the generation of sustainable product ideas by providing a structured and adaptable ideation guide to its users. The guide is designed to encourage users to think creatively and frequently about sustainability throughout the entire food product development process, even if it involves simply considering how to recycle a single component. By consistently integrating these sustainable principles, users can foster a shift in their mindset towards greater sustainability awareness.

Concretely, after thinking about sustainability at every step of the ideation session, the users will end up with a list of sustainable product ideas, along with any assumptions or implementation-related queries associated with these ideas. The users can then discuss these assumptions and questions with their colleagues after the session to explore potential solutions or next steps for product development.

The general value of the sustainable food product ideation guide

The Sustainable Food Product Ideation Guide provides value to its users by facilitating the generation of sustainable product ideas while also stimulating creativity. It offers the flexibility to conduct ideation activities at any time, with any number of participants and can be tailored to specific needs due to its modular design. The guide also encourages a shift in mindset, serving as a sustainability exercise that ultimately leads to increased awareness and thoughtfulness around sustainable principles. This is especially valuable for those with a "wait and see" attitude towards sustainability, as it can help to motivate and inspire them to consider sustainability throughout every stage of the product development process. Additionally, the structured approach provided by the tool enables product development teams to take concrete steps towards the creation of sustainable food products. The end result is a list of well-defined questions that can be researched to support the development of sustainable food products.

When do you use the sustainable food product ideation guide

Looking at a typical R&D process, this guide should be implemented during the ideation phase (See marked in figure 6.1). This guide should be used when new food product ideas need to be generated. For instance, when consumer needs, market trends or regulations are changed, the R&D manager or innovation manager of a food manufacturer can use the guide to generate sustainable product ideas to accommodate those changes. The end product of the sessions is a list of assumptions or questions which need to be answered if they were to develop certain sustainable products. With these specific questions, the R&D, marketing and finance departments will be able to further research and thus ensure the technical feasibility, consumer desirability and financial viability so that the sustainable product ideas will have more 'chances of survival' and be launched to the market.

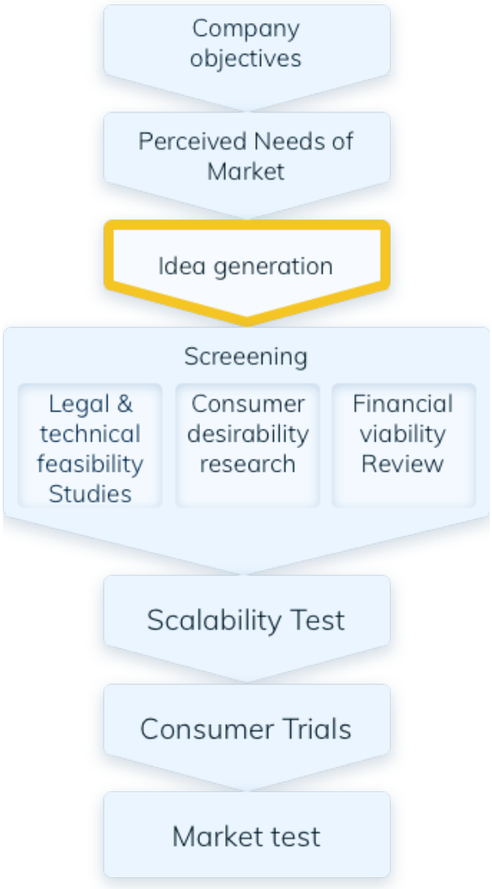


Figure 6.1 Place for the ideation guide within the R&D process

Paragraph 6.2

Content of the sustainable food product ideation guide

The sustainable food product ideation guide is a structured tool in the form of a card deck that facilitates the creative generation of sustainable food product ideas by food manufacturers. The 14 sustainability inspiration cards serve as the deck's core, providing examples of possible sustainability measures within the food product development process.

The deck comprises four steps (see figure 6.2 for the overview per step), namely the 'Creative Booster', 'Problem Definition', 'Break Free with Ideas', and 'Narrow Down' step. For the complete card set, see appendix E.

The 14 sustainability inspiration cards fall under the 'Break Free with Ideas' step. Next to this, each step includes an explanation card and five activity cards. The explanation card outlines the objectives and steps required for the respective step, while the activity cards offer various tasks that users can choose from to stimulate idea generation. During the 'Break Free with Ideas' step, users receive the core sustainability inspiration cards and use them in combination with the activity cards to trigger ideas for sustainable solutions.

To effectively and creatively generate sustainable food product ideas, the 'Break Free with Ideas' step is assisted by the other three steps.

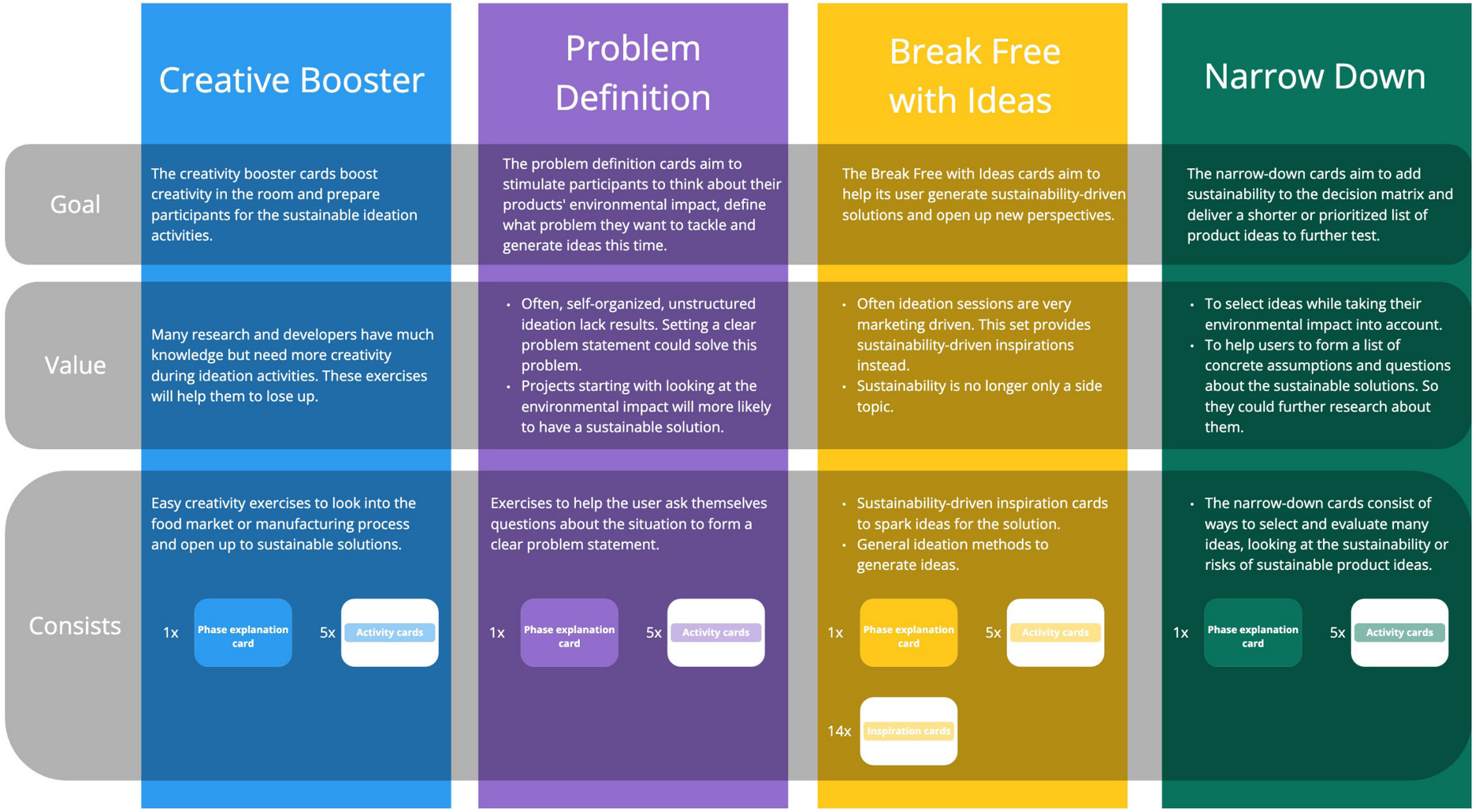


Figure 6.2 The four steps of the sustainable food product ideation guide

Step 1 Creativity Booster

The first step, the 'Creativity Booster', is designed to prepare the users for the ideation activity and to get them into a creative mindset by providing a variety of sustainability or food design-related exercises. Especially for researchers, developers or other participants who are very expert in their area but need more creativity to utilise them during the ideation phase and think mainly about limitations, these step cards will help loosen them up. The cards consist of the following activities: 'Shop visit', 'Up-scaled cooking', 'Throw throw trash', 'Repurposed Product' and 'Complete the drawing'. See figure 6.3 for an example card Creativity Booster- 'repurposed product. '

Step 2 Problem Definition

The second step, the 'Problem Definition', involves defining the problem that needs to be addressed. Users are asked to look at the environmental impact of their products and select one problem to examine more closely. The problem definition step consists of the 'problem definition step card', 'Desirable future', 'The WWWWWH' (Heijne & Van Der Meer, 2019), 'Journey Mapping' (Abbing, 2017), 'Problem definition (Roozenburg & Eekels, 1995)', and 'Sustainable product modelling' (Bocken et al., 2013). See figure 6.4 for an example card of Problem Definition - 'Desirable future'.

Step 3 Break Free with Ideas

The 'Break Free with Ideas' step is designed to stimulate users' creativity and generate sustainability-driven solutions. This step involves two types of cards: general ideation method cards and sustainability inspiration cards. Before starting, the basic rule of ideation is introduced:

No judgements. All ideas are good ideas.
Build up on each other's ideas.
Feel free to jump between ideas.
Generate as many ideas as possible.

Users first generate ideas with one selected general ideation card. After that, combine this card with the sustainability inspiration cards. By combining the ideation method cards and sustainability inspiration cards, participants can generate many sustainable product ideas. This step is aimed at opening up new perspectives, generating as many ideas as possible, and stimulating creative thinking to generate sustainability-driven solutions.

The general ideation activity cards include 'mind drawing' (Roozenburg & Eekels, 1995), 'Role-play', 'How to..?' (Heijne & Van Der Meer, 2019), 'SCAMPER" (Eberle, 1972), and 'think positively'. See figure 6.5 for an example card of Break Free with Ideas Activity cards - 'How to..?'.

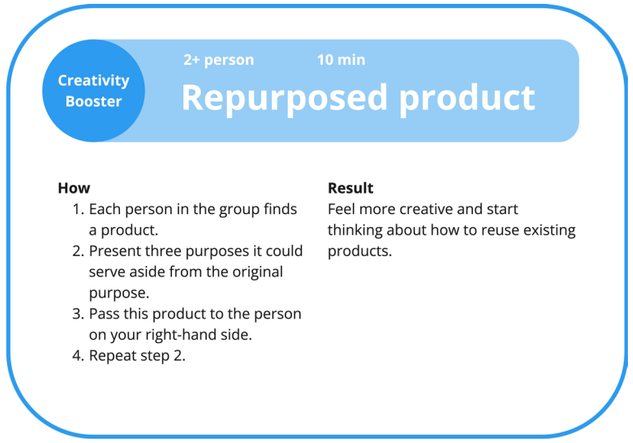


Figure 6.3 Example card Creativity Booster- 'repurposed product. '

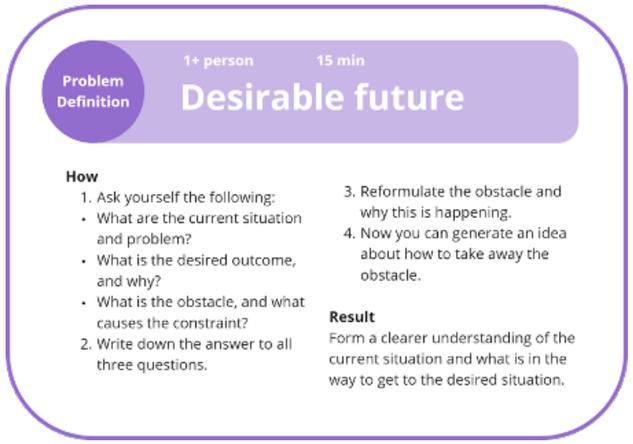


Figure 6.4 Example card of Problem Definition - 'Desirable future

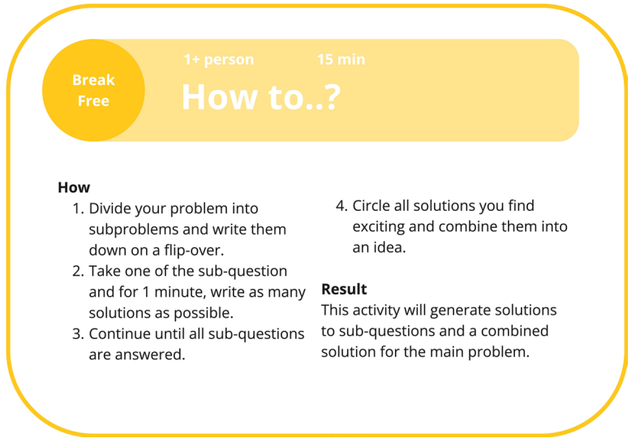


Figure 6.5 Example card Break Free with Ideas Activity cards - 'How to..?'.

The sustainability inspiration cards provide a range of ideas on how to tackle a problem sustainably across the product's entire environmental influence, from sourcing to consuming.
The cards guide users' thinking towards sustainable solutions and help them to approach the problem in a more effective way. The sustainability inspiration cards include 'Reduce food loss', 'Localization', 'Plant-based ingredients', 'Cut lines short', 'Existing Component', 'Reusable component', 'Bio-degradable', 'Recycle system', 'unpackaged', 'Universal component', 'Easier to take more', 'Easier to keep', 'Consumer behaviour', and 'New tech'. See figure 6.6 for an example card of Break Free with Ideas, Sustainabilitynspiration cards - 'Easier to keep'.

The sustainability inspiration cards do not indicate for which step of the product life cycle they are meant, as one measure could be used for multiple steps. This stimulates users to think creatively about which card to use for each situation. Example questions are included on each card to guide users' ideation thoughts, and examples of sustainable solutions could be added to the other side of the cards. Ideally, well-executed examples of sustainable solutions from Accenture could be included, which would help promote the sales of sustainability projects at Accenture. For legal reasons, the exact project which is allowed to be put on the back needs to be further discussed with Accenture and its clients.

Step 4 Narrow Down
Lastly, after generating a lot of ideas, the question is, of course: what to do with them? The 'Narrow Donw' step requires users to evaluate the value and environmental impact of each idea. They will either end up with 1) a short list of promising sustainable product ideas to further research or 2) a list of assumptions and questions about a promising sustainable idea to discuss across departments.

This step consists of cards with evaluation and selection methods: 'Eco Value Matrix' (Vogtländer, 2010), 'Compare method' (Pugh, 1981), 'Harris Profile' (Harris, 1961), 'Worst Case Scenario' and 'A look into the future'. See figure 6.7 for an example card of Narrow Down - 'Compare method'.

After the ideation, the innovation, R&D or product manager can discuss with the team and assign responsibilities for further research into the promising sustainable product ideas and to validate the assumptions made during the ideation session.

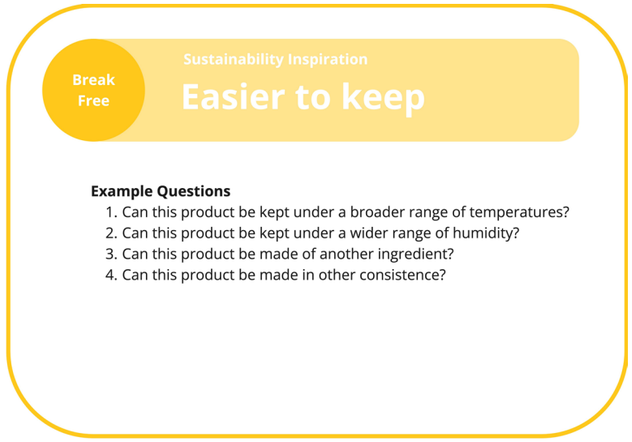


Figure 6.6 Break Free with Ideas, Sustainabilitynspiration cards - 'Easier to keep'

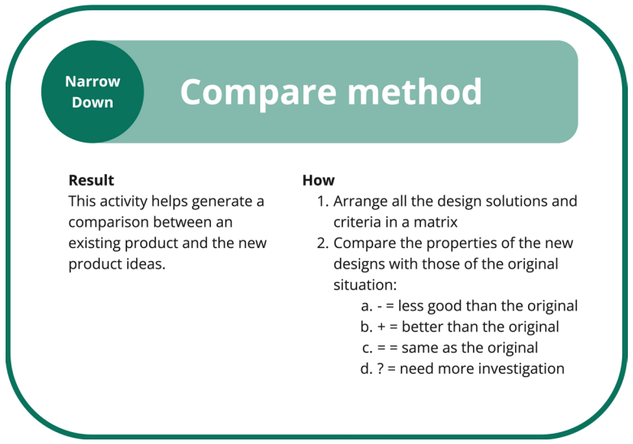


Figure 6.7 Narrow Down - 'Compare method'

Paragraph 6.3

Use scenario of the sustainable food product ideation guide

To demonstrate the working of the sustainable food product ideation guide, a use scenario is presented in this paragraph.

The starting point
An example fictive food manufacturer makes various food products. One of them is ice cream. Their product manager of ice cream noticed in their product life-cycle system that the greenhouse gas emission of their ice cream is quite high. And more than 60% of it comes from retail (see figure 6.8for example ice cream PLC report table). This is because the ice cream stays for a long time in the cooling unit before it is sold. And this is very energy inefficient. She can not change the way how supermarket or transport companies operates. Therefore, she wants to find a solution within the scope of her own company to lower this number.

Preparation
So, this product manager came to Accenture for help. The Accenture consultant has workshop facilitation skills and reads through the manual of the sustainable food product ideation guide. He brought the card deck of the sustainable food product ideation guide with him. The manual provided steps for the consultant to prepare for the ideation session. In collaboration with the product manager, cards were selected for each step, and the R&D and marketing team was gathered for the ideation session. Participants were given post-it notes and markers, and everyone stood around a table with a stack of flip-over papers. Then the ideation session starts.

Ice Cream			Sales vs 2010	9% ↑	Volume in cu									
	pcu	Δ vs 2010	Raw Materials	Δ	Manufacturing	Δ	Transport & Retail	Δ	Consumer Use	Δ	Disposal	Δ
GHG	252.14	-4% ↓	79.10	-5% ↓	10.14	-43% ↓	158.12	0% ↑	1.55	-14% ↓	3.23	3% ↑
Waste	4.37	-3% ↓	3.62	1% ↑					0.75	-16% ↓		

Figure 6.8 Example ice cream PLC report table (source classified)

Figure 6.9 The four steps of the sustainable food product ideation guide

Step 1 Creativity Booster
The creative booster cards aim to spark the users' creativity by providing a variety of sustainability or food design-related exercises. In this situation, the card 'repurposed product' is chosen. The Accenture consultant follows the manual and introduces everyone to today's programme and the first activity card. Each person in the group found one object in the room. They each write down three new purposes for this product, which are not its original use. After everyone is finished, Each team member presents their new ideas. Then the product gets passed to the next person and this person has to someone with more ideas which were not yet mentioned. As a result, the imaginations of users are stimulated, users who do not know each other have got the chance to listen to how the other person thinks and everyone got the chance to speak. Last but not least, users are exercising sustainable thinking, which will be useful for the next steps.

Step 2 Problem Definition
Before starting the session, everyone of course already has an abstract idea of what the problem could be and possible directions of solution. Step two aims to set a clear and common understanding of the to-be-solved problem. On a piece of the flip-over paper, the Accenture consultant wrote three things: the Current situation, the Desired situation and the Obstacle. In this example, the current problem is that the ice cream these food manufacturers make has a high greenhouse gas emission due to its condition waiting to be sold. The team will use their post-it to write down their own ideas. The desired situation could be: if the retailer keeps the ice cream as short as possible or if the ice cream does not need to be stored in the fridge. See figure 6.10, for example working sheet of desirable future. The team then chooses one of the obstacles to entering the next step to generate ideas.

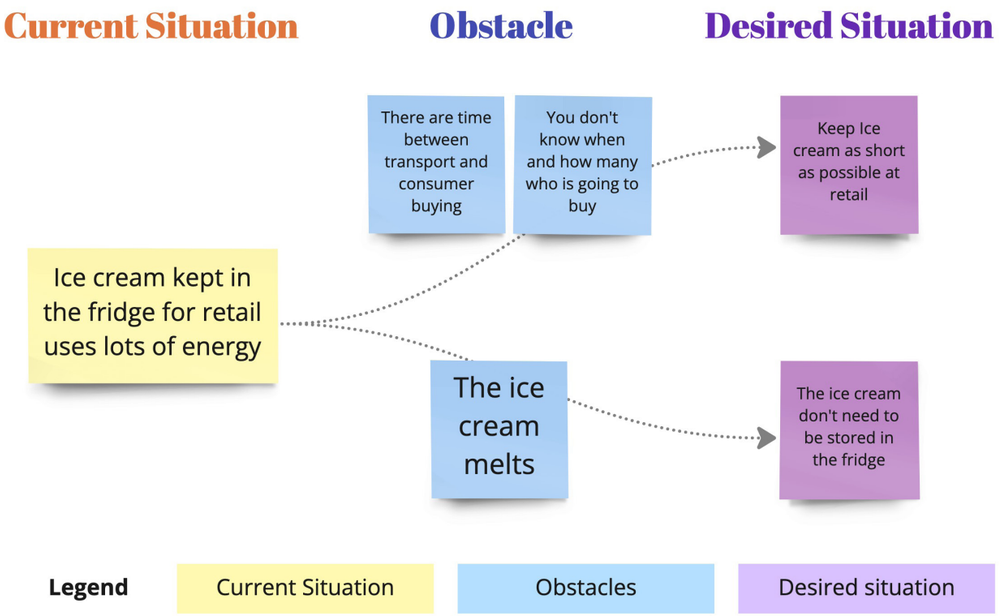


Figure 6.10 Example working sheet of desirable future

Step 3 Break Free with Ideas
First, following the manual, the Accenture consultant will introduce the users to the basic rules of ideation.

Then he lets everyone write down the first ideas they have in their mind for 2 minutes. The general ideation card used here as an example is the 'How to..?' card. The team have to write down 'How to prevent/stop/limit..' in front of the found obstacle from the previous step. So they wrote down: 'How to prevent the ice cream from melting?' onto the flip-over. Some users looked at the sustainability inspiration cards. Such as the 'Easier to keep' cards. And asks questions like "Can we make the ice cream with other ingredients?" or "Can we make the ice cream in another consistency?". After writing down a lot of different ideas, the group discusses the post-its and combines them into a few idea directions. See figure 6.11 for example worksheet 'how to prevent the ice cream from melting?'.

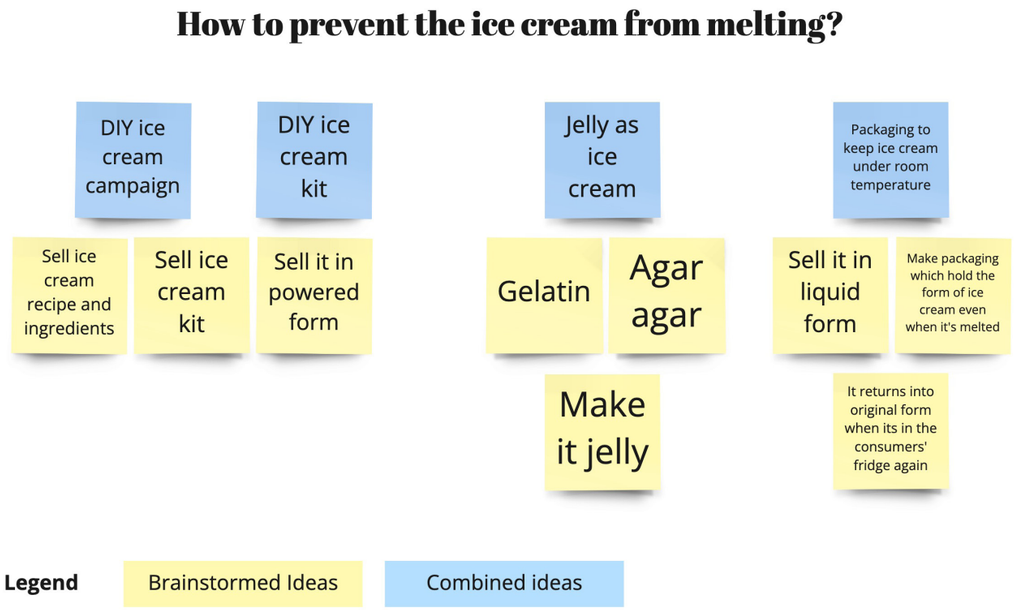


Figure 6.11 Example working sheet of 'How to..?'

Step 4 Narrow down
First, the team need to decide what their criteria should be to evaluate the ideas. The manual has a list of example criteria: environmental impact, regulatory and compliance, consumer desirability, financial viability, technical feasibility, fitting with vision and strategy and brand image. The team choose a few from the list and dives into the last activity card, 'Compare Method'. With the team, it is evaluated how each idea does compare to the original idea. If an idea is supposed to do better than the original idea, it gets a '+'. If it is the same, the to-be-evaluated idea gets a '='. And if it is unclear, then a '?' will be filled in. The team speaks from their own expertise. Yet a lot of assumptions were made, and questions were raised. See figure 6.12 for an example of the compare method.

Therefore, the session ends with the product manager dividing tasks to check those assumptions and questions. For example, It is unclear if consumers would like a DIY ice cream kit. So, marketing needs to check that. And it is unclear if it is possible to keep the good taste and remain the same quality for the ice creams to be DIYed. So, R&D need to check that.

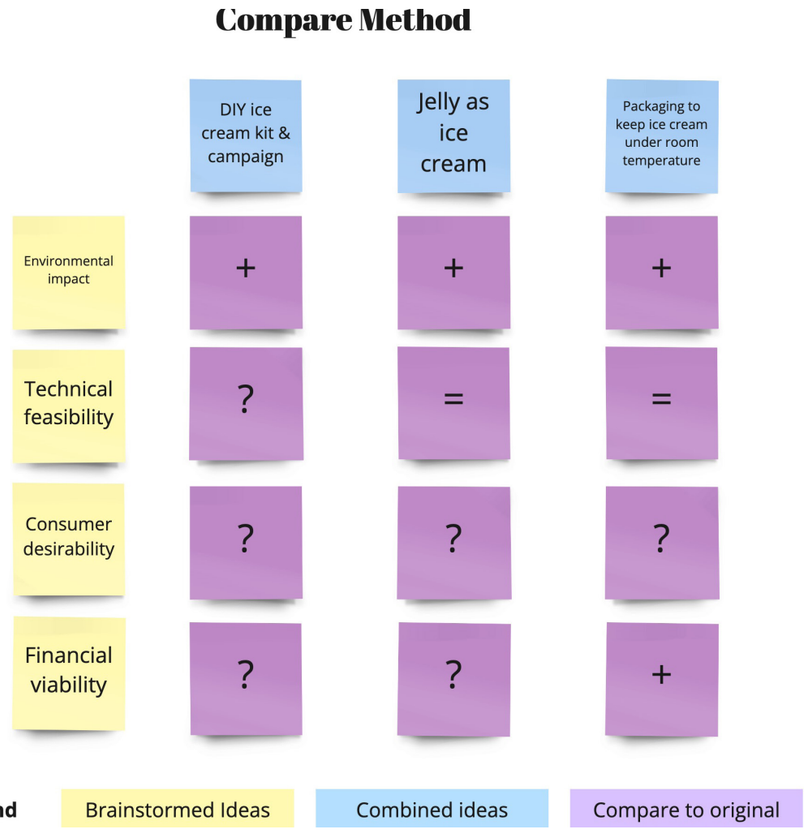


Figure 6.12 Example working sheet of 'Compare Method'

Paragraph 6.4

Key takeaways

The sustainable food product ideation guide is designed for Accenture consultants to assist food manufacturers in creatively developing sustainable food products. The guide should be implemented during the ideation phase of a typical R&D process for food manufacturing employees of new product development. The guide encourages users to think creatively and frequently about sustainability throughout the entire food product development process. The guide provides value by stimulating creativity, serving as a sustainability exercise, and enabling product development teams to take concrete steps towards the creation of sustainable food products.

The guide is structured in the form of a card deck that comprises four steps: Creativity Booster, Problem Definition, Break Free with Ideas, and Narrow Down. Each step consists of one explanation card and five activity cards. The Break Free with Idea step consists of fourteen more cards than the other steps, these are the sustainability inspiration cards, as the core of the ideation guide.

The 'Creativity Booster' step is designed to prepare the users for the ideation activity and to get them into a creative mindset by providing a variety of sustainability or food design-related exercises. The 'Problem Definition' step aims to set a clear and common understanding of the problem to be solved. The 'Break Free with Ideas' step involves general ideation activity cards and sustainability inspiration cards. The sustainability inspiration cards provide a range of possible measures on how to tackle a problem sustainably across the product's entire environmental influence. The 'Narrow Down' step requires users to evaluate the value and environmental impact of each idea and end up with a list of assumptions and questions about a promising sustainable idea to concretely further discuss across departments.

Last but not least, an example scenario is described in chapter 6.3.

07

REFINE THE SUSTAINABLE FOOD PRODUCT IDEATION GUIDE

This chapter outlines a series of usability review sessions conducted to evaluate the effectiveness of the sustainable food product ideation guide. The initial pilot test was conducted to assess the first impression of the card deck, allowing the researcher to refine the setup of subsequent review sessions. The subsequent review sessions included a session with designers, aimed at evaluating the clarity, readability, completeness, and logical flow of the guide's methods. A session with Accenture consultants was then conducted to gather feedback on how the guide could be further improved to meet the specific needs of food manufacturing projects. Finally, three Accenture experts reviewed the guide to determine whether it could indeed provide the anticipated value as envisioned by the researcher.

Paragraph overview

Paragraph 7.1

Pilot review session

Before bringing the card deck to a collaborative session, the complete card deck was shown to an agriculture engineer. During this 45 minutes qualitative review session. The participant is 1) asked whether he has an idea what to do with the cards if he sees them and 2), in general, whether he finds the cards logical and readable.

Result from Pilot test

As a result, the comments were made:
- It was unclear where to start.
- It was unclear if all cards needed to be read.
- It was unclear if everyone would get one complete set of cards if they participated in a creative session.
- Some of the terminologies used could mean several things.

Conclusion pilot test

Next to the existing explanation card of each step. There should be instructions for users on how to use the cards: where the participants should start, which cards do you read and not read, an overview of the whole set, a terminology list and also use more words that are easier to understand. Therefore, for the next sessions, the researcher will describe where to start with the cards and give an overview of the different steps.

Paragraph 7.2

Designers review session

Four designers participated in this session: one strategic designer, one interaction designer, one integrated product designer and one mechanical engineering designer. The researcher used a beamer for the presentation, and she used flip-overs, markers and post-it to collect feedback. Within this two-hour session, the participant reviewed the readability, clarity, completeness and logic of the card deck. First, the researcher gave a short presentation about the card deck. Then an example problem is presented (See figure 7.1 for an example LCA as the case problem). This is a product lifecycle assessment overview of ice cream of a possible targeted client food manufacturer.
It shows that more than 60% of the greenhouse gas emission of this product results from transport and retail, mainly because ice cream needs to be kept cool during this process. With this problem in mind, the designers go through the four steps one by one. The participants first read through the card decks. Then they practice one of the activities. Eventually, they give comments on the cards' readability, clarity, completeness and logic. See figure 7.2 for a picture of the card deck test session with designers.

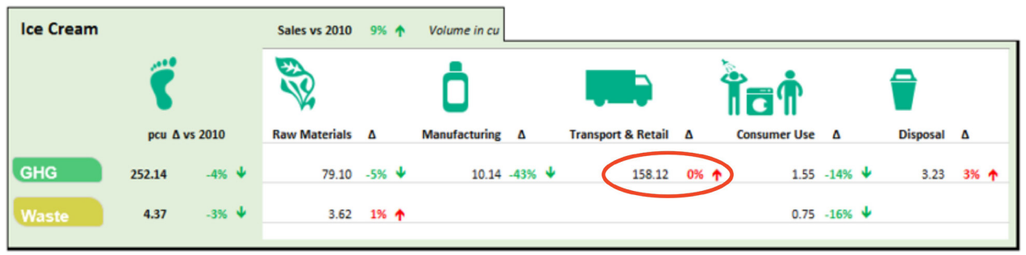


Figure 7.1 Example problem for the card deck test session

Figure 7.2 A picture of the card deck test session with designers

Results of the designers review session

1. Some of the cards have too much text.
2. It took a very long to read through all the cards.
3. There were too many choices.
4. What if people always go for the same method of cards?
5. Results are now at the end of the cards, it takes longer to realise what a card does.
6. There were both British and American English used in the descriptions.
7. The sustainability inspiration cards and the method cards of the break free with idea step look very similar.
8. Some of the cards have too many design terminologies, such as SCAMPER, datum etc.
9. For many activities, it is good to have a visual or example of the result.

Improvements according to the designer review session result

The duration of the steps needs to be shortened. This is achievable on several aspects:

1. the length of the description on the card decks,
2. the order of the text (put result first, rather than last),
3. a classification of cards, for example, by identifying them into different difficulty categories. Then the cards can be e

To make the card deck more user-friendly, the next improvement should be implemented.

4. The language of the card deck needs to be unified and changed to British English.
5. The layout of sustainability inspiration cards needs to be adjusted. So it visually separates itself from the ideation method cards.
6. Add visuals to assist the descriptions of the method cards.

To improve the readability of the card deck, the following two improvements should be implemented.

7. Terminologies which are unnecessary to remain in the card deck need to be replaced by words which are understandable by the general public within the food manufacturing industry.
8. Terminologies which are necessary to remain in the card deck need to be added to a wordlist in the manual. So the user could look them up when needed.

Paragraph 7.3

Accenture consultants review session

An one-hour test session with Accenture consultants is held for the usability test of the card deck. This simulates a multidisciplinary team with a facilitator. Four Accenture employees participated in this session, one of them has over 10 years of experience with food manufacturing product life cycle management systems, one of them is a consultant within the food of the future group of Accenture, and one of them has a background in strategic product design and the other in interaction design.

The researcher used a beamer for the presentation, a table to put a flip-over, several post-its and markers for participants to write down comments.

First, the researcher explained the design goal of the product and gave a short presentation about the product. Then the same example problem from the previous designer test session is also shared with the Accenture consultants.

This session simulates a session prepared by Accenture consultants for food manufacturing client teams. One method card is preselected for each of the steps. For the creativity booster step, next to teasing their brain about sustainability measures, and interacting with each other, they also used post-it and markers.

After the creativity booster step, the participants are asked to gather around a table with a stack of flip-overs (see figure 7.3 for a picture from the test session with Accenture consultants). On these plip-overs, the next three steps: Problem Definition, Break Free with Ideas and Narrow Down were conducted.

After trying out the different steps, the consultants filled in a Mentimeter with five questions. Participants are allowed to send in as many answers as they would like.

1. What effect did the creative booster activity have on you?
2. What effect did the creative booster activity have on the team dynamic?
3. What kind of project could you use a variant of this tool?
4. In what situation would this tool be helpful?
5. Other remarks or advice?

Result of test session with Accenture consultants

For the question: 'what effect did the creative booster activity have on you?' the following answers were given.

- Energising or warming up is mentioned three times.
- Inspiring, out-of-the-box or creative thinking is mentioned eight times.
- Interaction with other team members is mentioned two times.

With the question: 'what effect did the creative booster activity have on the team dynamic?' the following answers were given.

- Getting to know each other's way of thinking and having an equal chance to speak is mentioned six times.
- Broaden, inspire or train your thinking is mentioned five times.
- Create laughter or energising is mentioned twice.

For the question: 'For what kind of project could you use a variant of this tool?' The Accenture consultants think they could use a variant of the card deck for product lifecycle management projects, Environmental, Social & Governance projects, co-creation projects with multiple stakeholders, or open-ended new concept projects.

For the question: 'In what situation would this tool be helpful?' The Accenture consultants think that the card deck could be helpful to alight or co-create with different stakeholders, to bring everyone together and closer, especially useful as a kick-off activity or as the basis of a new product development activity.

With the question 'is there any other remarks or advice?', the following answers were given:

- The consultants wish to have example routes to see in the manual.
- The consultants wish to see a total overview of how the method works.
- The consultants wish to have a playboard to put the chosen cards, for a better overview of the cards.

Conclusion of test session with Accenture consultants

On an individual level, the creativity booster cards warm up participants' brains and guide them to think about sustainable solutions. On a team level, the creativity booster cards encourage participants to listen and learn from each other, energise the group and stimulate interaction between participants. This makes it a good starting point for a sustainability-driven ideation session with a multidisciplinary team.

In general, this card deck can be used for product lifecycle management projects, Environmental, Social & Governance projects, co-creation projects with multiple stakeholders, or open-ended, new concept projects. The card deck helps align and co-create with different stakeholders, bringing everyone together and closer, especially useful as a kick-off activity or as base materials for a new product development workshop. Eventually, some of the consultants recommended adding example uses of the card decks to the manual and designing a playing board to provide even more overview during the session.

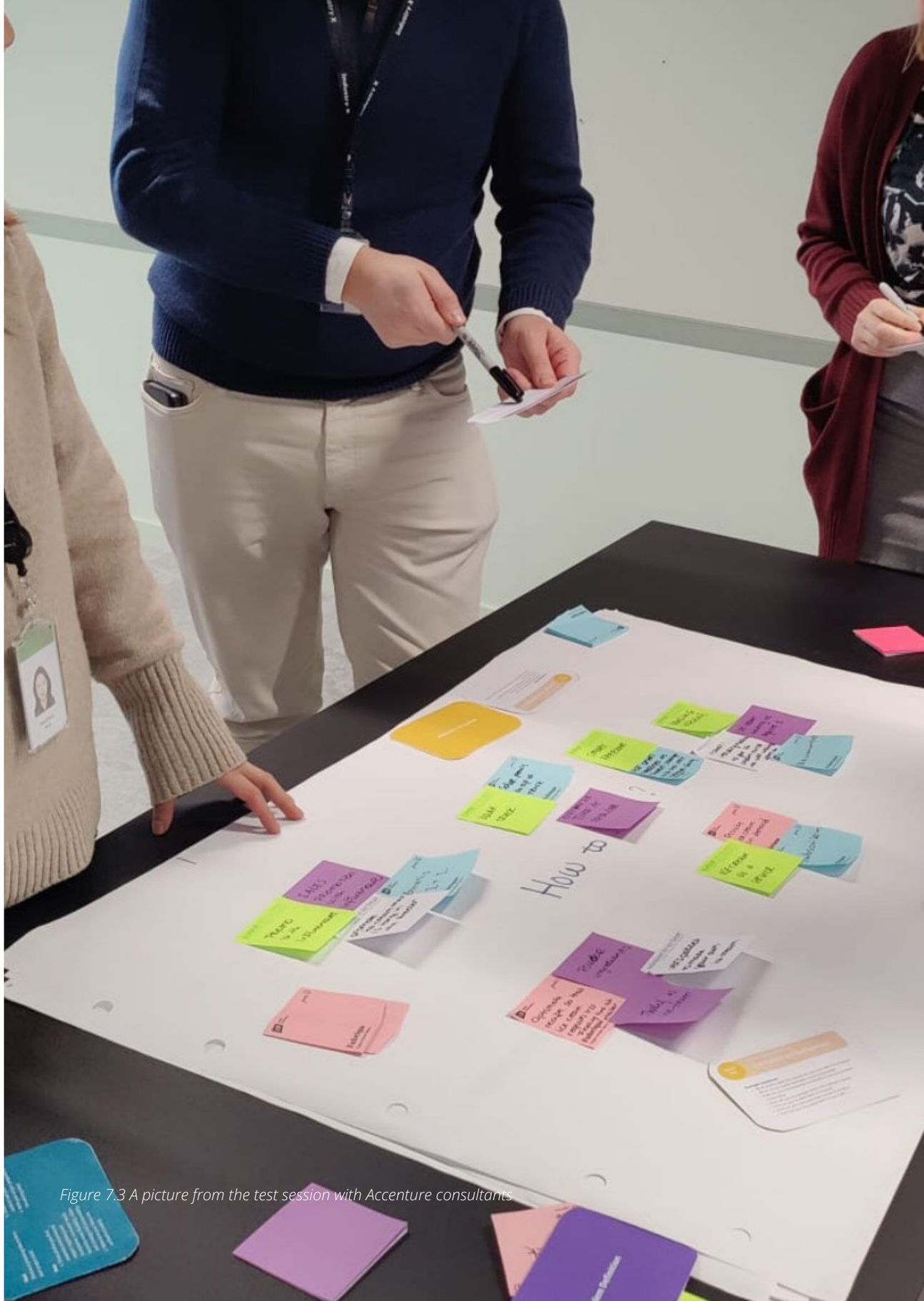


Figure 7.3 A picture from the test session with Accenture consultants

Paragraph 7.4

Accenture experts review sessions

Three individual review sessions were conducted with various experts from Accenture. The experts involved are the manager from the Accenture Inspiration Centre, the asset manager from Accenture food of the future offering and a sustainability expert from Accenture. They provided insightful feedback about the sustainable food product ideation guide. In this paragraph, the set-up and the result of these talks about the card deck are presented.

Review set-up with Accenture experts
First, the researcher gave a short introductory presentation to the project and the product. Then the expert gives his first impression and advice for the product.

Review results with Accenture experts
The experts agree that there should be examples of how each method could be used and advised that a QR code might solve the problem that the card decks are too crowded.

From their experiences, R&D usually think way too narrowly. Therefore, a tool guiding them to start broad and help them narrow down is desirable.

As for putting the example sustainable Accenture project on the back of the sustainability inspiration cards, it is possible. However, not every project is allowed to be published publicly. Some of the clients don't want anything about their project to be leaked, others are content as long as their brand names are not included, and some are very happy to be mentioned publically. So, the exact example projects to be included should be discussed later.

Conclusion of Card deck review with Accenture experts
The sustainable food product ideation tool is useful for the R&D department to generate new product ideas.
Examples of how each card could work should be added somewhere. And it is recommended to do further research about which example sustainable project of Accenture should be added to the sustainability inspiration cards.

Paragraph 7.5

Review conclusion and refined version

Paragraph 7.5.1

Advantages offered by the sustainable food product ideation guide

The sustainable food product ideation tool is useful for the R&D department to generate new product ideas.

Its applicability extends to product lifecycle management projects, Environmental, Social & Governance projects, co-creation projects with multiple stakeholders, or open-ended new concept projects within the food manufacturing industry. The tool can facilitate alignment and co-creation with different stakeholders, bringing everyone together and closer, and is especially useful as a kick-off activity or as a foundational component of a new product development workshop. Thus, the tool is efficiently positioned within a typical R&D process, during the ideation phase, specifically after identifying a problem, and before the various screening stages.

At an individual level, the creativity booster cards serve to prime participants' creative thinking and inspire them to consider sustainable solutions. On a team level, the cards encourage participants to listen and learn from one another, energising the group and stimulating interaction. This makes it an excellent starting point for a sustainability-driven ideation session with a multidisciplinary team.

Validated by the Accenture experts, R&D teams typically have a narrow focus during ideation activities. Therefore, a tool that guides them to broaden their thinking and subsequently narrow it down to concrete actions is desirable. The inclusion of sustainability considerations at each step can guide them to think about sustainable solutions. The sustainability inspiration cards can also trigger novel ideas during ideation activities. Finally, the ideation guide concludes with a list of concrete questions to be researched, which is also suitable for the working methods of R&D teams.

Paragraph 7.5.2

Improvements for the sustainable food product ideation guide

Terminologies and language

First, there are some changes made to the text of the card set (see figure 7.4 for example, improved activity card deck).

1. As noted by multiple interviewees, the language used on the cards contains very specific terminologies. Thus, the language has been revised to use more accessible wording. For instance, the “datum method” has been changed to the “compare method,” which is more descriptive and easier to understand.

2. The description language has also been simplified and converted to British English. Additionally, the length of the descriptions on the card decks has been reduced.

3. The text order has been revised so that the user first reads the result and then the method. This provides the user with a clearer understanding of what to expect.

4. The indication of the number of participants and session time has been removed, as the required time may vary depending on the group, and the tool will always be used by more than one person. Thus, the “+1 people” sign has been deemed unnecessary and removed.

Layout

The second improvement made was to the layout of the sustainability inspiration cards, as they were visually too similar to the ideation method cards. The layout has now been adjusted to create a clear visual separation between the two types of cards. See figure 7.5 for an example of the comparison between the old and new versions.

Digital prototype

A few reviewers expressed interest in the digital version of the ideation guide. Since people are working more and more remotely nowadays. Therefore, a digital prototype on miro is made. This will need to be further tested and iterated. In figure 7.6, the worksheet of the four steps can be found. And in figure 7.7, the digital version of all the cards can be found for the consultants to select and prepare for their digital ideation sessions.

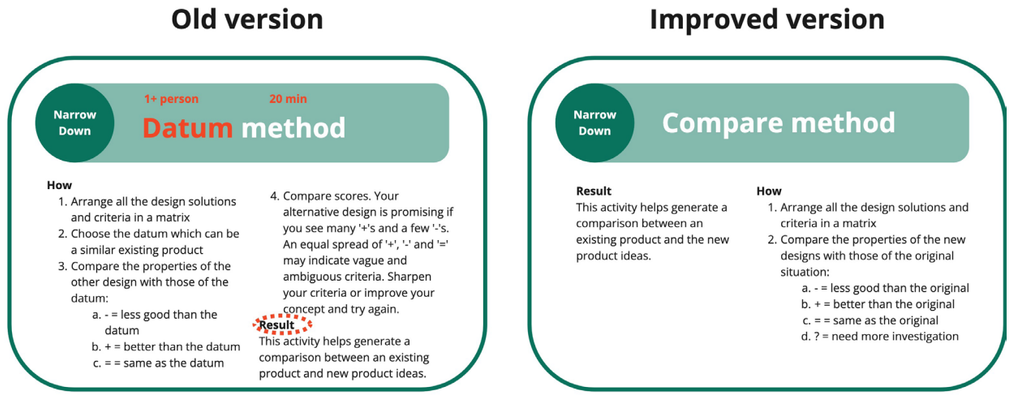


Figure 7.4 An example of the improved activity card deck

Figure 7.5 An example of an improved sustainability inspiration card.

Figure 7.6 Miro worksheet of the four steps of the sustainable food product ideation guide

Figure 7.7 Miro card deck of the sustainable food product ideation guide

Paragraph 7.6

Key takeaways

With one pilot review session, one designer's review session, one Accenture consultants review session and one Accenture experts review session have been conducted. According to the reviewers, the sustainable food product ideation guide offers several advantages.

First, it serves as a catalyst for creativity, providing inspiration for sustainable product ideas. On an individual level, the creativity booster cards warm up participants' brains and guide them to think about sustainable solutions. On a team level, the creativity booster cards encourage participants to listen and learn from each other, energise the group and stimulate interaction between participants. This makes it a good starting point for a sustainability-driven ideation session with a multidisciplinary team.

Additionally, it promotes a sustainability exercise by encouraging product development teams to think critically about the creation of sustainable food products.

Furthermore, the ideation guide enables product development teams to take concrete steps towards generating sustainable food product ideas. By presenting a structured process, the guide guides teams through the ideation phase, before moving on to various screening processes.

Overall, the sustainable food product ideation guide is a valuable tool for product development teams, providing a framework for ideation and promoting sustainability. In general, this card deck can be used for product lifecycle management projects, Environmental, Social & Governance projects, co-creation projects with multiple stakeholders, or open-ended, new concept projects. The card deck helps align and co-create with different stakeholders, bringing everyone together and closer, especially useful as a kick-off activity or as base materials for a new product development workshop.

08

IMPLEMENTATION ROADMAP

After conducting several product review sessions, the researcher compiled three potential use cases for the sustainable food product ideation guide. These use cases are examined in detail in this chapter. The researcher held three separate review sessions with various experts from Accenture, including the manager of the Accenture Inspiration Centre, the asset manager for Accenture's food of the future offering, and a sustainability expert from Accenture. These experts provided valuable insights and opinions based on their professional expertise.

Brainstorming activities to identify potential use cases for the product can be found in paragraph 8.1, and feedback on three proposed product use cases are analysed in paragraph 8.2. With the results of the review sessions, an implementation plan is presented in paragraph 8.3.

Paragraph overview

Paragraph 8.1

Product use case brainstorm

Set up for product use case brainstorm
After reviewing the product itself, the researcher asked the participant how would he or she use the sustainable food product ideation tool. The following questions are asked:

1. What type of project at Accenture would this product be useful for?
2. During which step of this project would you use this product?
3. What type of project on the client side would this product be useful for?
4. During which step of this project would you use this product?
5. What type of clients do you have in mind?
6. What type of employee from the clientside would be involved?

Result of product use case brainstorm
Together with each expert, a flip-over is filled for the above-mentioned questions. The results are combined and presented in this paragraph.

1) What type of project at Accenture would this product be useful for?
The experts agree that the sustainable food product ideation guide is especially suitable for the food of the future offering of Accenture. The consultants could use the tool for strategic sustainable food projects, R&D transformation projects, process optimisation projects and product lifecycle management projects.

Next to help consultants with the projects, the tool could also help Accenture with relationship building and spread the name of Accenture within the food manufacturing industry.

2) During which step of this project would Accenture use this product?
Accenture would use this product during the first step of a project, which is the ideation phase involving R&D and sometimes marketing and supply chain. The sustainable food product ideation guide is useful for kick-starting the project, guiding users to think broadly and take sustainability into account before defining the steps of the project. The digital version of this tool can be integrated into the PLM systems of various food manufacturers.

3) For what type of project on the client side would this product be useful?
For projects on the client side, the sustainable food product ideation guide would be useful for new product development projects. It could also be helpful in product lifecycle management system implementation projects. In this case, it will incorporate sustainability as a standard practice on a process level.

4) During which step of this project would the client food manufacturer use this product?
Based on the review insights, the sustainable food product ideation guide would be useful for client food manufacturers during the ideation phase and at the start of a project. It can also be useful for kick-starting a project and for incorporating sustainability. Additionally, it can be used in agile and scrum workshops, especially in real-life settings.

5) What type of clients do you have in mind?
The experts stated that the sustainable food product ideation guide could benefit these potential food manufacturing clients, for example, companies such as Nestle, Mars, Unilever, Coca-Cola, Mondelez, Hershey Company, Perfetti van Melle, Jacob Douwe Egberts or Danone. Moreover, the ideation guide may also be useful in expanding Accenture's offerings to include the manufacturing of animal food products, restaurant chains such as McDonald's, or food delivery services.

6) What type of employee from the client side would be involved?
Based on the expert insights, the sustainable food product ideation guide would involve the employees responsible for product development on the clientside, which could vary depending on the company's structure, and may include the R&D, marketing, product management, and portfolio management departments. Additionally, CFOs may find this type of project interesting as they are responsible for reporting both financial and environmental results in annual reports.

Paragraph 8.2

Feedback on potential use cases with experts' feedback

After soliciting the experts' ideas on how the sustainable food product ideation guide could be utilised, the researcher presented three potential use cases and asked for feedback on their feasibility, viability, and desirability for Accenture. In the following paragraphs, each use case is described, and the experts' feedback is presented.

Paragraph 8.2.1

Use case 1: Accenture inspiration centre demo

Description of use case 1: Inspiration centre demo

The first use case, referred to as the Accenture Inspiration Centre Demo, involves the testing of the sustainable food product ideation guide at the Accenture Inspiration Centre. This is an introductory moment, where potential clients can read through the sustainability inspiration cards or conduct a short session with an Accenture employee to explore the possibilities and get into conversations. This demo, therefore, also functions as an interactive business card or a teaser of possible sustainability projects. See figure 8.1 of a picture of the inspiration centre demo walls.

Review of use case 1: Inspiration centre demo

The review of this use case by the experts suggests that it is feasible, desirable and viable, as it requires low investment and can be integrated into the existing structure of the Inspiration Centre tour. The only costs involved are the expenses associated with creating the card deck and the explanation poster, allowing the consultants to show the clients around, talk about the product for a few minutes, and perhaps engage in a short card game for less than half an hour. The experts agree that if any project is generated from this activity, it will provide "1000 times more" profit (see appendix F or rough calculation). One of the experts thinks that "this is an excellent teaser for the visiting clients."

Figure 8.1 A picture of the Inspiration centre demo walls, photo taken by Ying Zhou

Paragraph 8.2.2

Use case 2: Sustainable food product ideation workshop

Description of use case 2: Sustainable food product ideation workshops
The second use case is a facilitated creative sustainability workshop, where Accenture consultants could use the modular form of the card deck to select elements for their client workshops. This model could help with the sales of sustainability projects and food-related assets of Accenture.

Review of use case 2: Sustainable food product ideation workshops
The experts found this use case feasible, as it aligns with the existing practices of Accenture consultants. Both the physical card deck version and the digital miro version are useful. They are also considered viable and desirable, as the ideation guide provides a standardised approach to addressing sustainability-driven projects, reducing the need for consultants to develop new workshop methods each time. This standardisation helps to upscale sustainable projects and can be incorporated into a standardised product life-cycle management process, which Accenture can sell to clients. The ideation guide also enables goal-oriented conversations with clients at the start of projects, which is desirable. Additionally, this use case can be used for existing clients who wish to develop sustainable products, not just clients who visit the inspiration centre. The experts think that "this is a good moment to get the client's commitment."

Paragraph 8.2.3

Use case 3: client in-house DIY ideation activities

Description of use case 3: Client in-house sessions
The third use case involves clients conducting their creative sustainability activities using the sustainable food product ideation guide. The guide will be updated based on the client's specific needs and types of manufacturers and activities. After a creative session with Accenture or a visit to the Inspiration Centre, clients could take the customised card deck with them. However, there is a risk of clients taking the card deck and working on the projects themselves or going to other companies for a cheaper solution.

Review of use case 3: Client in-house sessions
The physical form of the ideation guide is technically feasible, but it is not desirable or viable for Accenture due to the aforementioned risks. On the other hand, the digital version of the sustainable food product ideation guide is both desirable and viable. It should be developed into a digital platform and integrated as a standardised step within an Accenture product lifecycle management tool. This would make it easily scalable, automatic, and embedded into the systems within the intellectual properties of Accenture. Moreover, the experts think that by integrating the sustainability-driven way of ideation into the standard systems, "it could help initiate sustainable company culture change. "

Figure. 8.2 A picture of a workshop, photo taken by Ying Zhou

Paragraph 8.3

The sustainable food product ideation guide implementation plan

Combining the use cases that the experts proposed and the three use cases evaluated by the experts, a product implementation plan for the sustainable food product ideation guide was made. The product implementation plan consists of three horizons: Introducing the ideation guide, Iteration and development and the Digital platform implementation. In this paragraph, each horizon will be explained with infographics.

In the infographics, every topic related to the inspiration centre demo use case is marked light blue, the sustainability workshop related elements are marked light yellow and the digital sustainable ideation platform related topics are marked in light pink. When a topic is related to two use cases, it is then marked in the two marking colour. The colour on the left refers to the user case happening earlier in the timeline. The colour on the right side refers to the use case happening later in the timeline.

Paragraph 8.3.1

Horizon 1: Introducing the ideation guide

During this horizon, two use cases mentioned in the previous paragraph are implemented. The inspiration centre demo and the sustainable food product ideation workshops. See figure 8.3 for horizon 1 of the implementation plan.

Introducing to new clients at the Inspiration centre demo

The card set demo will be presented and become a part of the tour at the Accenture Inspiration Centre. This use case targets the visiting potential clients of Accenture. It gives them a low threshold to taste what the results could be if they buy a sustainable food product development workshop or project from Accenture. This is a way for Accenture to put low investment to get potential clients interested and initiate early-stage conversations. The resources required for this use case are some sets of the card deck, and Accenture employees to give tours and show the demo. They do need to get familiar with the card deck beforehand. So, some knowledge passing needs to happen before the start of the horizon. Even if only a few clients are excited to go into the next step and actually buy some workshops, it will be already profitable for Accenture (see appendix F for estimation of profit). However, the visitors maybe take the card deck with them. This risk will be minimised by only providing the most simple version of the ideation guide as a demo and making the card deck completely into Accenture house style, and referring to Accenture websites and blogs on each of the cards. So it could serve as an interactive business card. The product owner of the demo is the manager of the inspiration centre.

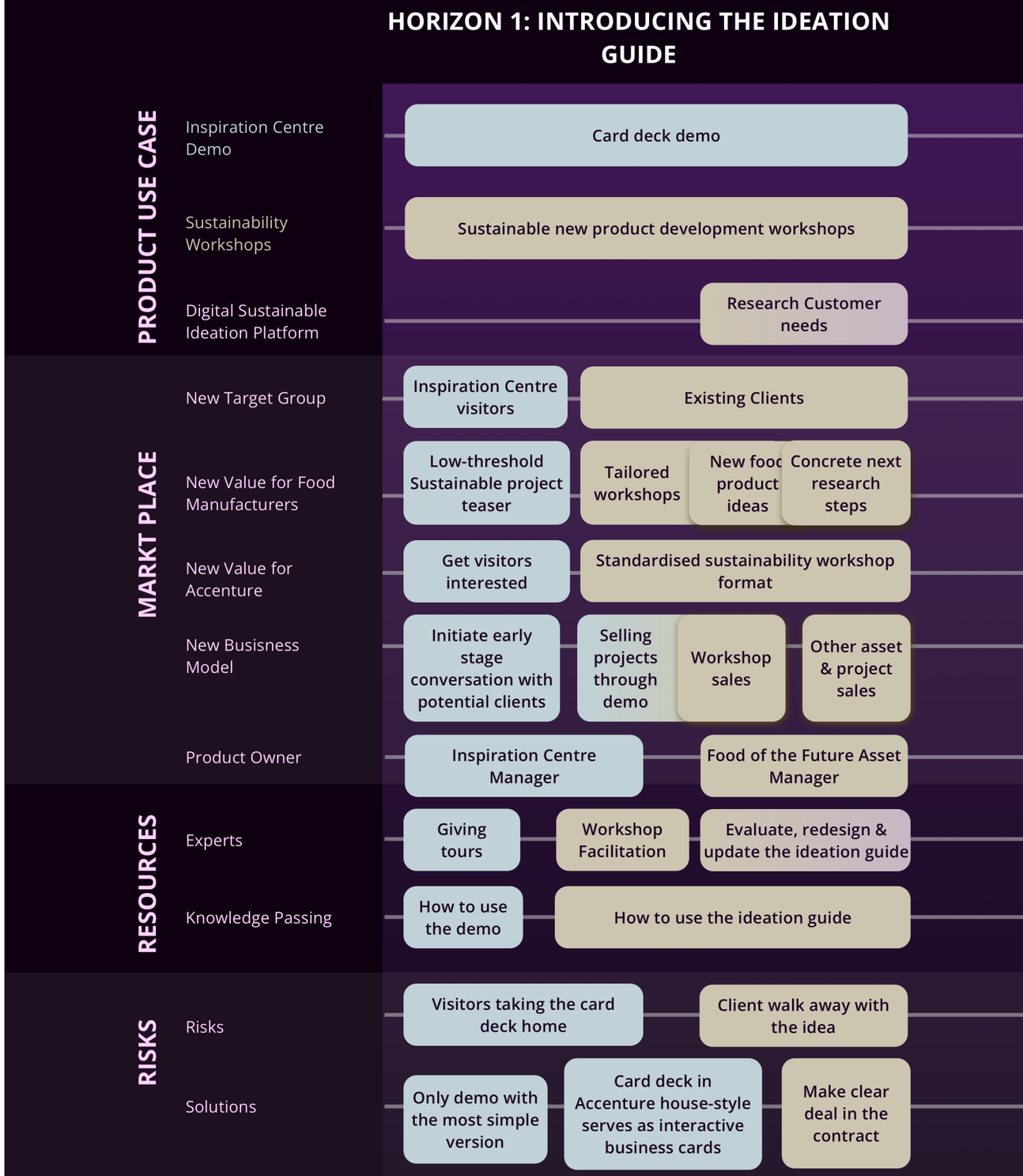


Figure. 8.3 Horizon 1 of the implementation plan

Introducing the workshops to existing clients

At the same time, for existing clients of Accenture, the ideation guide could be used as material for the sustainable food product development workshop. Accenture consultants could use this standardised modular format to tailor their workshops to various clients quickly and easily. The clients will get guided workshops, new food product ideas and concrete next research steps proposed. This is also profitable for Accenture. Aside from the workshop fees, by introducing example solutions of Accenture during the session on the inspiration cards and proposing the next steps involving Accenture assets and capabilities at the end of the sessions, more sales could be done.

As for expertise, consultants with workshop facilitation skills will need to read about how to use the ideation guide. They also need to evaluate and keep on track the parts of the ideation guide that works well and do not. However, the clients may walk away with the idea after the session and collaborate with other companies. By making clear deals in the contracts, this can be avoided.

Paragraph 8.3.2

Horizon 2: Iteration and integration

The second horizon of the implementation plan have three main objectives. Firstly, it aims to target food manufacturers who are committed to implementing a sustainability-driven way of ideation into their standard R&D process. Secondly, it involves iterating the ideation guide card deck and the demo to better match them with clients' existing structures. Then this gathered information will also prepare Accenture for the development of its own digital platform for sustainable food product ideation. An overview of horizon two is provided in figure 8.4.

Integrating sustainability workshops as standard practice

In this horizon, Accenture is assisting food manufacturers who are committed to incorporating sustainable food product development as part of their standard practice. Since each company has their own structure and way of working. The consultants, together with product lifecycle management experts, work closely with food manufacturers to design and fine-tune the modular workshop format to integrate well within the various R&D processes of different firms.

Continuous iteration of the ideation guide

Using the information gathered in horizon one, improvements are regularly made to the card deck, the Miro version of the ideation guide, and the demo version as needed. Trainings and manuals should be provided to Accenture employees who will be giving tours and facilitating workshops on how to gather feedback and use the updated ideation guide. The manager of the Inspiration Centre remains the product owner of the demos. While the manager of the Food of the Future assets, who is the product owner of the ideation guide, oversees the iterations and the research and development of the new Accenture asset.

Development of the Accenture sustainable ideation platform

In addition to experts proficient in evaluating, redesigning, and updating the online and offline versions of the ideation guide, this horizon requires a few new experts. Product lifecycle management consultants and software engineers will gather and research the existing platforms for food manufacturing PLM systems and other sustainability-focused software. By combining this information with customer needs and wants gathered from the online and offline workshops, a better understanding of what can be developed for Accenture is formed.

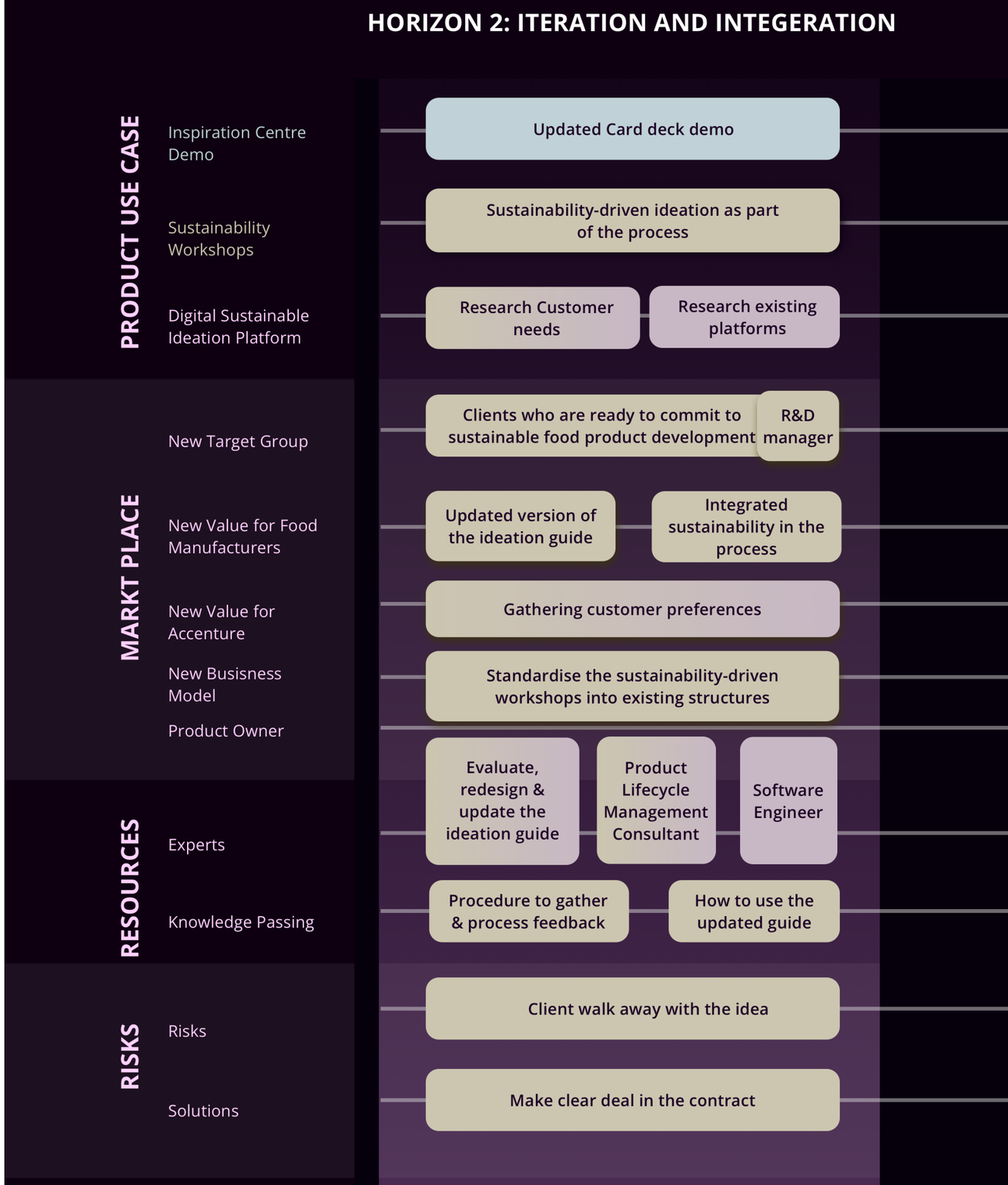


Figure. 8.4 Horizon 2 of the implementation plan

Paragraph 8.3.3

Horizon 3: Sustainable product ideation platform

The current digital version of the ideation guide has been created using Miro. However, Accenture aims to develop a more scalable and integrated digital version that can be sold as intellectual property and integrated into existing systems. While the card deck version remains useful for teams that work together in person, the Miro version will be updated and transformed into an online Accenture platform for sustainable product ideation, suitable for teams working remotely from different parts of the world. The development and implementation of this platform involve sustainability experts and experts on various existing ideation platforms. See figure 8.5 for an overview of the implementation plan horizon 3.

After its development, the platform can be sold to food manufacturers who wish to integrate sustainability into their standard practice and have a high proportion of remote employees. Revenue will be generated from the sale of licenses to use the platform. Besides, the maintenance and updates of the platform will be performed by maintenance engineers. By integrating this digital platform, Accenture consultants can host workshops more easily and securely. They will also pass on knowledge to clients about how to use the platform. Besides, R&D or other teams can do small, spontaneous sustainability activities on their own, which can be easily scaled.

As R&D employees are often very goal-oriented, they are more likely to incorporate sustainability into their practices when it is set as a goal at the beginning of the project. By making sustainability an integrated part of the structure, as many employees from sustainability-driven companies are doing autonomously, the platform can help initiate a company culture change in the sustainability domain.

However, integrating this platform into existing systems could be challenging. To address this issue, two solutions have been proposed. The first is to bundle the platform within a PLM project, where clients require a completely new system from Accenture. The second solution is to continuously update the platform to be compatible with more and more existing platforms.

For an overview of all three horizons, see figure 8.6.

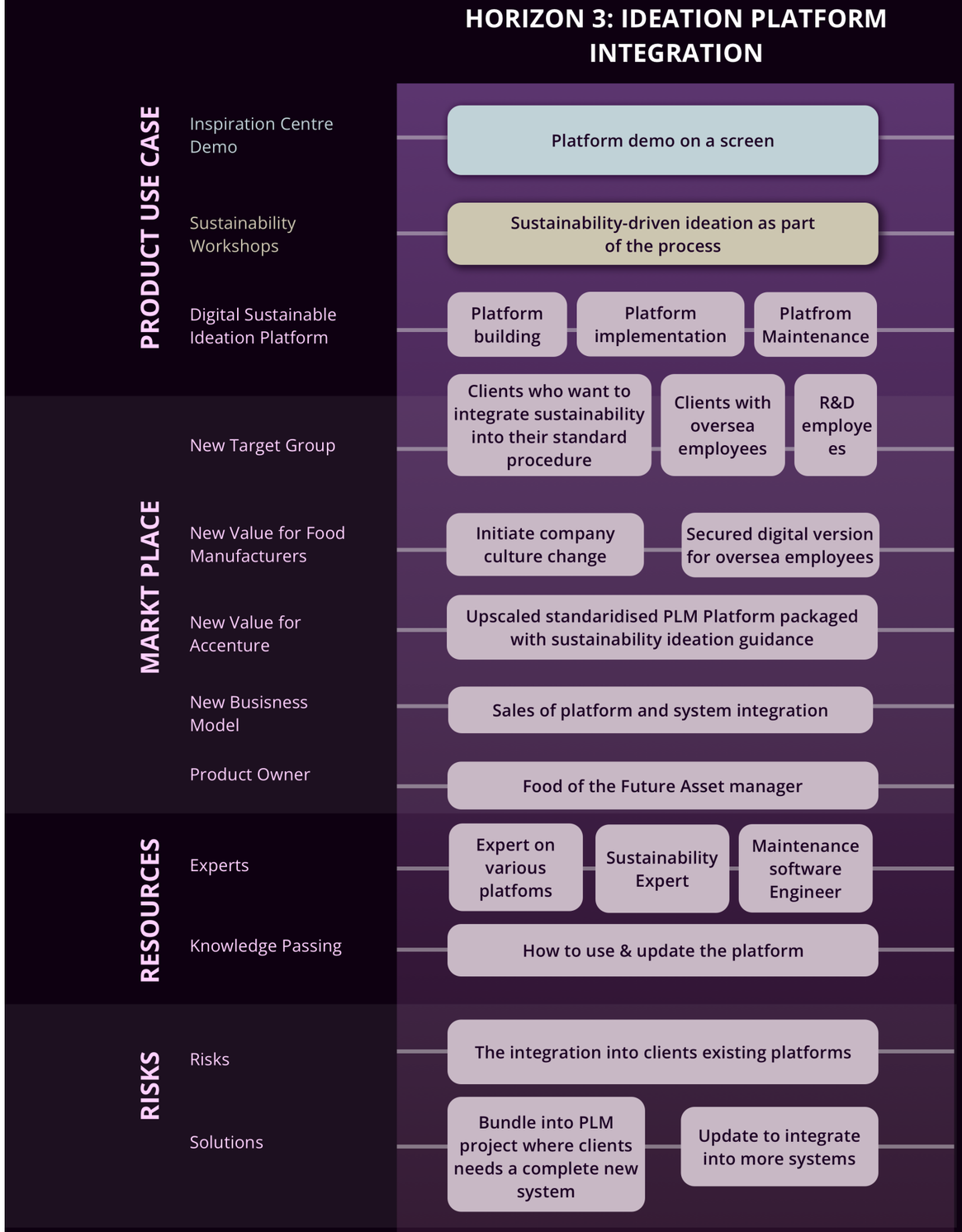


Figure. 8.5 Horizon 3 of the implementation plan

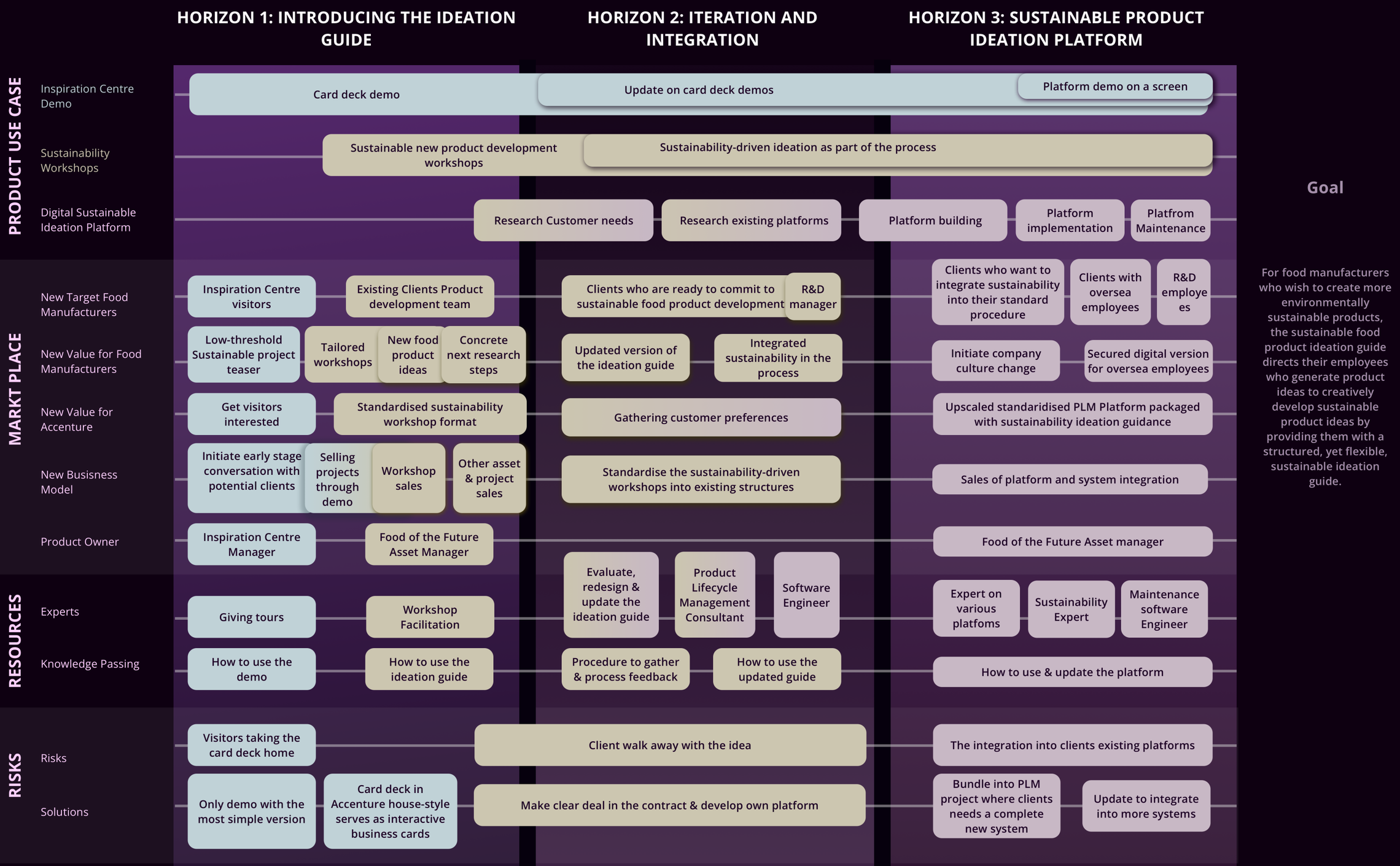


Figure. 8.6 The sustainable food product ideation guide implementation plan

Paragraph 8.4

Key takeaways

In this chapter, three Accenture experts were invited: the manager of the Accenture Inspiration Centre, the asset manager for Accenture's food of the future offering, and a sustainability expert from Accenture. They expressed how they would use the sustainable ideation guide. Whereafter they reviewed three use cases imagined by the researcher. Combining the use cases proposed by the experts and their feedback on the three proposed use cases, an implementation plan of the sustainable food product ideation guide is presented.

The implementation plan is divided into three horizons: Introduction to the ideation guide, Iteration and Integration, and Sustainable product ideation platform.

In horizon one, the ideation guide is introduced to potential clients through the Inspiration Centre demo and to existing food manufacturing clients through offline and online sustainability workshops.

Horizon two focuses on helping food manufacturers who are ready to commit to sustainable product development. Accenture helps them to implement the ideation guide as standard practice during their process. The ideation guide undergoes continuous iteration and is refined based on the information gathered from various projects to become even more easily integrated into the existing structures of various companies.

Horizon three targets companies with a high proportion of remote employees and focuses on developing a more scalable and integrated digital version of the ideation guide to be sold as intellectual property to clients. Sustainability is incorporated into the R&D practices by setting it as a project goal and making it an integrated part of product development teams' way of working, which can help initiate sustainable company culture change.

09

CONCLUSION, DISCUSSION & REFLECTION

Chapter 9 provides a summary of the problem and its subproblems, alongside with their corresponding reviewed solutions, to assert that the proposed ideation guide is a suitable solution to the initial problem. Section 9.2 outlines additional recommendations that Accenture should consider before executing the implementation plan. In section 9.3, the report acknowledges limitations encountered during the project. Finally, the report concludes with a personal reflection.

Paragraph overview

9.1 Conclusion: problems & reviewed solutions

9.2 Discussion: recommendations

9.3 Discussion: design limitations

9.4 Personal reflection

Paragraph 9.1

Conclusion: problems & reviewed solutions

In most R&D projects, sustainability is not considered until the scalability testing or production phase, when cost reduction is the objective or when a consumer directly requests it. R&D teams are highly focused on their predetermined goals for most of the process, making it crucial to incorporate sustainability at the beginning of the project during the ideation phase. Consequently, the current approach of food manufacturing R&D teams needs to change. Sustainability needs to be incorporated at the start of a project, during the ideation phase. After researching and interviews, this problem could be divided into a few concrete topics.

Topic 1 Urgency to change
More regulations for food manufacturers on greenhouse gas emission is coming. There is an urgency from the climate and regulation perspective for food manufacturers to make positive changes as soon as possible.

This is solved by implementing the ideation guide into the existing structures of workshops which Accenture provides. The consultants don't need to think of their own workshop starting from the start every time. The Accenture experts expressed that this modular and standardised guide is feasible, viable and desirable in the previous chapter.

Topic 2 Sustainability is barely mentioned during ideation activities
Sustainability is now barely mentioned except for being only a topic at the end of a trend presentation during the ideation activity. The traditional approach of product ideation needs to be revised to prioritise sustainability as a standard criterion in procedures.

This is solved by embedding sustainability into every step of the ideation guide. Which is considered feasible and desirable by Accenture experts.

Topic 3 Sustainability is abstract to act on
Many food manufacturers have a sustainability vision, which is often very abstract to act on. The R&D teams, on the other hand, are often very goal-oriented. So they need concrete sustainability-related goals added at the start of the project during the ideation phase to develop sustainable products. Otherwise, sustainability is barely taken into account during the R&D process.

This is solved by assisting Accenture consultants to give the R&D teams exact clear steps. The experts expressed that this is desirable. First, forcing the R&D team to think broadly and end the session with concrete questions that they can research. It is comfortable for them and effective for the sustainable food product development process.

Topic 4 R&D has limited creativity during ideation activity
Although R&D teams possess critical knowledge of possible solution ideas, they may exhibit limited creativity and are often constrained in their thinking. Encouragement of more creative thinking is necessary to develop sustainable products.

This is solved by adding sustainability creativity boosters in the ideation guide. During the review sessions, it is validated that these activities prime participants' creative thinking and inspire them to consider sustainable solutions. On a team level, the cards encourage participants to listen and learn from one another, energising the group and stimulating interaction.

Topic 5 Ideation activities either require much preparation or is not structured
While many types of ideation activities exist, organised ideation sessions require significant time to arrange and may be restrictive, while less structured sessions are often flexible yet lack a clear goal or outcome.

As a solution, a modular, flexible, yet structured design guideline is developed to allow consultants to tailor the workshops based on the clients' characteristics.

Topic 6 The FotF offering of Accenture is not well-know yet in the industry
Moreover, Accenture needs to raise its profile in the food manufacturing industry and highlight the various assets and capabilities of Food of the Future.

As a solution, the card deck is transformable into a demo at the Accenture Inspiration Centre. The visitors will be able to try out Accentures offering with a low threshold.

Certainly, the ideation guide is not the only solution to address the issue of sustainability is often overlooked during the R&D process. Paragraph 3.5 elaborated on three additional opportunities to explore and recommendations for further research and development by Accenture.

All and all, the sustainable food product ideation guide provides significant value for both Accenture and its food manufacturing clients. For Accenture, the guide offers the opportunity to attract new clients and initiate early-stage conversations, as well as provide a standardised workshop format with a modular toolkit that saves time and is scalable. Eventually, the digital version of the guide could be developed into Accenture's own ideation platform. For food manufacturers, the guide provides a low threshold to experience sustainable food product ideation sessions. It offers tailored workshops, new food product ideas, and concrete next research steps for the development team. Additionally, the digital version of the guide caters to remote employees and assists in integrating sustainability into their practices, helping to initiate company culture change. For a more detailed explanation about the implementation, please refer to paragraph 8.3.

Paragraph 9.2

Discussion: recommendations

Before executing the implementation plan, it is recommended that Accenture conduct further research and make some improvements to the ideation guide. The following changes or research initiatives are suggested.

Add or eliminate cards
It is recommended to conduct more research to determine if there is a need for more types of activities or if some of the activities appear to be not efficient. As consultants gather information from facilitated sessions and add new elements to the guide, this will also become apparent.

Validate the legal usage of example projects
Including examples of Accenture projects on the back of the sustainability inspiration cards is recommended. This would serve as a reminder of Accenture's capabilities, especially as the company's brand name is not yet widely recognised in the agri-food sector. It would also serve as an interactive business card, allowing consultants to naturally discuss these example projects. However, the exact projects that can be included need to be discussed further between firms. Some clients may not want information about their project to be shared, while others may be content as long as their brand names are not included. The specific example projects to be included should be discussed later.

Add visuals to assist the descriptions of the method cards
During the review sessions, it was mentioned that a visual representation of the design methods and examples of how the results would look would make them easier to use. More development is required to create these visuals and examples.

Termilogogie list in the manual
It is recommended that the manual includes a terminology list to explain any words or phrases that may not be commonly understood. The specific words that need to be included in the list will require further research to determine. One approach could involve the Accenture consultants keeping track of any unfamiliar terms encountered while using the manual and periodically updating the list accordingly.

Expand to other industries
During the review sessions, Accenture experts expressed an interest in expanding the application of the ideation guide into other industries' sustainability projects, such as animal food product manufacturing, restaurant chains like McDonald's, or food delivery services. It is necessary to conduct further research to determine which industry fits well with the principles of the ideation guide and what alterations need to be made.

Test the digital version of the ideation guide
Although the physical version of the sustainable food product ideation guide was reviewed in several sessions, and the principles of working are similar to the online version, testing is still required. Differences in the logistics of the online session need to be identified and included in the manual. Some activities work better for in-person sessions, while others work better for online sessions. Testing needs to be done to determine which activity is better for which situation, and an overview needs to be communicated in the manual. There are still yet-to-be-discovered aspects of the online version that need to be adjusted, and therefore online testing needs to be conducted.

Paragraph 9.3

Discussion: design limitations

This paragraph discusses several encountered limitations which challenged the designing process during this project.

Consulting for consultants
It is challenging to design for consultants. Especially designing strategies for strategy consultants. Compare to an average graduation project, it is less clear who the design is meant to be. Especially when the different consultants from the client side also do not always agree with each other. This offers the researcher a chance to leverage communication and stakeholder management skills.

The FotF offering is very new
This report aims to find a new asset for the Food of the Future offering of Accenture. This offering has only been active for a handful of years. It offers a lot of freedom for research because almost all of the directions are open to discovery. But this also leaves the scope of the project even broader, which made the research phase more open, broad and difficult to tackle than an average graduation project.

Network for research
Accenture has offered a lot of help and knowledge in-house from consultants who once worked at a food manufacturing company or worked together with a lot of food manufacturers. It is not allowed to contact Accenture's clients as a graduation intern student. However, it is still preferred by the researcher to also talk to R&D teams who are working at a manufacturing company right now and hear their stories from their side. Therefore, the researcher had to network a lot on LinkedIn and at a few real-life events for interviewees. The networking and interviewing were both very successful but did cost a lot of time every time the research direction shifted.

Paragraph 9.4

Personal reflection

Don’t be too ambitious
The first thing I need to reflect on is that I need to act less ambitiously. I saw the graduation project as the last moment to learn at the university and wanted to make the most of it. However, I took this a bit far, especially at the start of the project. The project was initially designed to be a combination of various extremely interesting topics: sustainability, the food manufacturing industry, designing design, design with data and consultancy practices. At the same time, I personally love to work with the ViP method and often give it my own twist. It opens up any topic to be even broader, looks at the not-obvious things, and envisions the future. However, there are already so many topics involved in the project, so my usual way of working has made the discovery phase an overload of information. From the other perspective, I did get to learn much about those interesting topics.

Picking fewer topics (only food manufacturing and sustainability), diving into the problem first, and narrowing it down after that, helped me to reach my final goal of designing design for people from other industries for sustainability purposes.

At the same time, I was also too ambitious with the planning. Initially, I planned to finish everything in less than 100 days. It should be doable, but I underestimated the complexity of the topics and did not consider all the onboarding days and activities from Accenture which I enjoyed very much. In the future, I should plan way more buffers.

Preaching design
Preaching design thinking is something I really enjoy doing. I see much value in doing so. Since our discipline is relatively new, next to what the design guide is meant for in the first place, it also enables other disciplines to take a look into the creative brain of designers and experience the value of design thinking themselves.

Discover sustainability in context
Studying at IDE, we are actually living in a bubble. A bubble with open-minded, human-centred people. Sustainability is not new for us anymore. But in the ‘real world’, the resistance to sustainable innovation is way heavier. From this perspective, my research experience is also mind-opening for me. Because it made me realise there are still so many people not realising the value and urgency of sustainable innovation and that it is not that difficult to practise. I am happy that I could design a tool that may help the sustainability transition in real life.

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Appendix A

Research phase interviewee overview

Interviewee nr.	Topic	Function title	Organization
1	R&D process, Accenture context	Managing Director Accenture Strategy & Consulting & Intelligent Products & Platforms Lead Industry X	Accenture
2	R&D process, Accenture context	Technology consulting manager	Accenture
3	R&D process, Accenture context	Senior manager	Accenture
4	Design and food	PhD Researcher	Market leader Food manufacturing client of Accenture
5	R&D process	Research and development	Market leader Food manufacturing client of Accenture
6	R&D process	Research and development	Food manufacturing client of Accenture 2
7	R&D process	Research and development	Food manufacturing client of Accenture 3
8	R&D process	Research and development	Food manufacturing client of Accenture 3
9	R&D process	Research and development	Bio-tech start-up 1
10	R&D process	Research and development	Bio-tech start-up 2
11	Ideation	Consumer food trend expert	Food design organization
12	Ideation	Developing and sourcing manager	Sustainable food manufacture 1
13	Ideation	Sustainability and innovation officer	Sustainable food manufacture 2
14	Ideation	Sustainability and innovation officer	Sustainable food manufacture 3
15	Design thinking for consumer R&D	Sustainability manager	Design agency

Table 10.1 Research phase interviewee overview

Appendix B

Interview guide for sustainability in food R&D

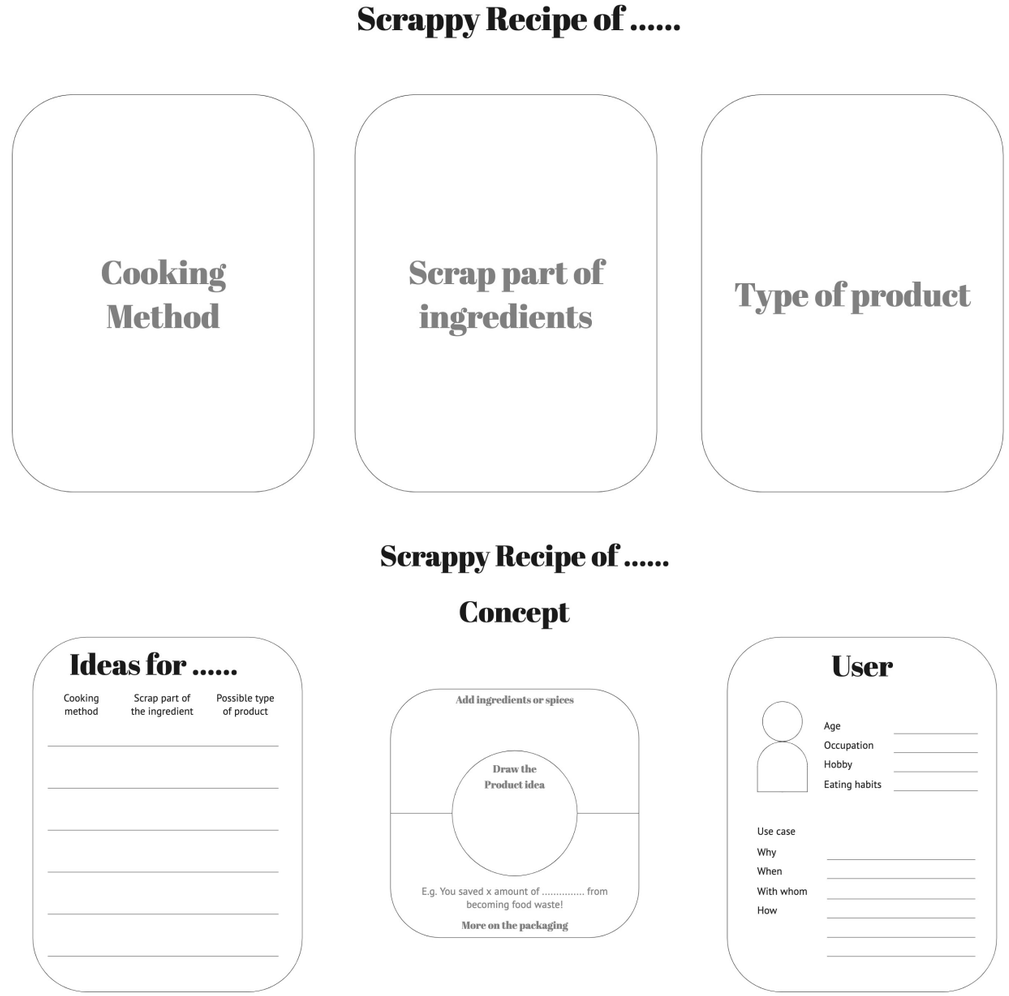
Questions to determine the moment to insert sustainability inspirations	
The need for inspiration	Would inspiration be helpful at this phase?
	If yes, what was the inspiration used during this phase?
	How was the inspiration gathered during this phase?
	Is the need for inspiration low, average or high during this phase?
Involvement of sustainability	Is sustainability involved during this phase?
	If yes, how was it involved?
	Is the involvement of sustainability low, average or high during this phase?
Validation about criteria	What are the criteria for an idea to pass to the next phase?

Table 10.2 Interview guide for sustainability in food R&D

Appendix C

Iterations of sustainable food product ideation guide

Figure 10.1 Iteration 1 of the ideation guide - cards



Evaluation meter

Based on your expertise, rate your product idea on the following criteria on a scale from 1 to 5.

Scrappy score	Originality	Desirability	Feasibility	Viability
○	○	○	○	○
○	○	○	○	○
○	○	○	○	○
○	○	○	○	○
○	○	○	○	○

Figure 10.2 Interation 1 of the ideation guide - worksheets

Figure 10.3 Interation 2 of the ideation guide

Appendix D

Manual for the sustainable food product ideation guide

Preparations

Prior to the session, it is advisable to discuss the client's objectives and determine which cards are most relevant to the session. Choose preferably one cards for eachphase. Additionally, preparations such as arranging flip-overs, markers, and post-its should be made.

During the session

Commence the session by presenting the day's program, followed by an explanation of the fundamental rule of ideation:
No judgements. All ideas are good ideas.
Build up on each other's ideas.
Feel free to jump between ideas.
Generate as many ideas as possible.

Then dive into the cards. The guide is structured in the form of a card deck that comprises four phases: Creativity Booster, Problem Definition, Break Free with Ideas, and Narrow Down. Each phase consist of one explanation card and five activity cards. And there are fourteen sustainability inspiration cards for the break free with idea phase, as the core of the guide.

The 'Creativity Booster' phase is designed to prepare the users for the ideation activity and to get them into a creative mindset by providing a variety of sustainability or food design-related exercises.

The 'Problem Definition' phase aims to set a clear and common understanding of the problem to be solved.

The 'Break Free with Ideas' phase involves general ideation activity cards and sustainability inspiration cards. The sustainability inspiration cards provide a range of possible measures on how to tackle a problem sustainably across the product's entire environmental influence.

The 'Narrow Down' phase requires users to evaluate the value and environmental impact of each idea and end up with a list of assumption and questions about a promising sustainable idea to concretely further discuss across departments.

The instructions on the explanation cards, as illustrated in appendix E, should be adhered to. For a scenario example, refer to Chapter 6.3.

Ending the session

To end the session, provide participants with a specific list of actions, including assumptions and questions that arose during the session, for themselves and their colleagues. It is also important to consult with the client contact on the next steps, such as the possibility of a follow-up session or other available options at Accenture.

Appendix E

The complete set of the sustainable food product ideation guide

Phase 1 Creativity Boosters

With ‘shop visit’, participants go to a shop or online to find products and discuss why they find something inspiring. As a result, they will think about this product’s inspiring quality when generating new ideas.

With ‘up-scaled cooking’, participants think about how they can upscale their favourite recipe: how can you make this for 100, 10000 or 100000 people? As a result, they will better understand the scalability of recipes.

With ‘throw throw trash’, participants take a piece of ‘trash’ and speak loudly one by one about what they can do with this piece of ‘trash’. A ball of paper is thrown at the person who needs to speak. Incorporating small physical tasks into the activity stimulates participants’ creativity. As a result, participants’ creativity is opened up, and they can start thinking about recycling.

With ‘repurposed product’, each person presents three purposes of a product they found in the room. Moreover, pass these products around, and everyone has to think of new purposes for the new product they got. As a result, participants’ creativity is stimulated, and they can start thinking about multipurpose products.

With ‘Complete the drawing’, everyone draws a half circle and passes them to the next person. Eventually, a complete drawing will be formed by the group altogether. As a result, participants are stimulated to communicate by drawing, and it also shows them that there are many interpretations of something they created, and this stimulates their creativity.

The subsequent three phases, the problem definition, break free and narrow down phases, imitating the Dubbel diamond design structure (British Design Council, 2005): discover, define, develop and deliver.

See figure 10.4 for the creativity booster cards.

Figure 10.4 Creativity booster cards

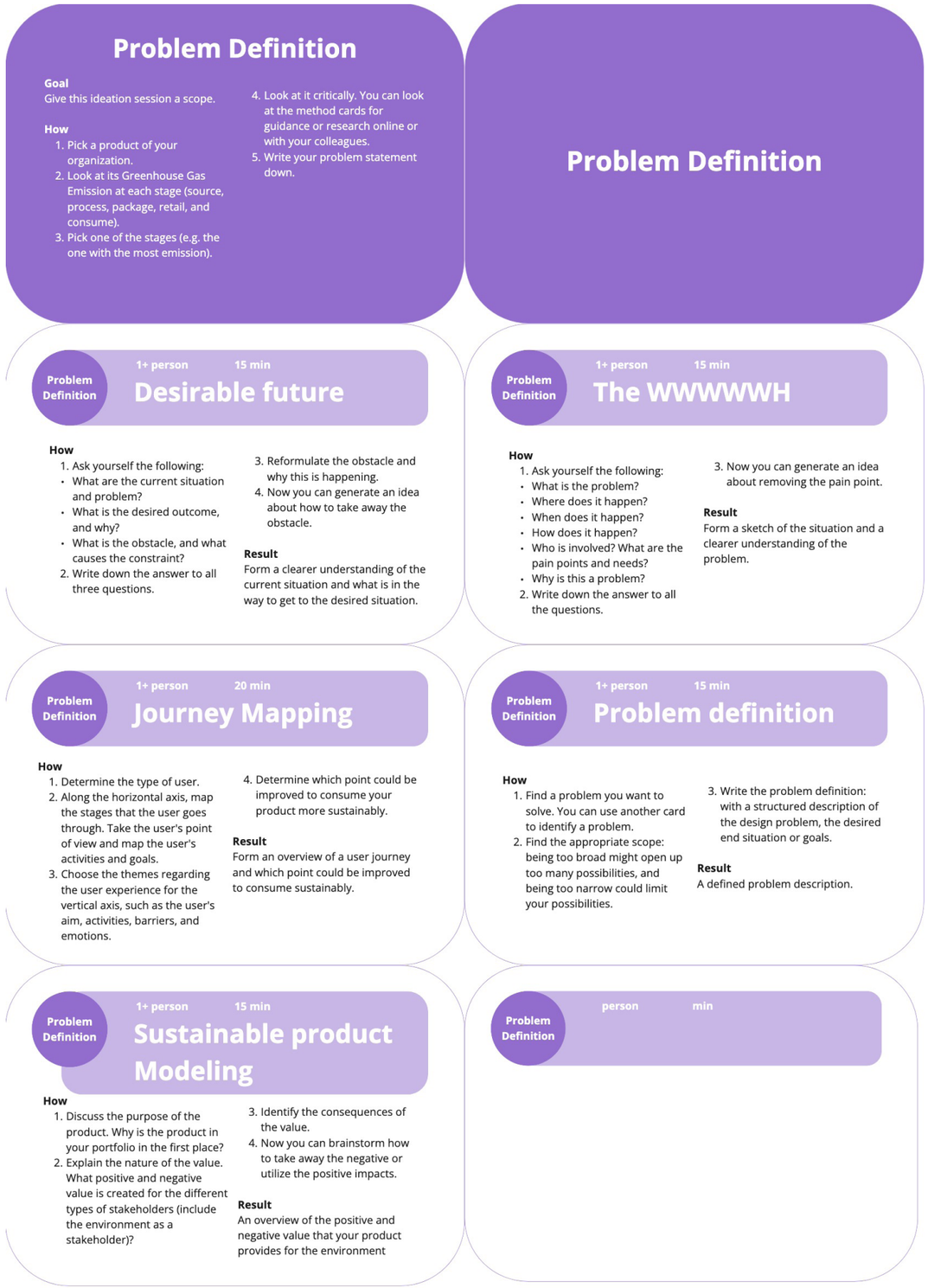


Figure 10.5 Problem definition cards

Phase 2 Problem definition

With the 'problem statement phase card, the participants are asked to take a product of their organisation and evaluate the Greenhouse gas of this product. The participants can form a product statement using the activity cards with this information.

The 'Desirable future' asks the participants to think of their desired future and current situation and compare them to find what obstacle is in the way. The problem statement will then be formed around taking away the obstacle.

'The WWWWWH' helps the partcipants to ask themselve all the 'what, when, where, who, why and how' around a problem. This will help the participants to understand the situation of the problem better.

'Journey Mapping' helps determine how a consumer interacts with a food product. As a result, this provides a better understanding from the consumer's perspective of the problem.

'Problem definition' helps with the forming of the problem definition.

'Sustainable product modelling' is inspired by sustainable business modelling from the design guide (van Boeijen et al., 2014). This activity helps its user determine the positive and negative value of a product for the stakeholder, stimulates participants to look at its impact on the environment and looks at the problem from the environmental perspective.

See figure 10.5 for the Problem definition cards.

Phase 3 Break Free with Ideas

The general ideation activity cards consist of 'mind drawing', 'Role-play', 'How to..?', 'SCAMPER', 'Mind-map' and 'think positively'. Many of them are inspired by the problem-defining method from the Delft Design Guide (van Boeijen et al., 2014).

The 'mind drawing' activity stimulates the team to communicate and brainstorm visually. Because one picture speaks a thousand words and the interpretation of a word is always different for different people, Visual brainstorming helps tackle that.

The 'role-play' card helps the participants think about the problem from another perspective, such as what a chef/child/ parent would do.

The 'mind-map' activity helps the participants to generate more solutions by letting everyone associate with every word everyone wrote. As a result, there will be many ideas generated.

The 'think positively' activity lets the participants look at the problem positively and stimulate them to use it for their merits.

The 'How to..?' activity let participants dissect the problem into subproblems and tackle them one by one by asking 'how to ...?'. This results in many sub-solutions, and by combining them, many solutions to the initial problem statement.

The 'SCAMPER' activity stimulates participants to "Substitute, Combine, Adjust, Modify, Put to other uses, Eliminate and Reverse' the solutions they already have to generate more ideas.

See figure 10.6 and 10.7 for the Break Free with ideas cards.

Break Free

3+ person 15 min

Mind Drawing

How

1. Everyone draws an idea in the middle of an A4 sheet. It doesn't matter how well you can draw
2. Give your sheet to your neighbour. Set a timer of 2 minutes.
3. Every round of 2 minutes, you draw things you think of or improvements around that idea. Build on each other's drawings.
4. Do the rounds until you get your leaf back. Look at the inspiration from the rest and write the improved idea on a post it. Discuss these ideas.

Result

An improved version of your solution idea.

Break Free

1+ person 15 min

Role-play

How

1. Pick someone
   a. Chef
   b. Child
   c. Parent
   d. ...
2. Think about this problem through their lenses.
3. What could be the solution?

Result

Solution ideas are generated from a new perspective.

Break Free

1+ person 15 min

How to..?

How

1. Divide your problem into subproblems and write them down on a flip-over.
2. Take one of the sub-question and for 1 minute, write as many solutions as possible.
3. Continue until all sub-questions are answered.
4. Circle all solutions you find exciting and combine them into an idea.

Result

This activity will generate solutions to sub-questions and a combined solution for the main problem.

Break Free

1+ person 15 min

SCAMPER

How

Put the current situation on paper and discuss if the following actions might help with solving the problem:

- Substitute
- Combine
- Adjust
- Modify, magnify, minify
- Put to other uses
- Eliminate
- Reverse

Result

This activity helps with generating solutions based on the current situation

Break Free

1+ person 15 min

Think positively

How

Discuss the following questions:

1. How can you use this problem positively?
2. For whom is this situation favorabel? How can you collaborate with them?

Result

This activity helps generate solution ideas from thinking about a problem positively.

Figure 10.6 Break Free with ideas - activity cards

Break Free with ideas

Goal

Generate as many ideas as possible for the problem that you identified.

Basic rules

- No judgements. All ideas are good ideas.
- Build up on each other's ideas.
- Feel free to jump between ideas.
- Generate as many ideas as possible.

How

1. Please write down the first ideas and assumptions which popped up in your mind on a post-it and stick it in front of you.
2. Lay out the inspiration cards and the ideation method cards.
3. Scan them through and use at least one of both types of cards.
4. Generate as many ideas as possible.

Break Free with ideas

Break Free

Sustainability Inspiration

Localisation

Example Questions

- Can the ingredients be localized?
- What can you do with your local ingredients?
- Can you leave out the ingredients from faraway places?
- How do the local farmers use to use their ingredients traditionally?
- What are the local restaurants doing? Can you get inspiration from them?

Break Free

Sustainability Inspiration

Plant-based ingredients

Example Questions

- What property of the meat product could be substituted by plant-based ingredients?
- What can you do with these plant-based ingredients?
- Can you borrow a recipe from other cultures?
- How is this plant-based ingredient eaten traditionally in other countries?

Break Free

Sustainability Inspiration

Cut lines short

Example Questions

- What are the steps in your process?
- Are there steps in the process that could be shortened?
- Can some steps be combined?
- Can some steps be left out?
- What would happen if some steps were left out? Can you use this positively for a new product?

Break Free

Sustainability Inspiration

Existing component

Example Questions

- What new product can you develop with your existing material?
- What new product can you create with your current ingredients?
- What new product can you develop with your existing machines?
- What else can you do with this existing component?
- Who else might be interested in this existing component?

Break Free

Sustainability Inspiration

Reusable component

Example Questions

- Is your packaging reusable?
- Which part of the packaging is reusable?
- What more can you do with the packaging?
- What more can a consumer do with the packaging?
- How can you stimulate the consumer not to throw this packaging away?
- How can you encourage the consumer to use this packaging for which purposes?

Break Free

Sustainability Inspiration

Bio-degradable

Example Questions

- Which part of your packaging can be bio-degradable?
- What can you do with particular food waste? Can you make bio-degradable packaging with it?
- What did people do when they couldn't access plastic and glasses?
- How do people from other cultures package their food?

Figure 10.7 Break Free with ideas - sustainability inspiration cards - part1

Figure 10.8 Break Free with ideas - sustainability inspiration cards - part 2

Phase 4 Narrow Down

The 'Datum method' guides the user to compare the original product solution with the new ideas which have just been generated. As a result, the user will have a list of things that each idea is doing better and worse than the original one.

The 'Harris profile' guides the user to compare their requirements on a four-point scale. As a result, the user will have an overview of which product fulfils their preset requirement the best.

The 'Worst Case Scenario' helps the user imagine the risks when choosing specific ideas. This helps them take away their uncertainties and encourages them to try out sustainable ideas which they usually would hesitate about.

'A look into the future' helps the users with imaging which product fulfils the user's need until what time in the future. As a result, the user will find out which idea will last the longest in the future and which one is only for now.

After finishing the narrow-down cards, the users will have a short list or a product solution for their problem with a list of important reasons. They can bring this to their colleagues to further discuss and conduct tests.

See figure 10.9 for the Narrow down cards.

Narrow Down

Goal
Choose a promising idea to form your project brief.

How
1. Think of what you find essential: environmental impact, regulatory and Compliance, consumer needs, business case, feasibility, vision and strategy and accountability.
2. Make sure your ideas are worked out evenly.
3. Choose one of the method cards to rate your ideas.
4. Write your project proposal for the winning idea!

Narrow Down

Narrow Down | 1+ person | 25 min

Eco Value Matrix

How
1. Rank the product solutions in order of relative value
2. Rank the product solution in order of relative eco-burden, such as relative eco-costs
3. Characterize the product solutions about an important issue, such as the expected market volume, the Ease of implementation, ease of production and costs.
4. Draw the Eco Value decision Matrix on a whiteboard or flip chart. Draw a dot at the right spot on the matrix for each product solution and label it.
5. Discuss the result and decide on the most attractive solution.

Result
An overview of how much eco-burden each product provides.

Narrow Down | 1+ person | 20 min

Datum method

How
1. Arrange all the design solutions and criteria in a matrix
2. Choose the datum which can be a similar existing product
3. Compare the properties of the other design with those of the datum:
    a. - = less good than the datum
    b. + = better than the datum
    c. = = same as the datum
4. Compare scores. Your alternative design is promising if you see many '+'s and a few '-'s. An equal spread of '+', '-' and '=' may indicate vague and ambiguous criteria. Sharpen your criteria or improve your concept and try again.

Result
This activity helps generate a comparison between an existing product and new product ideas.

Narrow Down | 1+ person | 20 min

Harris Profile

How
1. List the requirements as fully as possible and rank them according to their importance for the design project
2. Create a four-point scale matrix net to each requirement (code as -2,-1,+1 and +2)
3. Create a Harris Profile for each of the design alternatives by evaluating the relative performance of each alternative.
4. Draw the profile by marking the scores in the four-point scale matrix for all the criteria
5. Present the profile next to each other to allow for discussion, and to determine which design concept has the best overall score.

Result
This activity helps with the comparison between different product ideas.

Narrow Down | 1+ person | 25 min

Worst Case Scenario

How
1. Preselect a few ideas. Per idea, write down the assumptions or uncertain elements.
2. Think about the consequences or risks if the assumptions per idea were wrong. Write down and number the consequences and market their impact as high, medium or low.
3. Select both the ideas with the lowest and the highest risks.
4. Reflect and discuss the ideas to define the level of risk and uncertainty you are willing to take.

Result
This activity helps the users imagine risks per solution ideas and compare them.

Narrow Down | 1+ person | 25 min

A look into the future

How
1. Draw a timeline. On one side, write now, and on the other side, a year in the future.
2. Define the need or wish your idea is fulfilling and write it down at the 'now'. The project on the timeline of how this need or wish could change in the future.
3. Select a few ideas. Start with one idea, and focus on every change in the need or wish over time to answer the following question: what elements of the idea are essential throughout the timeline, and what elements are not necessary throughout the timeline? Repeat for other exciting ideas.
4. Discuss all the findings with your team. Select the idea that can be useful for the longest throughout the timeline.

Result
This activity helps to imagine and evaluate which idea is more valuable in the long run.

Figure 10.9 Narrow down cards.

Appendix F

Rough calculation for inspiration centre demo

The card decks cost 17 euros per deck starting from 7 sets. The posters cost around 70 euros. Depending on the person giving the tour, it costs Accenture 30-100 euros an hour. So, 15-50 euros per time. If the tour is given 30 times, it costs Accenture around 650-1700 euros for the tour.

The project duration at consultancy firms typically starts at 6 weeks, a project team costs 500k to 1000k a month. So if one out of thirty visitors decides to do a project would at least give Accenture a profit of 750k to 1500k.

Which makes around 1000 times of profit. Let alone that the tours are existing structures, so the costs are even lower.

Appendix G

Interview guide for ideation activities in food R&D

Questions about the ideation process at sustainability-driven manufacture	
Before the ideation	When does this happen? before or after a project brief? or both?
	What's the goal of an ideation session?
	Who is involved? And why?
	What are the inputs to bring to the table? Market trends, consumer needs or sustainability data?
	What tools are used to gather or convert those data into insights?
	Why?
During the ideation	Who does what during this process?
	What tools or methods are used?
	Why this tool?
Ending the ideation	When do you know that the idea is good enough to go (if before the project brief then the project brief, if after then be handed to the lab)?
	What do you aim to have at the end of an ideation activity?
	From your experience, what needs to be improved around this?
	What do you miss during/after this process?

Table 10.10 Interview guide for ideation activities in food R&D

Figure 10.9 Narrow down cards.