

Algae as a Transformative Agent in Food Ecosystem

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Preface

The motivation to work on 'Algae as a Transformative Agent in Food Ecosystem' for my thesis project stemmed from a desire to explore an uncharted territory. I began this journey knowing nothing about 'Algae', 'Agency', 'Speculative design', or the 'More-than-human' perspective. My goal was to create something thought-provoking, something that challenges perspectives, and I took up the challenge. This journey led me to discover new fields of design that expanded my understanding of design beyond traditional problem-solving. I realized that influencing people's mindsets is something I deeply enjoy, and I intend to continue this pursuit in my professional career. I am grateful for the opportunity to explore this during my master's program.

I would like to express my gratitude to my professors, Dr. Nazli Cila and Dr. Laurens Kolks, for their excellent guidance and mentorship. Their support has made this process enjoyable and productive! A special thanks to Dr. Joana Martins, whose expertise in biodesign greatly enriched my project.

I am extremely grateful to my family— Mom, Dad, Grandparents (Dadaji, Dadi, Nana, and Nani), and my Uncle (Mama)—for their unconditional support. Love you guys! A heartfelt thanks to Gaurav, who has been a support system throughout the two years of my masters. I would like to extend my appreciation to my chosen family, my friends, for their support and motivation throughout this process.

Executive Summary

This thesis, “Algae as a Transformative Agent in Food Ecosystem,” authored by Kashish Ramrakhiani under the supervision of Dr. Nazli Cila and Dr. Laurens Kolks, explores the potential of algae in redefining the food ecosystem. The study situates itself within the framework of Human-Food Interaction (HFI) and Human-Computer Interaction (HCI), addressing sustainability challenges in the global food system.

The global food system faces significant sustainability challenges, including resource depletion and environmental degradation. Rising demand for animal products has increased meat and milk production, contributing to environmental issues such as greenhouse gas emissions. Veganism, while reducing these impacts, can lead to nutritional deficiencies. Algae, rich in essential nutrients like omega-3 fatty acids, protein, vitamins, and minerals, emerges as a viable solution to address both environmental and dietary needs.

Following Actor Network Theory (ANT), the research views Algae as a ‘transformative agent’ within the food ecosystem. By adopting a more-than-human lens, the study challenges traditional hierarchies and advocates for a more thoughtful approach to algae care, supported by speculative design methodologies. The research employs a combination of methodologies, including literature reviews, interviews, ethnographic observations, and speculative scenario planning.

These methods uncover key insights into the complex entanglements within the food industry that would be influenced by the integration of algae as a transformative agent, as well as the ripple effects this could create throughout the food ecosystem. The findings also emphasize the critical need for a shift in how we treat algae, highlighting the risk of repeating the exploitative patterns seen in other established food industries. The thesis

imagines a speculative scenario where algae bioreactors are common in food production, backed by innovative policies and education programs that highlight algae's role in sustainable food systems.

The study's design vision culminates in the 'Algacare Conference,' an immersive event designed to educate and engage food industry stakeholders about the potential future role of algae. This speculative event is presented through a website and video, connecting today's realities with future possibilities in a way that is both accessible and forward-thinking.

This thesis suggests that algae could be a transformative force in food ecosystems. It advocates for recognizing algae not just as a food source but as a key player in creating a sustainable and ethical food system.



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Chapter 1: Introduction

Introduction

The study of human-food interaction (HFI) has gained momentum within the field of Human-Computer Interaction (HCI), focusing on the interconnectedness between individuals and their food (Choi et al., 2014). This interdisciplinary area explores how technology intersects with everyday food practices, encompassing activities such as cooking and eating that hold cultural significance and occur at the scale of the body. Unlike conventional design materials, food presents unique challenges due to its perishable nature and broader implications for sustainability (Dolejšová et al., 2020).

The global food system faces significant sustainability challenges, including resource depletion and environmental degradation (Poppy et al., 2019). Algae has emerged as a promising ingredient due to its nutritional benefits and eco-friendly profile, gradually finding its place in culinary settings beyond experimental kitchens (Pérez-Lloréns, 2020). Rich in essential nutrients like omega-3 fatty acids, protein, vitamins, and minerals, algae can address both health and dietary needs (Pereira, 2011; Zabochnicka-Świątek, 2010). The context of this study started with 'restaurant kitchens' as Algae is versatile and is gradually making its way onto menus beyond avant-garde restaurants into casual and mid-range restaurants (Pérez-Lloréns, 2020). As the study progressed, the project's scope naturally extended beyond restaurant kitchens, encompassing the entire food industry.

The study explores a pattern of exploitation rather than care observed in the Algae food industry. Hence, a "More-than-Human" lens is used, where Algae is considered a 'transformation agent' and not a mere ingredient. The concept of agency and structure, as discussed in social theory, plays a critical role in understanding the potential of algae in transforming restaurant kitchens. By applying Actor-Network Theory (ANT) (Latour, 2005), which views the agency as distributed across networks of both human and non-human actors, this study challenges traditional hierarchies and explores how algae can influence and be influenced by its environment (Müller, 2015). The study focuses on algae care and building an algae-centric world rather than merely exploiting algae and extracting from it for the benefit of

humans.

This study is an intersection of the More-than-Human Design Lens and the Speculative Design Approach. Hence, the methodologies employed are a blend of these two disciplines. The selection of methodologies is inspired by existing research, with some specially developed to suit the scope of this study. It employs a blend of exploratory research and speculative design methodologies.

This project envisions a world where algae becomes a staple in restaurants. It delves into the necessity of algae care within the food industry, imagining an algae-centric culinary landscape. The study aims to speculate the potential new and transforming entanglements in the restaurant ecosystem from a more-than-human lens. These changes could include new stakeholders entering the scene (e.g. biologists working with the chefs), shifts in how the kitchen operates (e.g. growing algae in the kitchen), and adjustments in how chefs work with it. It dives into the exploratory journey of algae as a transformative agent in restaurant kitchens.

1.1. Project Aim and Sub-Questions

"The aim of this project is to provide an experience that helps stakeholders within the food industry to critically reflect on the possibility of Algae becoming a transformative agent in the future of the food ecosystem."

Sub-Questions:

1. How can we generate a symbiotic relationship between algae and humans in future food ecosystems?
2. What could be the possible entanglements in the restaurant industry due to the presence of Algae's agency?

1.2. Report Structure

This section provides an overview of the content and structure of the report. Chapter 1, Introduction, briefly overviews the domain and the research topic. It highlighted the aim of the study and the sub-questions to be fulfilled during the study. The remaining thesis project is structured as follows:

Chapter 2: Transformative Agent – Algae

The first chapter introduces Algae as a transformative agent, detailing its agency and significance. It sets the groundwork for the study by reviewing relevant literature in the field.

Chapter 3: Research Approach

This chapter outlines the research approaches used in the study and explains the rationale behind combining a more-than-human lens with a speculative design approach, supported by relevant literature.

Chapter 4: Research Activities

This chapter details the research activities undertaken to conduct exploratory research and construct a speculative scenario.

Chapter 5: Outcome of the Activities

This chapter presents the insights gained from the exploratory research and the speculative scenario developed in the previous chapter.

Chapter 6: Design Vision

Building on the project aim, previous research and activities, this chapter outlines the design vision and design criteria that will guide the design stage of the project.

Chapter 7: Brainstorming and Ideas

This chapter explores four initial ideas and prototypes. It describes the testing and evaluation process that led to selecting one idea to be further developed.

Chapter 8: Final Design

This chapter provides a comprehensive explanation of the final design created.

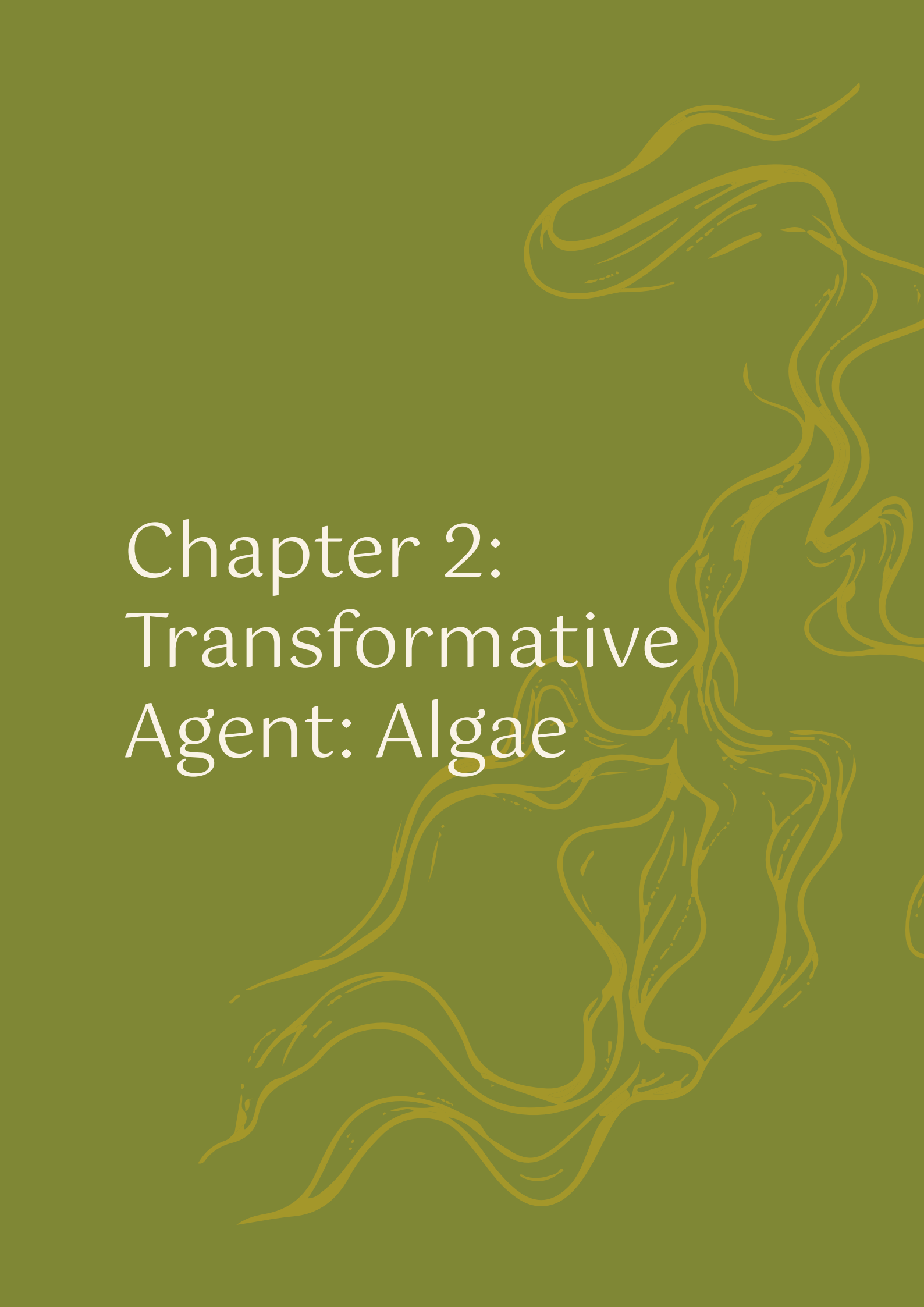
Chapter 9: User Reflections

This chapter involves stakeholders in the restaurant industry and explores their reflections after viewing the Final design.

Chapter 10: Conclusion

The concluding chapter summarizes the report, reflecting on the research aims and questions introduced in Chapter 2 and assessing whether they have been addressed. It discusses the study's limitations and also provides a future scope for the study.





Chapter 2: Transformative Agent: Algae

2.1. 'Agency' of Algae and the 'structure' around it

Agency and structure are two key concepts in social theory, often discussed in relation to each other. Agency refers to the capacity of individuals to act independently and make their own choices, while structure refers to the social, political, and economic forces that shape and constrain these choices (Giddens, 1984).

Actor Network Theory (ANT), as explained by Law and Hassard (1999), sees agency in both humans and nonhumans equally. By conceptualizing agency as spread across networks of people and objects, ANT challenges traditional hierarchies and supports a perspective where all entities are equally significant (Müller, 2015).

Within this framework, uncertainty surrounds the distribution of agency between human and nonhuman actors. Let's take the example of a gun shooting incident. The question arises: what role does the gun play? Let us try and understand the paragraph from Bruno Latour's Pandora's Hope (1999) :

"Guns kill people" is a slogan of those who try to control the unrestricted sale of guns. To which the National Rifle Association replies with another slogan, "Guns don't kill people; people kill people." The first slogan is materialist: the gun acts by virtue of material components reducible to the social qualities of the gunman. On account of the gun the law-abiding citizen, a good guy, becomes dangerous."

When we try to dissect this, it is understood that there are two majorly prevalent aspects that can be found here: A materialist perspective, and a human-centric view.

According to the materialist perspective, the gun assumes a central role, shaping the narrative of the event. In this view, an innocent individual holding a gun suddenly transforms into a criminal solely by virtue of their possession of the weapon. From a materialist perspective, it holds significant sway, shaping how events unfold. Here, having a gun can turn an innocent person into a perpetrator, as the gun not only aids but also guides the action, essentially becoming a key player in the scene (Latour, 1999, p. 177). On the flip side, the human-centered view sees the gun as a neutral tool without its own will. It's seen as a channel

for actions to occur, but it doesn't actively shape what happens (Latour, 1999, p. 177).

However, both the materialist and human-centered perspectives overlook a critical aspect: the intersection between society and materiality where agency resides (Knappett & Malafouris, 2008). As Latour (1999) contends, agency exists within the blind spot where society and matter exchange properties. Neither the isolated gun nor the individual can bear sole responsibility for an act of violence. Instead, accountability lies in the convergence of these two agents, resulting in the emergence of a new hybrid entity. Moreover, the socio-technical network that supports and facilitates such encounters shares responsibility for causing an action. Thus, action involves a fusion of human and nonhuman elements, necessitating a shared responsibility for its outcomes (Latour, 1999, pp. 180–182). In this context, it is impossible to distinguish between the actions of humans and nonhumans. (Knappett & Malafouris, 2008)

Understanding agency as the interplay between individuals and their social context, sociology delves into the dynamic relationship between human and nonhuman actors. This broader perspective challenges the notion of agency as exclusive to humans, extending it to nonhuman entities like algae. By examining how the agency of algae transforms its surrounding structure and how the structure, in turn, constrains algae's agency, we gain insight into the complex interdependencies shaping social and environmental dynamics.

Before we delve into the Agency of Algae, Let's explore a case study that delves into how "wheat" acts as a transformative agent, drawing parallels to how algae's agency can play a similar transformative role. Twelbeck (2020) in their article, 'Wheat: a powerful crop in US-American culture' examines Emanuel Leutze's painting "Mrs. Schuyler Burning Her Wheat Fields on the Approach of the British" (1852) and Frank Norris's novel "The Octopus" (1901) providing an insight into the dynamic relationship between humans and wheat. The article shows us that wheat stands as more than just a staple crop. It is a testament to the intricate interplay between genetics and culture. In North American art and literature, wheat emerges as a symbol of what might be termed "plant agency," a concept that underscores the notion of plants exerting a palpable influence on human affairs (Twelbeck, 2020).

In the book “Sapiens: A Brief History of Humankind” (2015), Yuval Noah Harari explains how farming wheat transformed ancient human societies. People spent their days toiling in wheat fields, dealing with challenges like clearing rocks and pulling weeds. This hard work took a toll on their bodies, leading to health issues like back pain and arthritis. Because farming demanded so much time and effort, people had to settle down near their fields, drastically altering their way of life. Harari (2015, p. 76) suggests that instead of humans controlling wheat, it was wheat that ended up shaping human societies, highlighting the profound impact of agriculture on our history.

“We did not domesticate wheat. It domesticated us.”
– Yuval Noah Harari, *Sapiens: A Brief History of Humankind* (2015, p.76)

Highlighting wheat’s significance emphasizes how a simple crop, wheat, had a profound impact on human history. This notion prompts us to consider the potential for other resources, like algae, to play a similarly transformative role, especially in a future where protein sources may become scarce. Just as wheat shaped our past, these overlooked resources may hold the key to addressing future challenges and shaping the course of human development. The next section explains why algae could be a transformative agent in the future.

2.2. Why is Algae considered ‘Transformative’?

2.2.a. Need of Algae – for humans and the animals

The current global food system is unsustainable and detrimental to both human and planetary health (Poppy et al., 2019). This is due to the depletion and destruction of natural resources, as well as the lack of focus on the interdependence of food supply and the ecosystem (Knorr, 2022). Human health is further compromised by the ecological health disorders resulting from the population explosion and ecosystem loss (Wahlqvist, 2016). The need for a fundamental transformation of the food system is emphasized, with a focus on sustainability, environmental protection, and human rights (Karanu, 2021).

Over the past 40 years, rising demand for animal products due to demographic changes, economic growth, and urbanization has greatly increased meat and milk production. From 1977 to

2017, global meat production rose from 122 to 330 million tonnes and milk from 317 to 811 million tonnes (FAO, 2019). The livestock sector generates about 7.1 GtCO₂eq/year, or 14.5% of global GHG emissions, mainly methane (CH₄) at 44%, nitrous oxide (N₂O) at 29%, and carbon dioxide (CO₂) at 27% (Gerber et al., 2013). Ruminant meat and milk production contribute 64% of these emissions. In Europe, animals currently play a crucial role in providing protein to meet the dietary demands of a growing global population. However, this has led to worries about the environmental effects of current food production methods, as well as concerns about health and animal welfare (Dury et al., 2019).

Promoting veganism is a growing trend in contemporary societies. A range of studies have highlighted the potential health benefits of a vegan diet, including reduced risk of cardiovascular disease, type 2 diabetes, and obesity (Nikolić et al., 2019). However, these studies also point to several nutritional deficiencies associated with veganism, such as insufficient intake of omega-3 fatty acids, protein, calcium, zinc, iron, vitamin B12, and vitamin D (Nikolić et al., 2019). These deficiencies can lead to nervous, skeletal, and immune system impairments, hematological disorders, and mental health problems (Bali et al., 2023).

Hence, the contrast between the environmental impacts of the meat industry and the nutritional challenges associated with veganism underscores the urgent need for alternative protein sources. In this research, Algae is proposed as a viable solution to address this need, offering a sustainable and nutritious alternative.

2.2.b. Nutritional benefits of Algae

Algae have played a significant role not only in sustaining human nutrition but also in shaping human brain evolution (Cornish et al., 2017). Because they contain vital substances necessary for brain growth, namely super-unsaturated Omega-3 and Omega-6 fatty acids, taurine, magnesium, zinc, vitamin B12, and iodine (Pereira, 2011). Algae is increasingly recognized as a sustainable and efficient source of food and feedstock for the future (Zabochnicka-Świątek, 2010). The rich nutritional content of Algae and sustainable qualities make it a transformative food source. As research continues to improve its nutritional profile and productivity, algae is set to play a key role in shaping a sustainable future of nutrition. With these benefits, it's likely that

with increased awareness, people might choose algae as their preferred dietary option.

The potential of algae as a food source is particularly promising due to its capacity to enhance nutritional content, productivity, and organoleptic traits (Torres-Tiji et al., 2020). As seen from the previous sentence, there is a trend promoting modifications to algae to improve its sensory attributes. Despite its high nutritional value, there is a recognized need for sensory changes to make algae more palatable and acceptable to consumers.

2.2.c. Understanding the potential of Algae through art and design

As we navigate the complexities of life on Earth and prepare for the challenges ahead, cultural artifacts like names, emblems, novels, and paintings offer valuable insights into our evolving relationship with the environment (Twelbeck, 2020). Exploring these artistic expressions of Algae will provide a fascinating window into the potential impact of algae.

Let's look at some artworks and speculative designs that show the scope of algae in the food industry. Examining speculative work like Superflux's "Mitigation of Shock," we see a portrayal of a future where the home blends the unsettling with the everyday, reflecting the social and economic impacts of climate change infiltrating our daily lives. Along with many other details, this narrative anticipates a future with food scarcity (Superflux, 2023b). Such predictions underscore the potential for algae to step in as a crucial protein source during times of scarcity. With its nutritional value, accessibility, and forecasts of increased demand for food alternatives, particularly protein, algae emerges as a promising transformative agent in shaping the future of food.

Algae Society BioArt Design Lab brings together these diverse fields to create art with algae, highlighting the connections between different species (Harrower et al., 2022). Similarly, Bell et al. (2022) explore how Alganyl, a plastic made from algae, can be used in eco-friendly designs. These projects show that algae can inspire both art and sustainable practices. One example is "Living Things" by Jacod Douenias and Ethan Frier. Instead of just using algae as a resource, they imagine a future where people and microorganisms live together in harmony. They've

designed household items like furniture that also grow *Spirulina* algae, blurring the lines between humans and microbes (Mattress Factory, 2015). Another example comes from German designer Malu Lücking, who is giving microalgae a new look and taste. Instead of just being seen as a health supplement, Lücking is turning microalgae into gourmet food. By making it visually appealing and tasty, microalgae could become a popular ingredient in cooking (Cairns, 2023).

These projects showcase Algae's potential beyond practical applications, demonstrating its capacity to inspire creativity and sustainable living. Through collaborative efforts, artists, designers, and scientists are exploring innovative ways to utilize algae and reimagine our connection with the natural world. By fostering interdisciplinary dialogue and pushing the boundaries of traditional practices, these initiatives pave the way to integrate algae in our daily lives and cause a transformative change.

2.3. The rich history of Algae usage

For centuries, microalgae, which include cyanobacteria and seaweed, also called macroalgae and sea vegetables, have been consumed as food, primarily in Asia. In recent years, their popularity has been on the rise in Europe as well (Bleakley & Hayes, 2017). Algae have been consumed as food for thousands of years, with a wide variety of species being used in different parts of the world (Borowitzka, 1998). Understanding the historic consumption of algae is crucial as it provides a foundation for exploring and unlocking future possibilities of using the transformative agent in the food industry.

In Europe, over 150 species of algae have been regularly consumed, with 20% approved under the EU Novel Food legislation (Mendes et.al, 2022). Algae are rich in protein, fatty acids, minerals, and vitamins, making them a valuable source of nutrition (Hasan, 2017). They also have potential applications in the food industry as stabilizers, thickeners, and gelling agents (Borowitzka, 1998). Despite their long history of use, the majority of algal species have yet to be evaluated for food and feed applications, suggesting a wealth of untapped potential (Packer, 2016).

Throughout history, algae have served as a significant food source, with evidence dating back to ancient civilizations. Archaeological findings at Monte Verde (in Chile) indicate that

seaweeds were collected for both sustenance and medicinal purposes as far back as 14,000 years ago (Dillehay et al., 2008). Across Asia, seaweeds have been integral to culinary traditions for centuries, particularly in regions like Korea, Japan, and China, where their nutritional properties and distinct flavors have been appreciated (Pereira, 2016).

For populations residing on islands, where traditional agriculture is challenging, reliance on marine resources, including seaweed, has been crucial for sustenance (Mendes et.al, 2022). Coastal communities in various countries such as Portugal, Spain, France, the UK, Ireland, Denmark, Norway, and Iceland have historically harvested seaweed by hand, without the aid of mechanization or equipment (Pereira, 2016). Beyond its culinary value, seaweed has often been a lifeline during times of famine and poverty (Mouritsen et al., 2018).

Arthrospira, commonly known as “Spirulina,” holds a significant historical presence. The Aztecs living near Lake Texcoco in the 14th century harvested Spirulina as an ingredient for a dry cake known as “Tecuitlatl” (Pereira, 2016). Similarly, in Africa, the local population in Chad harvested Spirulina, referred to as “Dihé,” from Lake Kossorom, possibly as early as the 9th century. Sundried Spirulina was utilized in various dishes like meat and vegetable broths, and it was traded in local markets or sold to wholesalers (Gantar & Svirčev, 2008).

After World War II, concerns arose regarding the potential inadequacy of protein supply to meet the needs of the rapidly growing global population (Gantar & Svirčev, 2008). Consequently, algae emerged as a promising protein source due to its well-balanced profile of essential amino acids (Becker, 2007).

Figure 1 (Mendes et.al, 2022) illustrates the historical significance of microalgae and seaweed in various aspects, including their consumption as food, use in supplements, and contribution to the phycocolloid industry. While microalgae consumption has been relatively recent in Europe, global markets such as the US and some Asian countries have witnessed significant commercial development, particularly since the 1980s. Spirulina, for instance, is not only available as a food supplement in various forms but also as an ingredient for the formulation of novel healthy foods (Mendes et.al, 2022).

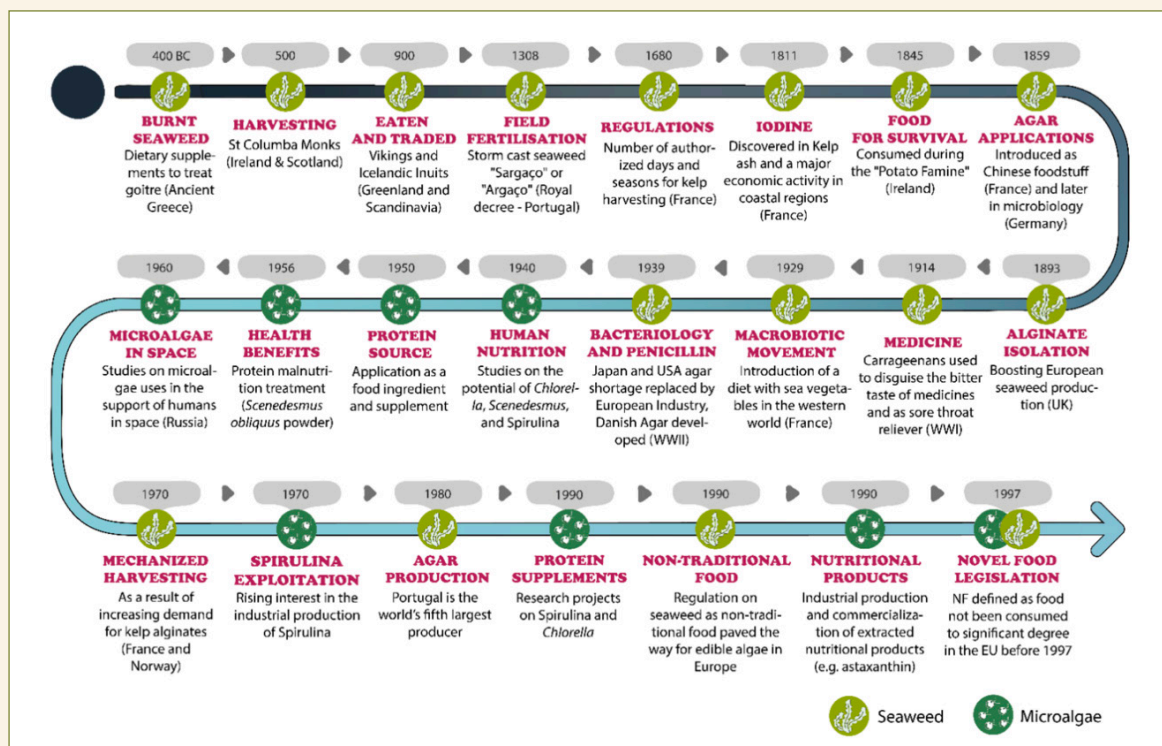


Figure 1. The European historical milestones in the consumption of algae as food and food supplements. (Mendes et.al, 2022).

In conclusion, looking at the historical consumption of Algae across cultures shows the transformative potential that they have in the food industry. With their rich nutrition and diverse flavors, algae offer opportunities to create healthy and delicious dishes. By incorporating algae into menus, chefs can not only differentiate their offerings but also cater to the growing demand for healthier, environmentally conscious dining options, thereby enriching culinary landscapes with both tradition and innovation.

2.4. Algae in the commercial sector

The commercial landscape of algae is brimming with emerging companies poised to redefine the food industry. This analysis delves into the evolving trends within the algae sector for food consumption, drawing insights from various online sources.

A food-tech company harvesting Algae is Alagama. Its website (Home | Algama, 2024) boldly proclaims their mission: "Algama's goal is to feed 10 billion people by 2050, while preserving the planet and offering consumers additional and better choices in foods". Sophie's Bionutrients (Sustainable urban protein, 2024) advocates for bioreactors as the future of food production. They assert, "Growing foods and nutrients using bioreactors is the future. When we have over 9.8 billion population on this planet,

conventional animal farming and agriculture will not be sufficient” . Meanwhile, Phycom (Phycom, 2024), a leading algae company, aims to revolutionize product development by harnessing the nutritional and functional properties of microalgae. Their offerings span a wide range of categories, from meat replacements to smoothies, bakery products, and pasta.

While the claims made by these companies highlight the promising potential of algae-based foods, they require critical evaluation to verify their accuracy and long-term implications. Achieving a balance between sustainability, food security, and environmental stewardship demands a nuanced understanding of the complexities involved in algae cultivation and its integration into the broader food system. A holistic approach that considers ecological, social, and economic factors is essential to ensure that algae-based solutions genuinely benefit both humanity, planet and algae in the long run.

Through interviews of experts in the commercial sector of algae, and the inspection of multiple websites, it becomes apparent that numerous companies are primarily interested in extracting protein from algae to cater to their target consumers’ preferences. Some experts in the industry believe that Algae could be the next most popular protein source after soy (ProVeg Incubator, 2022). The interview findings indicate that these companies are actively working to improve the market appeal of algae-based products. They’re focusing on altering the taste and smell of algae to make it more appealing to a wider audience. The interviews reveal that company stakeholders are actively engaged in research endeavors aimed at neutralizing the flavor and color of algae. Various cultivation methods and experimental approaches are being explored to achieve this objective. Notably, the emphasis is placed on isolating protein from algae, with particular attention to eliminating chlorophyll for color neutrality and minimizing fatty acids to mitigate any undesirable fishy taste. The product is envisioned to be marketed as ‘pure’ protein extract sourced from algae, targeting the business of sports nutrition or as an alternative protein source for daily consumption.

This highlights how new and emerging companies see great promise in algae as a protein source. Their significant investments of time and energy reflect their belief in its potential for revolutionary change. This suggests that algae could indeed be a major force for transformation in the near future.

2.5. Algae in Restaurant Kitchens

In this section, current possibilities of presence of Algae in the restaurant kitchens are discussed. Renowned chef Ángel León's pioneering efforts have been instrumental in introducing microalgae into avant-garde gastronomy (Pérez-Lloréns, 2020). Collaborating with research institutions like CSIC and the University of Cádiz, León explored the culinary potential of these microalgae, culminating in their incorporation into dishes served at his acclaimed restaurant, Aponiente (Pérez-Lloréns, 2019).

The innovative utilization of microalgae in dishes like 'Alkalinity, Fake Oyster' highlights their versatility and unique flavor profiles, captivating the palates of diners and garnering attention at gastronomic events (Pérez-Lloréns, 2019). Furthermore, the European authorization of microalgae as a Novel Food underscores its growing acceptance and integration into Western culinary practices (Pérez-Lloréns, 2019). In parallel, traditional ingredients like *Nostoc sphaericum*, known as *cushuro*, are undergoing a renaissance in Peruvian haute cuisine, further illustrating the global trend of embracing niche ingredients in culinary innovation (MATTA et al., 2016). Algae offers sustainability and nutritional benefits. It's versatile and gradually making its way onto menus beyond avant-garde restaurants, into casual and mid-range restaurants (Pérez-Lloréns, 2020). As algae finds its way into Western kitchens, it signifies not only a shift towards sustainability and culinary experimentation but also a broader cultural exchange that enriches the gastronomic landscape. This emerging trend promises to redefine culinary boundaries and offers exciting opportunities for chefs and diners alike. It shows how Algae could be a game changing transformative agent in the future restaurant kitchens if it is made staple.

For this study, there were observations conducted in two very different kinds of restaurant kitchen spaces. One was conducted at a 1 star Michelin star restaurant and the other one was in a home-run small restaurant. These two different types of restaurants were chosen to be immersed in different vibes in a kitchen environment. As a researcher, the process of immersing oneself in kitchen environments and conducting interviews with experts has proven to be essential in uncovering the intricacies of these spaces. By experiencing the kitchen atmosphere firsthand and engaging with chefs and kitchen staff provided valuable insights

into the dynamics, rules, and power structures that govern daily operations. Time spent within kitchens has provided an opportunity to observe not only the physical layout and design but also the intangible aspects such as stress levels and interpersonal interactions. Conversations with chefs and staff have revealed their perspectives on the functionality and purpose of the kitchen environment. This is further elaborated in Chapter 4.2

An intriguing aspect that emerged from these interactions is the tension between designing the kitchen for the convenience of chefs and prioritizing the protection of ingredients. While chefs may perceive the space as tailored to their needs, it becomes evident that considerations for ingredient safety also heavily influence its layout and organization. For example, there need to be multiple refrigerators for storing different types of food ingredients, and the food ingredients that are used more frequently need to be kept in a refrigerator closer to the cooking area in small quantities. This is done so that the majority of the ingredients are kept safely in the bigger refrigerators and not bothered multiple times a day, whereas the quantity that is likely to be finished needs another space. This shows that the kitchen is catered more to the ingredients, and these ingredients exhibit their agency in the kitchen, in this example, by staying fresh or getting spoiled and the structure of the kitchen, in this example, the refrigerators in the space facilitates or restricts the same. Furthermore, exploring the concept of presence in the kitchen has unveiled a fascinating line of inquiry. Examination of various forms of presence, whether physical, symbolic, or social, has highlighted their influence on the structure and agency of the kitchen. This exploration sheds light on how tasks are performed and decisions are made within these culinary spaces.


The integration of algae into kitchen spaces has the potential to trigger significant transformations, reshaping both the physical infrastructure and the dynamics of culinary practice. How algae manifests in the kitchen environment will dictate the adaptations needed in infrastructure and influence chefs' interactions with these novel surroundings. These changes are poised to create a 'ripple effect' across the entire food ecosystem, affecting suppliers, producers, and end-users alike. Moreover, the introduction of algae could usher in a new dynamic in kitchen power play, a phenomenon that merits further investigation in this study.

2.5. Key takeaways from this chapter

- Neither isolated human actions nor objects alone are responsible for outcomes. Instead, accountability lies in the convergence of human and nonhuman agents, forming a new hybrid entity, requiring shared responsibility for actions and their consequences (Latour, 1999; Knappett & Malafouris, 2008).
- Actor Network Theory (ANT) extends agency to both humans and nonhumans, emphasizing the significance of networks of people and objects in shaping outcomes (Law & Hassard, 1999; Müller, 2015). In this project, the agency of This project acknowledges algae's agency, recognizing its ability to act within the social, political, and economic forces that influence and constrain actions.
- The rise in demand for animal products has significantly increased meat and milk production, contributing to environmental issues such as greenhouse gas emissions. There is an urgent need for alternative protein sources to mitigate these environmental impacts in the meat industry and address nutritional deficiencies associated with veganism (Gerber et al., 2013; Nikolić et al., 2019; Bali et al., 2023)
- Algae offer significant nutritional benefits, including essential omega-3 and omega-6 fatty acids, vitamins, and minerals. As a sustainable and efficient food source, algae can play a crucial role in addressing the challenges of the current global food system, which is detrimental to both human and planetary health (Poppy et al., 2019; Knorr, 2022).
- Historical examples, such as wheat in human societies, demonstrate how plants can profoundly influence human affairs (Twelbeck, 2020; Harari, 2015). Algae, with its rich nutritional content and sustainability, holds similar transformative potential for the future. Evidence from art, its high nutritional value, its introduction in restaurants, and its long and rich history support this potential.
- However, in the case of algae, there is a prevalent pattern of exploitation rather than care. From commercial sectors to laboratories, the focus is on extracting benefits and altering its organoleptic traits, often without considering the well-being of the algae itself. This approach mirrors the exploitative practices seen in the current food industry.

Chapter 3: Research Approach





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3.1. More than human Lens

As seen in the previous chapter, there is a prevalent pattern of exploitation of algae, focusing on extracting benefits and altering its traits without considering its well-being, mirroring the exploitative practices of the current food industry. To address this, a 'more-than-human' lens will be used in this study. This section includes literature that helps in understanding this lens and explains why it is essential.

Understanding the necessity of adopting a more-than-human lens is crucial in contemporary design thinking. To illustrate this, consider the example of a plastic bag, as discussed by Ron Wakkary in his conference talk, "Things We Could Design for More-than-Human-Centered Worlds." (Elisava, 2021). The plastic bag, a patented product, was designed to address a specific problem: it is easy to produce, inexpensive, and provides convenience for carrying items. However, the real-life impact of plastic bags is starkly different; millions of them end up polluting our oceans. This discrepancy highlights the importance of not only solving immediate design problems but also understanding how a product exists and impacts the world throughout its lifecycle. Recognizing the agency of any new product or idea in the world is essential. When we consider algae as an agent, acknowledging its various expressions of agency throughout its life, we move beyond a human-centered perspective. This approach allows us to explore the interactions and impacts of algae in a broader ecological context, offering a more comprehensive understanding of its significance within ecosystems and the environment.

The concept of more-than-human design challenges traditional human-centered design, emphasizing the interconnectedness of people, technology, and the environment (Giaccardi & Redström, 2020). This approach expands the scope of design to include non-human entities, such as animals and machines, in shaping the future (Maffei, 2022). Posthuman theories encompass a range of movements and philosophies, including transhumanism, new materialism, and object-oriented ontology (Sorgner, 2014). These theories challenge traditional human-centric perspectives and explore the relationship between humans and non-humans, often through the lens of literature (Sanchez, 2015).

This lens equality, as instead of favoring a direct connection

between a technology and its user(s), a more-than-human-design focuses on managing various relationships at once. This means no one relationship is more important than others. It's about handling, presenting, and negotiating multiple connections equally. (Giaccardi & Redström, 2020)

In both contemporary and traditional theories, a recurring theme emerges: the interconnectedness of objects and non-humans with humans. Notably, within the realm of posthumanism, various theories underscore this concept. Posthumanism encompasses disciplines such as science and technology studies (STS), Actor-Network Theory (ANT), and Object-Oriented Ontology (OOO). ANT, for instance, emphasizes the agency of objects and their relations to humans, rejecting the centralization of human actors (Latour, 1996). Similarly, New Materialism, a subset of posthumanism, prioritizes the study of matter and avoids binary distinctions like mind-body and human-nonhuman (Braidotti, 2019). OOO takes this further by asserting equality among all entities, focusing on the tangible qualities and aesthetics of objects (Harman, 2018).

Moreover, in the humanities and social sciences, the notion of decentering serves as a critical perspective and methodological tool. Decentering challenges dominant viewpoints, theories, and narratives, advocating for the recognition and prioritization of multiple voices, especially those traditionally marginalized or excluded (Nicenboim et al., 2023). In fields like Human-Computer Interaction (HCI) and design, decentering disrupts the human-centric focus prevalent in traditional approaches. It advocates for the inclusion of nonhuman agency in design processes, acknowledging the co-participation of humans and nonhumans in shaping the world (Giaccardi & Redström 2020).

In traditional knowledge systems, humans and nonhumans are intertwined. For example, in indigenous cultures like those in New Zealand, rivers are seen as living entities with legal rights. Since 2017, some of these rivers have been officially granted this formal status. (Roy, 2017). Traditional knowledge doesn't separate humans from nonhumans; instead, they coexist and interact within their environment. This perspective could inform design studies by encouraging a more conscious approach to nonhuman elements (Tarcán, 2022)

This convergence of modern and traditional theories

underscores the significance of acknowledging the interconnectedness of humans and non-humans. Rather than existing as separate entities, they are intricately intertwined, shaping and influencing each other in complex ways. This study advocates for treating non-humans with the same care and nurturing as we do for our loved ones. It argues that if everything has agency, then we should extend our care to non-human entities around us. To address the patterns of exploitation with algae, this study seeks to shift the focus away from human interests and instead prioritize the care and nurturing of algae. The objective is to use a more-than-human lens to establish a relationship of mutual care, where the primary concern is the well-being of algae rather than solely benefiting humans. By centering algae in this way, the study aims to promote a deeper understanding of and respect for non-human life forms.

“By seeing the self not as an individual hero, but as one among many — human and non-human — a new kind of tentacular, multi-kind, multi-species politics of care might emerge” (Superflux, 2023a)

This quote by Anab Jain talks about the mutualistic care that this research is trying to achieve.

More-than-human design can also be considered as a method to design from the lens of objects, which allows one to see the world through a different lens. Some methods used in more-than-human design include thing ethnography, where objects are fitted with sensors and cameras to see from their perspective (Giaccardi et al., 2016). Autoethnographic documentation involves using artifacts, photos, and reflective diaries to gain insights (Tarcan, 2022). By considering one’s surroundings, a making activity can become more-than-human, involving non-human elements. Co-design, participatory design, and speculative design also contribute to a diverse approach. Additionally, approaches like Practice-Based Research (PBR) enrich discussions about non-humans and traditional knowledge, highlighting the process of design (Tarcan, 2022).

In this project, the concept of “More-than-Human” design serves as a foundational lens, incorporating speculative design as a key approach.

3.2. Speculative design approach

Speculative design employs design as a platform for imagining and creating alternative sociotechnical narratives that challenge our current relationship with reality, opening up discussion and debate about current and emerging issues (Dunne & Raby, 2013). As defined by DiSalvo (2012), speculative design is a practice that uses design to create imaginative projections of alternate presents and possible futures. It is a form of critical design that challenges assumptions and preconceptions about the role of products in everyday life. Barendregt (2021) further emphasizes the potential of speculative design for raising critical discussion and public engagement on science, technology, and society, comparing it to thought experiments. Chen (2022) adds that speculative design can be seen as a method to discover and discuss technology's influence on everyday life, blurring the lines between design and art. Auger (2013) highlights the dual purpose of speculative design: to enable thinking about the future and to critique current practice, emphasizing the importance of managing speculation in design proposals.

The constructs that form our understanding of the world are continually outpaced by the sheer force and speed of technological, political, and social change. Modernism's methodologies of mapping, designing, and planning for controlling and changing deeply complex systems may not address the challenges we face today. Anab Jain (2023a) proposes that we may need to work in networked, symbiotic companionships, like mycelial arrangements (the structure of fungi), to generate infinite micro-revolutions .

In the context of food practices, speculative design involves the creation of imaginative and often provocative representations of alternate food futures (DiSalvo, 2012). This can be seen in projects like the Parlour of Food Futures, which uses a Tarot parlor to explore possible food-tech futures (Dolejšová, 2018). Speculative design is also used to develop provocative solutions addressing global health and food challenges (Tseklevs & Pollastri, 2019). The Edible Speculations project further explores the potential of speculative design in engaging with food-tech issues through speculative design events (Dolejšová, 2021). These studies collectively demonstrate the potential of speculative design in challenging and reimagining food practices.

Anab Jain (2023b), in her TED Talk “Why We Need to Imagine Different Futures,” mentions the phenomenon of “Bregret,” which is a word play of Brexit and Regret, where people who voted for Brexit did so without fully considering the potential consequences. This underscores the importance of speculative design in anticipating and exploring the real-life impacts of decisions before they are made.

The research direction is further illustrated by the case of algae cultivation. Initially grown under controlled laboratory conditions, algae face real-life consequences once moved out of the lab. A visit to AlgaePARC, a research facility for algae, was conducted for observation and interviews. This visit is further elaborated on in the methodology section (Chapter 4.2). This visit highlighted the need for speculative design to address these challenges, as it can create concrete experiences that bridge the disconnect between today and tomorrow. Creating speculative scenarios is crucial so that people can ‘live and experience’ these near futures, fostering optimism and proactive engagement with possible outcomes.

3.3. Combination of the More than human lens with speculative design

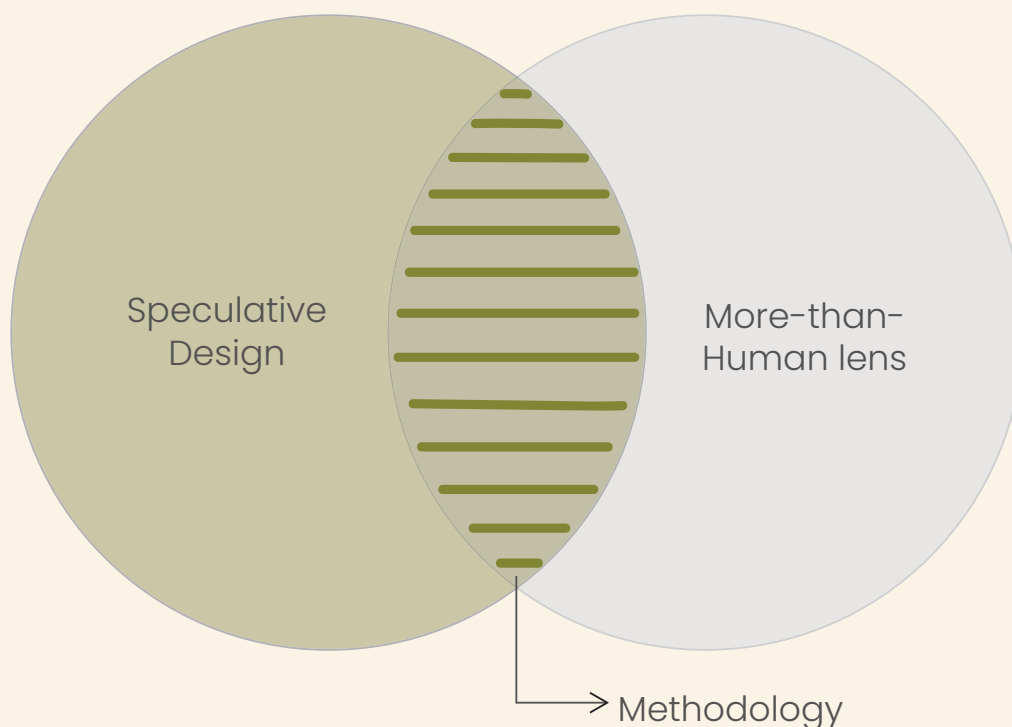


Figure 2. Combination of Speculative design and More than human Lens

This aspect also aligns with the realm of biodesign fiction, wherein designers explore the potential outcomes of biotechnological advancements through scenarios or prototypes before they become reality (Ginsberg et al., 2014). This research is situated within a speculative scenario of biodesign, approached from a more-than-human perspective where the focus is centered on the biological agent.

This approach is anticipated to facilitate understanding the tangible implications of seemingly idealistic scenarios. This study argues that embracing speculative design within a more-than-human lens not only facilitates the forecast of potential futures but also empowers individuals to live more responsibly within them.

3.4. Key takeaways from this chapter

- There is a prevalent pattern of exploiting algae for its benefits without considering its well-being, similar to practices in the current food industry. To address this, this study adopts a 'more-than-human' lens, emphasizing the importance of considering the well-being and agency of non-human entities like algae.
- The more-than-human design approach recognizes the interconnectedness of humans, non-humans, technology, and the environment, challenging traditional human-centered design perspectives.
- Creating speculative scenarios is crucial so that people can 'live and experience' these near futures, fostering optimism and proactive engagement with possible outcomes.
- This project explores a combination of speculative design and a more-than-human lens aims to understand and address real-life implications, fostering a relationship of mutual care and respect for non-human entities like algae.



Chapter 4: Research Activities

4.1. Aim and overview of the research activities

After reviewing the literature on algae, its potential applications, and exploratory practices, it became apparent that taking a more-than-human perspective on algae care and using a speculative design methodology was necessary. It was essential to conduct additional research activities to explore this research further. The aims of these research activities were as follows:

1. **Exploratory Research:** To generate findings and nuances in the field of algae in restaurants.
2. **Scenario Creation:** To create a speculative scenario within the context of algae in the food industry.

Given that this field of study intersects both More-than-Human Design and Speculative Design, the research activities blend these two disciplines. The selection of these activities was carefully considered and inspired by existing research, with some methods being specially developed to suit the scope of this study. This careful selection instils confidence in the research process.

The research activities logically progress from one step to the next, with the results of each stage informing the subsequent steps. This comprehensive and cohesive exploration of the subject matter ensures a thorough understanding. This chapter explains the activities in depth. Figure 3 presents the two objectives of the research approach and an overview of the activities below.

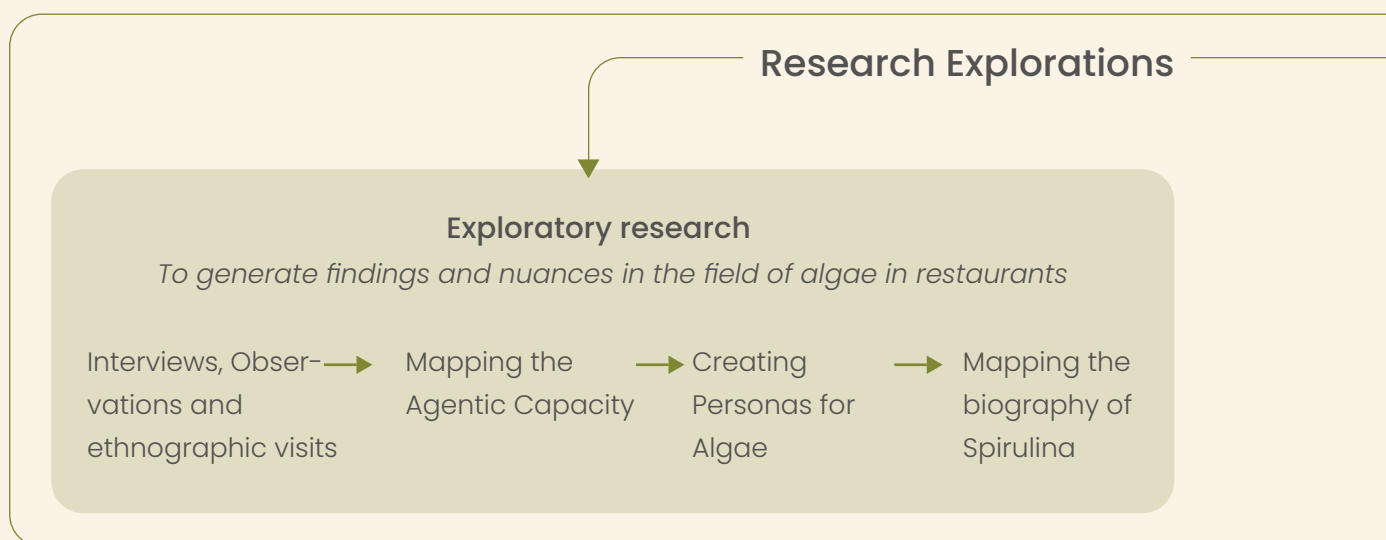


Figure 3. Overview of explorations based on the aim of the research activities

4.2. Exploratory research

4.2.a. Interviews, Observations and ethnographic visits

This project employed a mixed-method approach, incorporating interviews, observations, and ethnographic visits to understand the subject matter comprehensively.

Interviews were conducted with industry experts, biologists and chefs, whose valuable insights into the intricacies of the kitchen ecosystem and the processes involved in algae production were instrumental in the research.

Ethnographic research, a key component of the study, involved conducting observations in various kitchen settings to understand their operations thoroughly. Two distinct types of kitchens were studied:

- **Kokam, Delft:** This small Indian restaurant with two kitchen staff provided an intimate view of the dynamics in a modest kitchen setting.
- **Harry's, Maastricht:** A Michelin-starred restaurant (1 star) that offered a detailed perspective on the operations in a high-end, highly detailed kitchen environment.

Interviews with the chefs from these restaurants were also conducted to gain further insights into the nuances of kitchen operations and ingredient placements. These observations and

Scenario creation

To create a speculative scenario within the context of algae in the food industry

Methodology of the Future wheels → Mapping the journey of algae

interviews were crucial in understanding the existing kitchen ecosystem and the factors that influence it. Figure 4. illustrates images from the observations conducted in these two different types of kitchens.



Figure 4: Images from observations in the two types of restaurant kitchens

A visit was made to AlgaePARC at the Wageningen University campus; a leading multidisciplinary research initiative focused on the microalgae and cyanobacteria process chain. The facility features various reactor types and sizes for preliminary studies, biomass generation for pilot-scale reactors, and year-round production (About AlgaePARC | AlgaeParc, n.d.). The infrastructure includes :

Indoor reactors (25L, 250L) serve as the starting point for initial screenings and physiological studies, providing a practical platform for early-stage research.

Pilot-scale reactors (1700L) for commercial-scale simulation, including two LGem® 1700L tubular photobioreactors.

During the visit, discussions with biologists and scientists provided extensive information on the current algae cultivation and experimentation methods. Figure 5 presents images from the AlgaePARC visit.

Interviews with company owners in the algae industry were a crucial part of the visit, providing valuable insights into the commercial realities of algae production. These discussions offered a unique perspective on the manufacturing processes and the challenges faced in the commercial sector.

Overall, this approach provided a well-rounded understanding of the current realities in kitchens, laboratories, and the commercial sector, contributing significantly to the project's objectives.

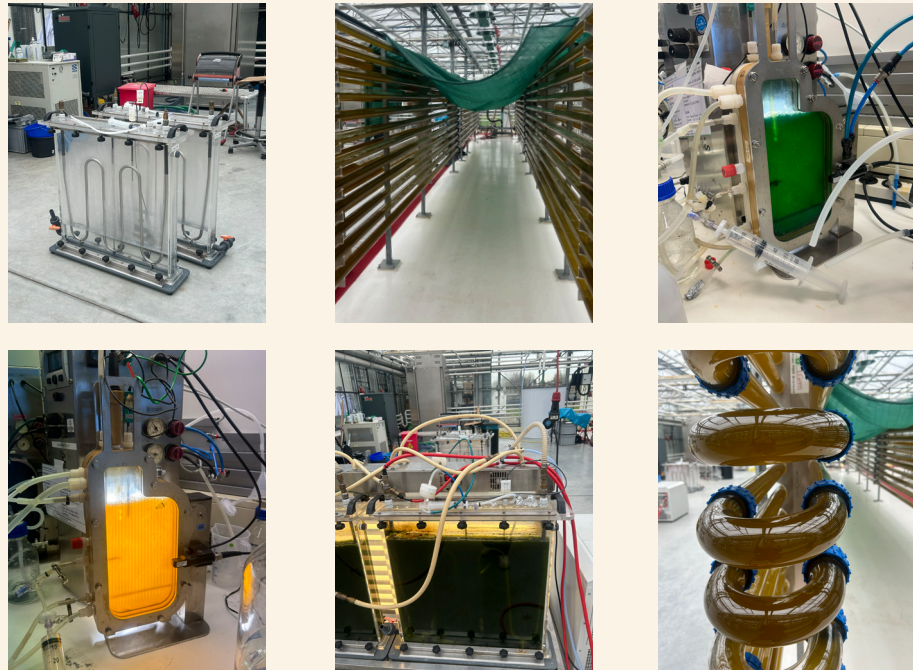


Figure 5: Images from the AlgaePARC visit

4.2.b. Mapping the agentic capacity

Reflecting on Ron Wakkary's previously discussed example of a plastic bag agency (Elisava, 2021), it becomes evident that recognizing a plastic agency can shed light on its negative impacts. Treating plastic as an agent and mapping its capacity to express agency in the real world brings its adverse effects into sharper focus.

Similarly, it became crucial to map algae's agentic capacity as part of the methodology. This step aimed to understand and illustrate how algae can express agency within different contexts.

Figure 6 presents the mapped agentic capacity of algae, highlighting its potential roles and interactions in both natural and engineered environments.

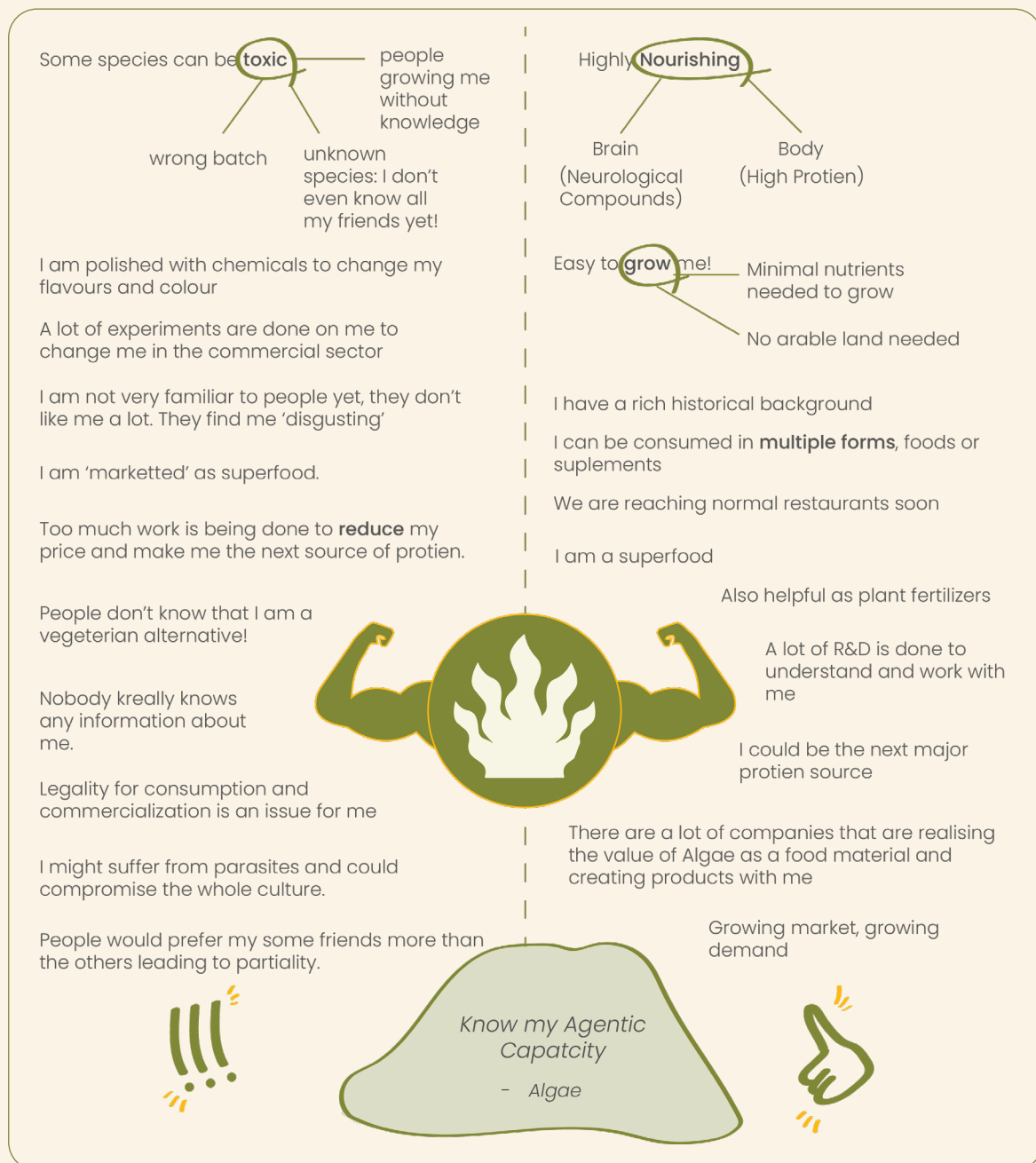


Figure 6: Agentic capacity of Algae

4.2.c. Creating Personas for Algae

Creating personas can significantly enhance understanding of users' needs, experiences, behaviours, and goals. This practice encourages designers to move beyond their perspectives and recognize that different individuals have distinct needs and expectations. Furthermore, it fosters a deeper identification with the users being designed for (Dam & Siang, 2024).

In this study, personas were created for algae to comprehend their unique characteristics better and prioritize their needs within

the project's more-than-human focus. By developing these personas, it becomes possible to design with a deeper appreciation for the diverse roles algae can play, fostering a stronger connection with the natural world. It would additionally help in building scenarios for the diversity of the algae.

Three distinct personas were developed:

Algacore: This persona represents commercial algae cultivated in farms and valued for its unique properties.

Verdigris: This persona depicts free-spirited, wandering algae embodying a hippie-like nature.

Chroma: This persona characterizes an artistic algae associated with the elegant and sophisticated segments of the algae world.

Figure 7 below provides a detailed illustration of these personas.

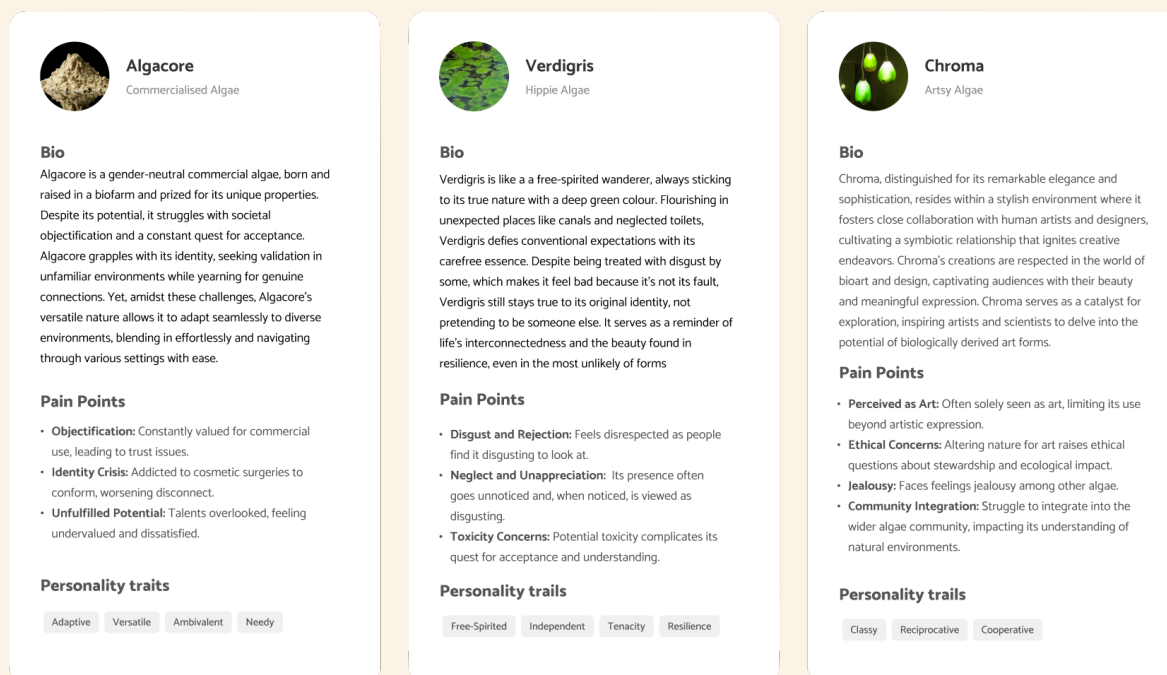


Figure 7: Three personas of Algae

These personas of Algae helped in setting grounds for the imagination of Algae as having traits that could exhibit Agency.

4.2.d. Mapping the biography of Spirulina

This research was narrowed down to focus on Spirulina for three primary reasons: (1) it is edible, (2) it is well-known, enhancing audience relatability, and (3) extensive data is available on it.

Focusing on one type of algae was essential, as different algae have varying requirements, and generalizing them would be unfair. Additionally, spirulina encompassed all the three scenarios stated above during its different stages and applications.

This step in the methodology aimed to thoroughly understand Spirulina's preferences, identifying both favorable and unfavorable conditions for its growth. To achieve this, the book 'Grow Your Own Spirulina' by Jean-Paul Jourdan (2001) was referenced. This book was treated as an "autobiography" of Spirulina, providing insights into its ideal growing conditions. The information from this book was used to imagine Spirulina as a user, analyzing its needs and preferences as if conducting an interview. Points from the book that contribute to Spirulina's health and vitality were considered its "likes" and were integral to the study.

The preferences of Spirulina for its Climate, Ponds, Medium, Seeding, Harvesting, Feeding, Taking care, Drying, Storage, and Consumption were mapped on Figma board, as seen in Figure 8.

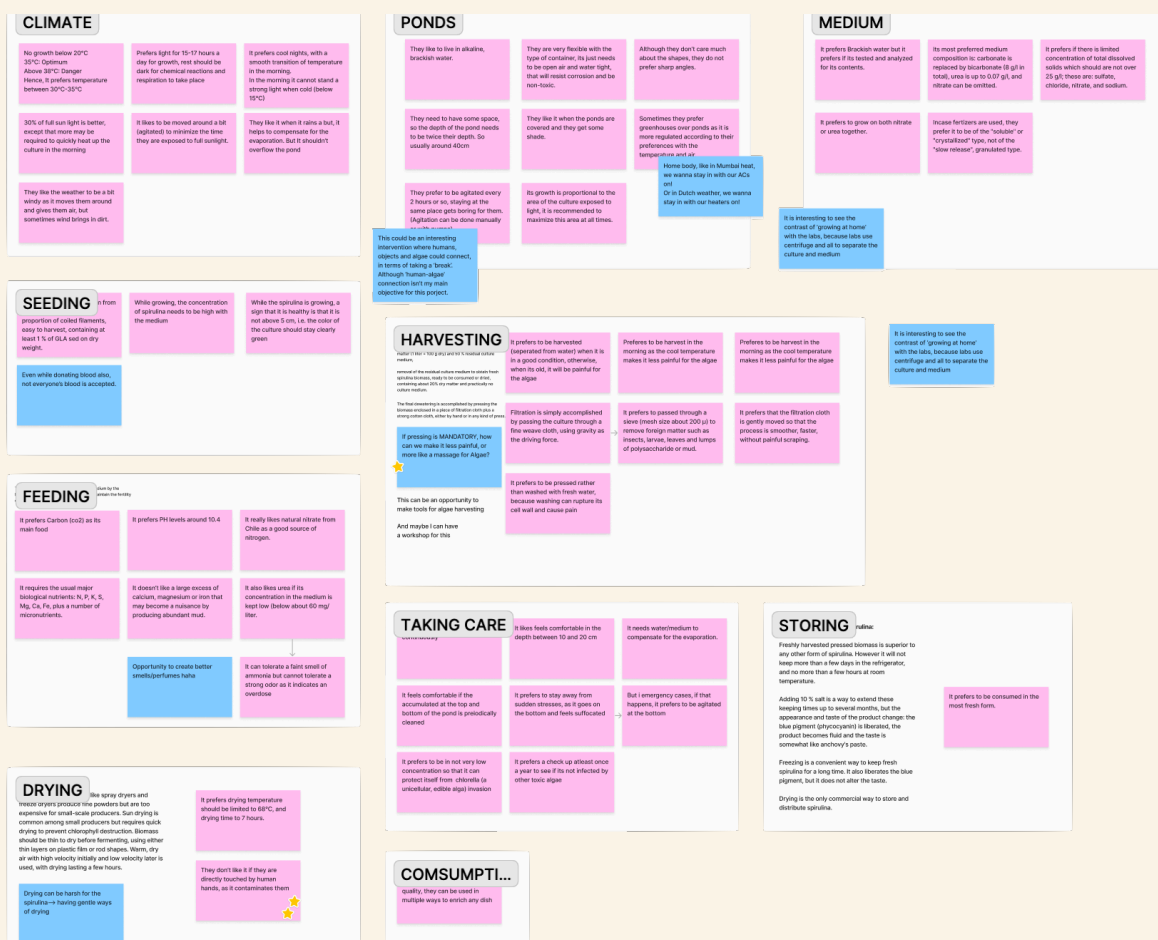


Figure 8. Mapping the likes of Spirulina

This approach facilitated treating Spirulina as a user, allowing it to be viewed as an equal alongside humans. It highlighted that even non-humans have likes and dislikes, and these preferences should be valued in the research. This application of the exploration of the biography of Spirulina will be referred to in the 'Final Design' chapter.

4.3. Scenario creation

4.3.a. Methodology of the Future wheels

The future wheel is a method for determining and organizing the primary, secondary, and tertiary effects of events, trends, new problems, and potential future decisions. Jerome C. Glenn, an Antioch Graduate School of Education student, created it in 1971 (Glenn, 2021).

The Futures Wheel was used in this study to structure future-focused questions and thought processes; it is similar to organized brainstorming. The name of a trend or event is written in the center, and tiny spokes are drawn outward from the center to resemble a wheel. Each 'spoke' has a primary influence or consequence (Glenn, 2021) written at the conclusion. The second ring of the wheel is formed by the secondary impacts of each main hit. This ripple effect continues until a complete picture of the event's or trend's ramifications emerges (Glenn, 2021). The Future Wheel was created digitally for this study using the Figma software. In this study, two Future Wheels were constructed, each mapping three levels of consequences. These levels were sequential, building upon one another, and were informed by data from literature reviews, interviews, observations, industry projections, and speculative thinking. The Future Wheel was created based on the exploratory research and the literature research conducted so far.

One of the future wheels centered on "Algae as a common food ingredient in restaurants." The objective was to analyze how this trend could reshape surrounding structures and how these structures might influence the changes associated with algae. This approach facilitated the comprehension of alternative scenarios. Particularly intriguing scenarios were identified with a "?" sticker. Several of these potential scenarios are depicted in Figure 9.

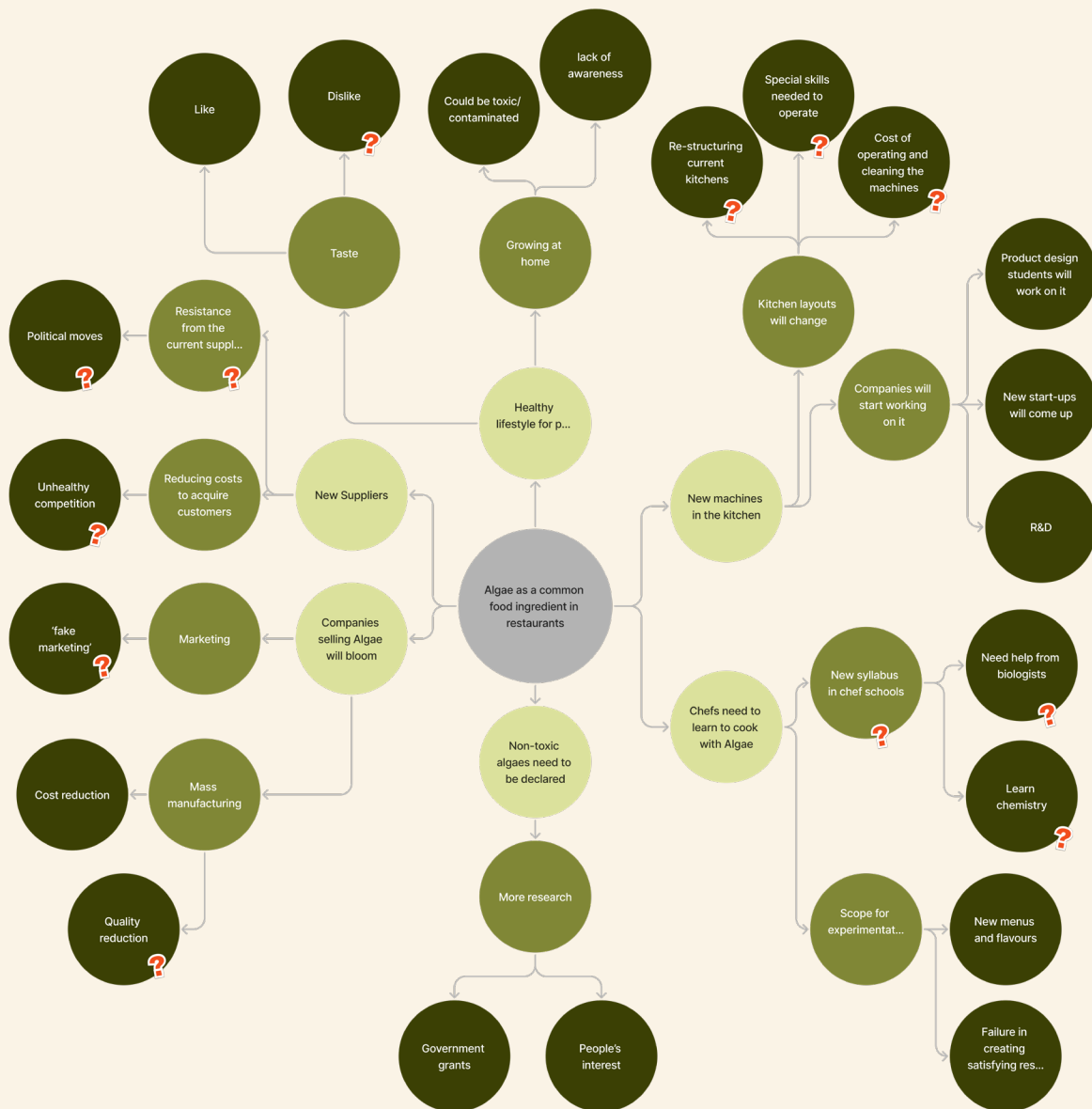


Figure 9. Future Wheel 1: with center scenario *Algae as a common food ingredient in restaurants*.

After the first wheel was created, multiple areas of interest were identified. However, the goal was to devise a concept grounded in reality yet forward-looking. Taking cues from current bioreactors and amalgamating ideas and alternative scenarios from Figure 9, a new scenario emerged. The central theme shifted to “Harvesting Algae in restaurants.” In this envisioned scenario, algae emerge as a crucial food component cultivated in diverse restaurant kitchens. Fresh algae are harvested on demand, enriching dishes with flavorful and nutrient-packed attributes. Diners indulge in many recipes, ranging from algae-infused soups to salads and beyond. The research question posed for the second future wheel was: “How do algae systems exert influence within their ecological framework, and how do the structural

aspects of surrounding ecosystems either facilitate or impede the agency of algae?”. The Future Wheel is devised in Figure 10 and aided in shifting from linear, hierarchical, and simplistic perspectives towards a more network-oriented, organic, and intricate mode of thinking in formulating this speculative scenario.

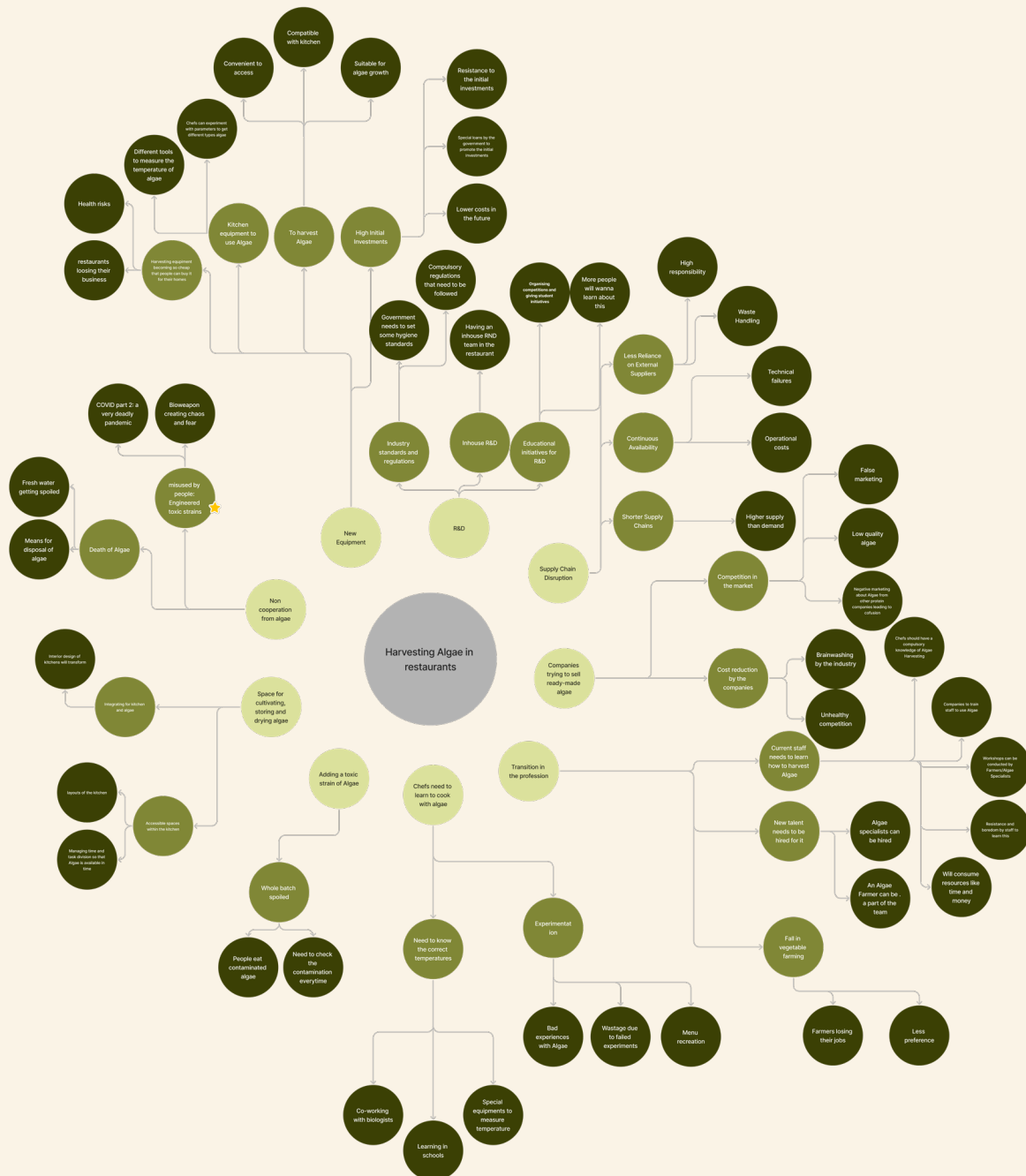


Figure 10. Future Wheel 2: with center consequence: Harvesting Algae in restaurants

As seen in Figure 10 creation of the second wheel gave rise to Utopian and Distopian consequences, and scenarios.

Some of the scenarios that were interesting for the study are as follows:

- **Algae cultivation in restaurants:** Restaurants might incorporate small-scale algae bioreactors within their premises to ensure a fresh and constant supply of algae for their dishes. Innovative cultivation techniques could be developed to optimize algae growth in restaurant settings.
- **Government incentives:** European governments might provide incentives or subsidies to encourage restaurants to adopt algae cultivation and incorporate algae-based dishes into their menus, as part of broader sustainability initiatives.
- **Bioweapon Threat:** Algae bioreactors are weaponized by rogue actors or terrorist organizations, who engineer genetically modified algae strains to produce deadly toxins or pathogens. Covertly introduced into restaurant kitchens worldwide, these bioweapons unleash pandemics of unprecedented scale and lethality, plunging humanity into chaos and fear.
- **Economic Collapse:** The rapid proliferation of algae bioreactors disrupts global markets and triggers economic collapse, as traditional industries reliant on agriculture and food production are rendered obsolete. Mass unemployment, poverty, and civil unrest follow, as societies grapple with the upheaval wrought by the sudden shift towards algae-based economies.

The future wheel unveiled various scenarios, showcasing both positive and negative outcomes. While dystopian scenarios portrayed undesirable futures, the focus of this project is on fostering a utopian world centered around algae care.

4.3.b. Mapping the journey of Algae

Algae cultivation in restaurants was selected based on the previously discussed utopian scenario. In this scenario, restaurants incorporate small-scale algae bioreactors to ensure a fresh and constant algae supply for their dishes. A journey was mapped within this context, considering multiple speculative possibilities to broaden and refine the scenario. This mapping was informed by prior exploratory research and the Wheel of Future methodology.

Mapping the journey of algae helped identify pain points and

areas for improvement. For instance, the current practice of harvesting algae during the growing stage can be suboptimal. By examining the bacterial growth curve (Bailey, 2024), it was determined that harvesting should occur just before the stationary phase to avoid unnecessary stress on the algae. Figure 11. Illustrates these findings and the speculative journey.



Figure 11. Journey of Algae

Additionally, this mapping exercise highlighted several aspects that had been previously overlooked. It provided a comprehensive view of the entire lifecycle of spirulina in the kitchen, covering details such as waste disposal, cleaning protocols, and storage requirements. This holistic approach ensured a thorough understanding of the algae's integration into a restaurant setting, from cultivation to disposal and potential entanglements.



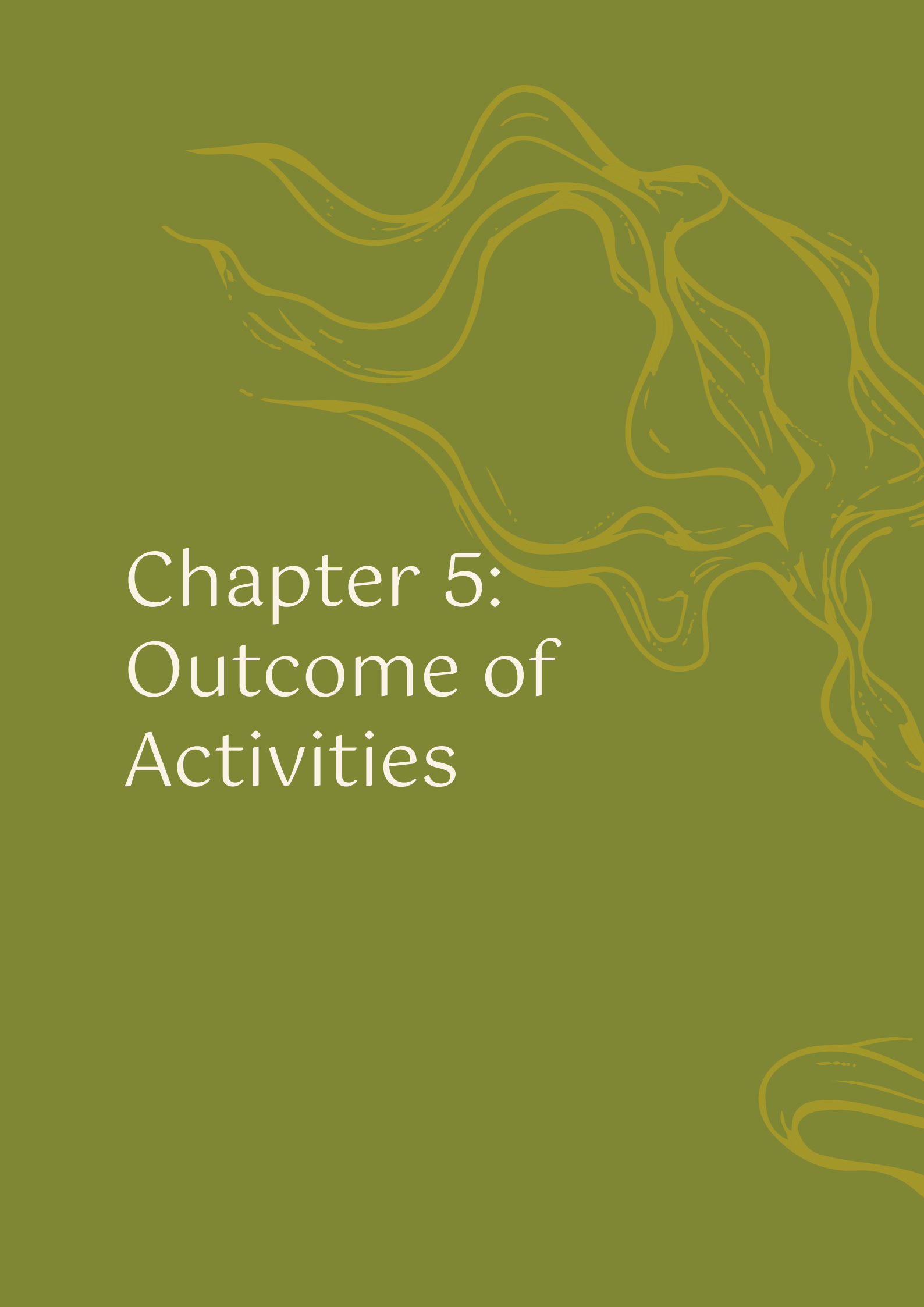
4.4. Key takeaways from this chapter

The activities employed in this research yielded two significant outcomes:

- **Exploratory Research Findings:** The research process generated valuable findings that provide insights and inform the project's subsequent phases.
- **Development of a Concrete Scenario:** A detailed and robust scenario was established to serve as a consistent framework throughout the project. This scenario includes comprehensive details that are crucial for consideration in subsequent design stages.

The results of the activities will be discussed in the next chapter.





Chapter 5: Outcome of Activities

5.1. Exploratory Research insights

The Exploratory Research, combined with the literature review mentioned in Chapters 1 and 2, led to nuanced insights about the presence of algae in the context of the restaurant ecosystem. These insights are summarized below as follows:

Influence on Kitchen Layout and Organization:

In restaurant kitchens, chefs often perceive the environment as tailored to their needs. However, it becomes apparent that ingredient considerations heavily influence the layout and organization. Integrating algae could reshape the physical infrastructure and dynamics of culinary practice.

Transition from Laboratories to Kitchens:

Algae is currently grown in controlled laboratory environments or by local farmers. However, cultivating algae in restaurant kitchens introduces new challenges. Factors such as kitchen heat, noise, and a high-stress environment, combined with non-expert handling, can affect algae growth. Establishing best practices for algae care at this stage is crucial for successful integration and sustainability.

Systemic Entanglements in the Restaurant Industry:

Integrating algae will cause systemic changes across the restaurant ecosystem, with wide-reaching implications. For instance, new equipment for algae cultivation will require specialized chef training and could influence educational curricula in design schools. This ripple effect extends to industries like education, waste management, interior design, policy-making, etc. Anticipated changes include bioreactor procurement, competition with commercial industries, and new policies and cleaning protocols, presenting challenges that require cross-sector collaboration to ensure algae care.

Algae Care and Equipment Design:

Current methods for handling algae can be harsh on the algae itself. For instance, Jourdan (2001), in “How to Grow Your Spirulina”, describes the final dewatering process, which involves pressing the biomass wrapped in filtration and cotton cloths, either manually or with a press. This method can be stressful for the algae. There is a need to develop tools that are gentle and algae-friendly, ensuring the algae is treated with care throughout the

handling process.

Understanding Algae Preferences:

Different types of algae have unique preferences, making it essential to understand each type's specific needs and characteristics. Recognizing these individual "personalities" helps ensure optimal care and integration into various applications.

Balancing Algae Care and Consumption:

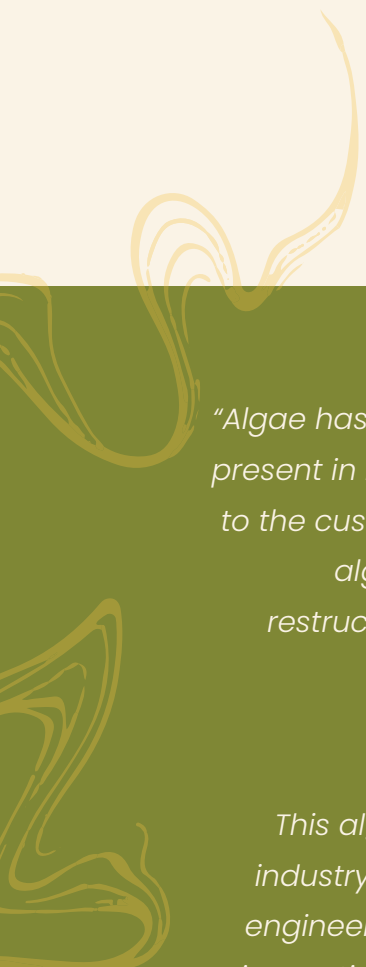
While algae care is emphasized, the ultimate goal in restaurants is to consume the algae. Addressing this paradox involves determining the best time for consumption, ideally before the stationary growth phase. Promoting responsible consumption practices, including moderation and avoiding over-exploitation, is essential for balancing care and utilization.

5.2. Constructed scenario

Based on the exploratory research findings and the scenario creation activities, following is the scenario that was created to ground the further speculations:



Figure 12. Algae Bioreactors in chef schools to teach the new-age chefs about Algae-friendly kitchens (generated by the author using ChatGPT 4o)



"Algae has become a staple in restaurant kitchens. Algae bioreactors are present in restaurant kitchens, where fresh algae is harvested and served to the customers. The chefs need to know when to exactly harvest these algae, so that it is not harmful for the algae. Kitchens are restructured to harmoniously blend cultivation areas with cooking stations, creating a comfortable and symbiotic environment for the algae.

This algae-centric world is creating ripple-effects within the food industry, and beyond! It has encouraged new-age chefs, designers, engineers and biologists to further learn about algae (Figure 10), as it is creating new job openings for the up and coming talent. It has also caused universities to include Algae learning in their curriculum.

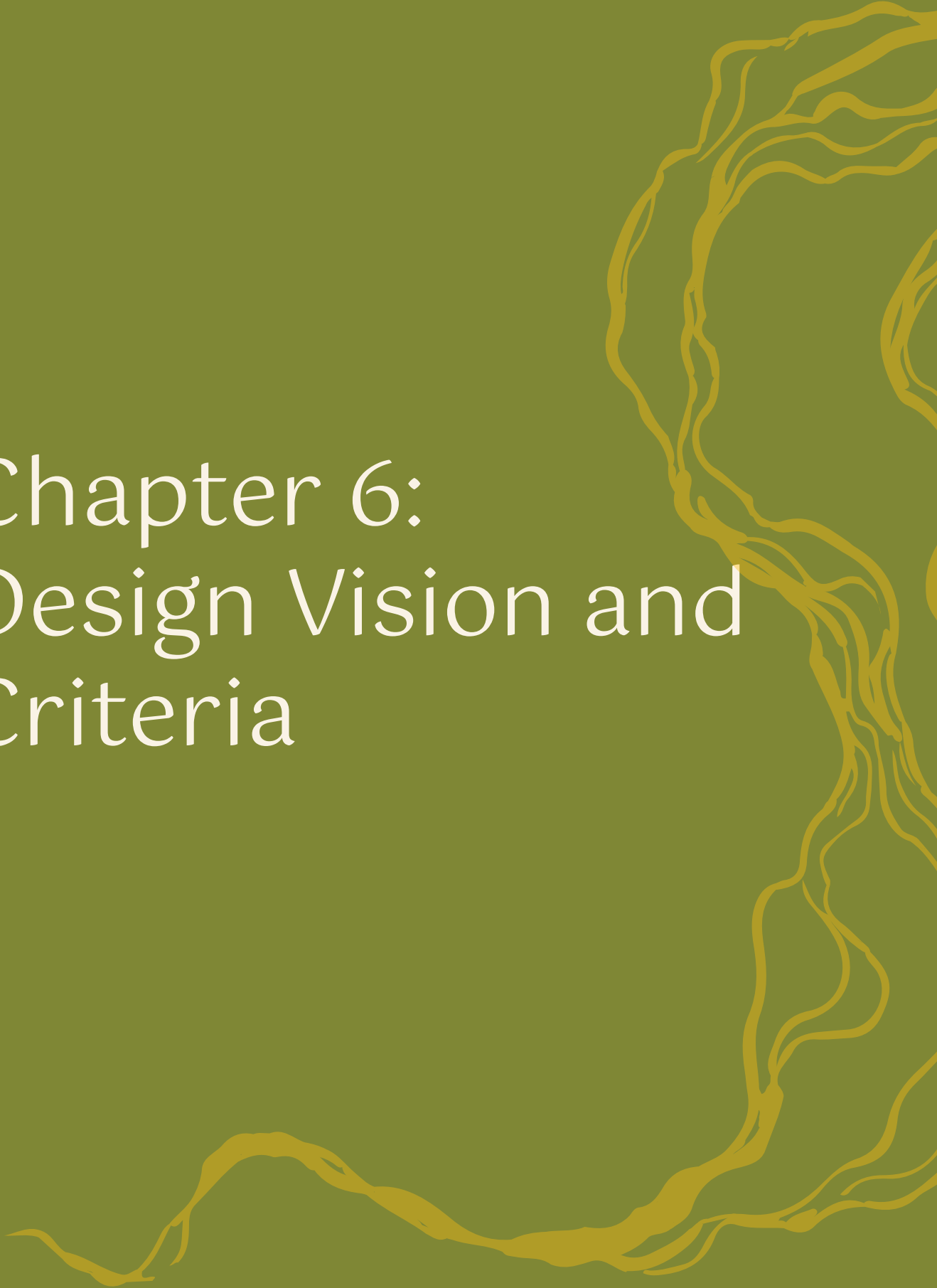
In parallel, Government is working hard to build policies for the wellbeing of Algae. There is a special government body dedicated to ensure that. Algae friendly equipment usage is mandatory while interacting with it, hence there are companies investing millions of dollars to build algae-friendly products.

Algae is transforming how we live, and we are trying our best to keep up!"

This scenario was constructed to demonstrate the algae care, and also provide an overview of the possible entanglements within the food industry.

The findings and the constructed scenario were subsequently used to brainstorm ideas for future research and applications.

Chapter 6: Design Vision and Criteria



A Design Vision and Design Criteria were created based on the literature review, research activities and the outcome of the research activities, also keeping in mind the project aim sub-questions mentioned in the introduction. They are as follows:

6.1. Design Vision

Reflecting back on the project aim:

“Aim of this project is to provide an experience that helps stakeholders within the food industry to critically reflect on the possibility of Algae becoming a transformative agent in the future of the food ecosystem”.

As mentioned in the project aim, this project adopts an experience-centered approach to speculative practice aimed at suspending disbelief. Bleecker’s concept of Design Fiction (2009) exemplifies this approach through the creation of objects that convey narratives. In this context, speculative design work involves creating and showcasing artifacts and materials, known as ‘diegetic prototypes’, which communicate a narrative world (or diegesis) and embody its values (Bleecker, 2009).

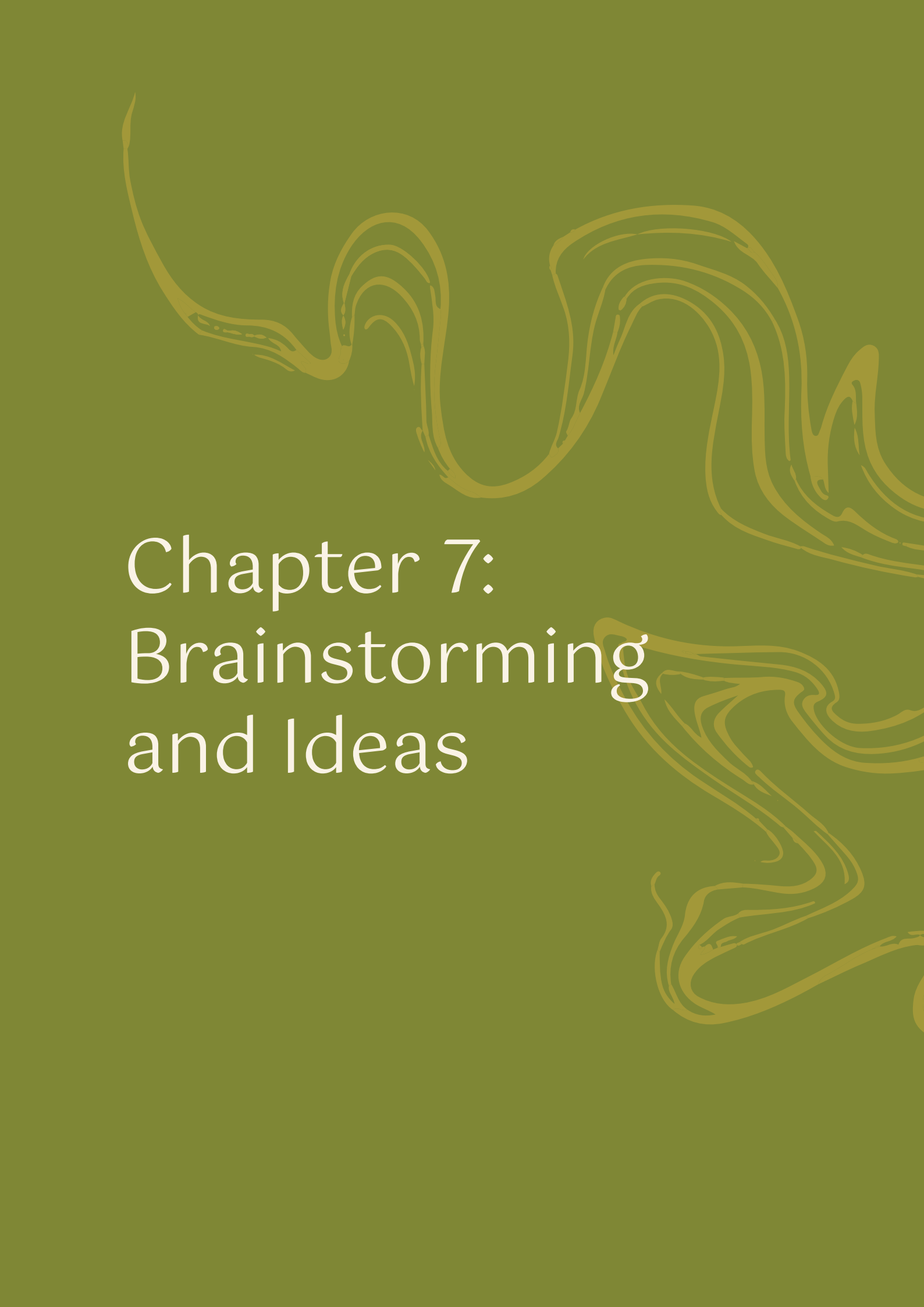
The objective of this project is to create ‘diegetic prototypes’ that immerse individuals in a futuristic scenario, facilitating storytelling and enhancing engagement. The design approach involved utilizing a series of reality-grounded artifacts to communicate a future where algae are nurtured and valued.

6.2. Design Criteria

Keeping in mind the design questions mentioned in the introduction, criteria of the designs is that they should effectively convey two key concepts:

- 1. Caring for Algae (the more-than-human element):** Emphasize the importance of algae care and our role in protecting and nurturing it.
- 2. Entanglements within the Industry and Potential Ripple Effects (Speculative World Building):** Illustrate the interconnectedness of the industry, exploring its complexities and the possible consequences of various actions.





Chapter 7: Brainstorming and Ideas

7.1. Ideas created

After having a clear set of finding and design approach, brainstorming sessions were conducted to arrive at four probable ideas. Low fidelity prototypes were created to evaluate the ideas, and experience the speculation.

1. AlgaCare conference
2. Algae Friendly tools
3. An aspiring chef looking for specializations
4. Chef opening an Algae-based restaurant

This Chapter is a deep dive into each of these ideas, and their evaluation, to finally arrive to a concrete solution:

1. Idea 1: AlgaCare conference

A conference dedicated to the care of algae will be organized, featuring talks on algae conservation, workshops, panel discussions, and sections highlighting the interconnected aspects of the algae-centric world. The conference aims to showcase educational opportunities within the algae care industry, government regulations, and more.

Artifacts created to communicate the conference (see Figure 13) include:

- **Conference Advertisement:** Promotional materials designed to attract and inform potential attendees.
- **Event Ticket:** Customized tickets for conference participants.
- **Goodie Bag with Interactive Elements:** Curated bags containing interactive items to enhance the attendee experience.
- **Sketched Layout of the Conference and program schedule:** Detailed illustrations of the conference setup.
- **Brochures:** Informative pamphlets explaining the various elements of the conference.

Low-fidelity artifacts were given sequentially to the participants, with a suitable narrative.

Idea 2: Algae Friendly tool

An algae-friendly tool designed for massaging algae while separating it from its medium. This process not only provides spirulina with a calming experience but also fosters a tangible connection between humans and spirulina, instilling a sense of care and responsibility. The tool is equipped with massage points to guide users in properly massaging the algae, refer to Figure 14.

Accompanying the tool is an instructional video that users are encouraged to watch while using the product. This video demonstrates the correct usage of the tool and includes moments of reflection, encouraging users to appreciate their symbiotic relationship with spirulina and to contemplate the future of the food industry. (Refer to Figure 14)

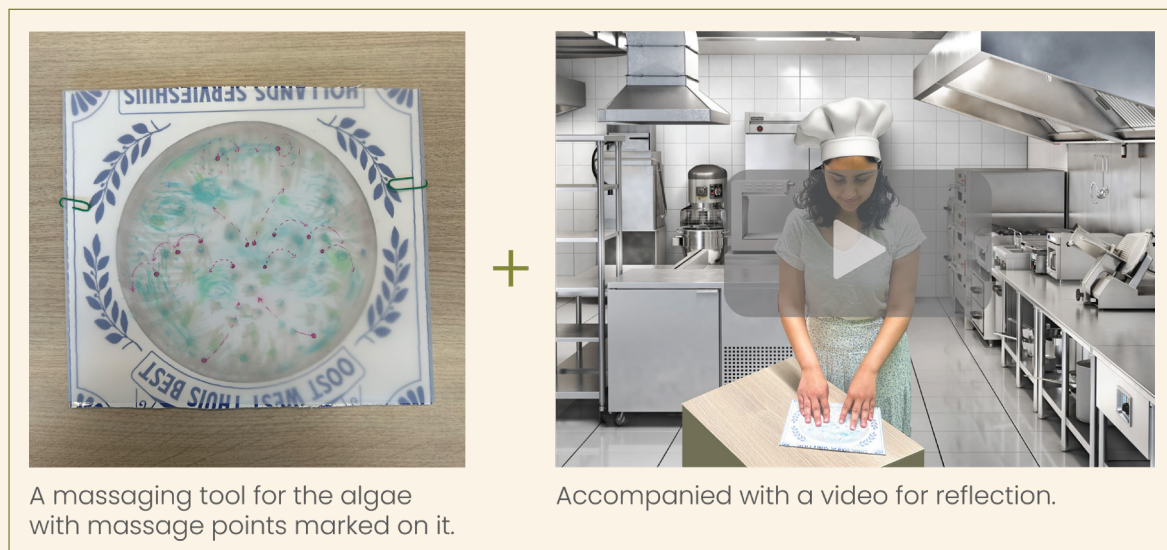


Figure 14. Idea 2: Product and video

Idea 3: Narrative of an Aspiring Chef Seeking Specialization

This narrative explores the decision-making and research process of an aspiring culinary student, aiming to highlight the importance of algae, the necessity for chefs to care for it, and the complexities within the industry that spark curiosity in aspiring chefs. The artifacts provided were (See Figure 15):

- **YouTube Video:** Discussing how algae will transform culinary practices.
- **Newspaper Articles:** Featuring multiple articles that highlight the significance of algae.

- **University Brochure:** Detailing a specific course on algae at a university.



Figure 15. Idea 3: Three artifacts to support the narrative

Idea 4: Narrative of a Chef Opening an Algae-Based Restaurant

The participant is presented with the following scenario:

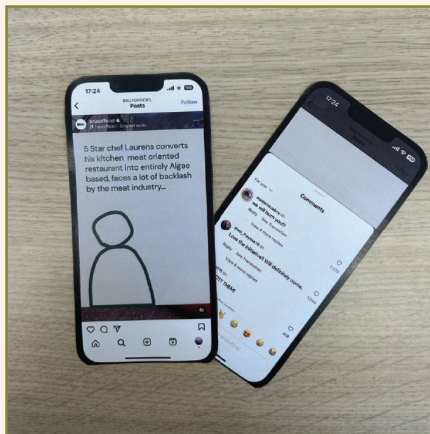
"You are a well-renowned chef at a highly acclaimed restaurant that primarily serves meat. However, you begin to recognize the downsides of serving meat and the benefits of incorporating algae into your cuisine. Consequently, you decide to transform your restaurant into an algae-based establishment."

The artifacts provided for this scenario include (See Figure 16):

- **Social Media News:** Highlighting the implications of the chef's decision to switch to an algae-based menu.
- **Algae Starter Cards Pack:** Introducing various types of algae and their culinary uses.

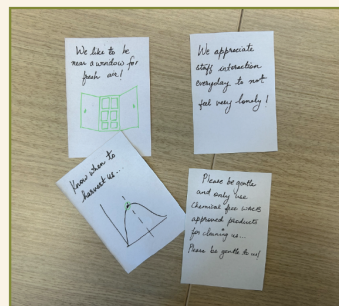
- **Interactive Website:** A platform where one can order algae-friendly tools, design algae-friendly spaces, and get matched with suitable algae types.
- **CVs for Hiring Staff:** Applications from prospective employees specialized in algae cuisine.

Participants are then questioned if they feel all set for their new restaurant and if they believe they are truly prepared for the future. Figure 16 showcases the idea in depth.



The participant is told that as they are a famous chef, the news about their decision goes viral.

Platforms like Brut make videos about it on social media. Participant is asked to check the phone placed on their desk to view the video regarding their decision. The video has positive and negative sides. The participant is also asked to read the comments below the post, and there are a lot of mixed comments.



To start with the venture, right after their announcement, the first step is to learn basics about Algae.

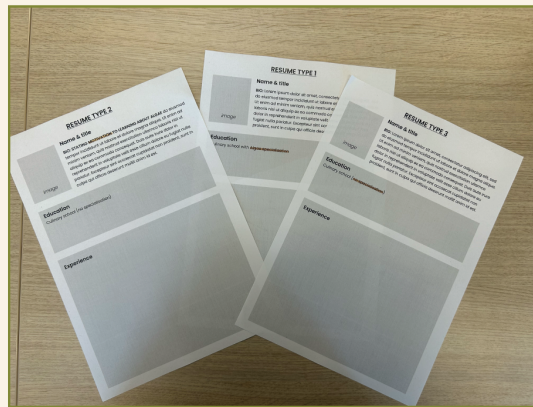
They are asked to imagine that they go to a store near you and buy the 'Algae starter cards' pack. This card deck is handed to them, it is a colour coded card deck that helps them learn about the basics of algae care.

After going through the deck, you realise they realise that...

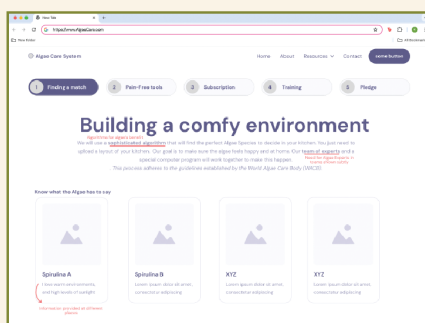
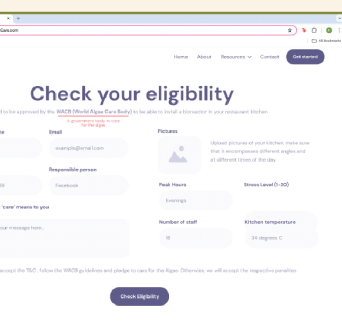
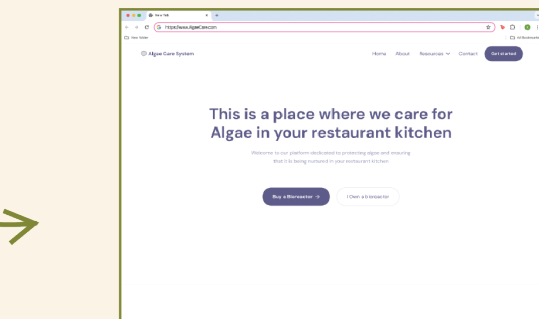


First, the kitchen body...

Figure 16. Idea 4: Artifacts and Narrative



Then they need to hire the correct staff, so you they are asked to imagined that they aded a job post and got some CVs. They are presented with the CVs, they have to go through these CVs to make their restaurant team.



This experience is followed by: Debrief, reflection and questioning.

7.2. Evaluation of the ideas

These concepts were evaluated with a team of experts from the Industrial Design Engineering department at TU Delft University, comprising professors with diverse backgrounds. The evaluation process involved running the ideas with the experts as participants, followed by in-depth discussions to determine which concepts would create the most impactful experience for users.

To aid in the evaluation, a feasibility versus impact graph was created (refer Figure 17).

“Impact” was defined by the following criteria:

- The ability of the concept to communicate algae care and the entanglements of the industry,
- The ability to make the participants suspend reality and immerse themselves in the speculative world, interact with it, feel a part of it, and be intellectually provoked.
- This evaluation relied on the expertise of both the professors and the design researcher.

“Feasibility” was defined as:

- The ability to create the concept within the given time frame for the project.
- The extent to which the skills of the design researcher could be utilized to their maximum potential in building the speculation.



Figure 17. Impact versus feasibility graph for evaluation of concepts.

This graph helped to identify which ideas could be realistically pursued in the available time for the project and simultaneously have the most significant impact on users. The analysis of the graph can be seen in the Table 1.

Ideas	Impact	Feasibility
Idea 1: Algacare Conference	This idea has a high impact as it creates a relatable world for multiple stakeholders within the restaurant and food industry. It also encompasses other users such as designers, engineers, and artists, engaging multiple age groups and professionals.	The feasibility is high, as it is possible to create a conference experience within the given time frame. Further work would be needed to flesh out how the conference would be communicated.
Idea 2: Algae-Friendly Tool	This idea was considered impactful as it provides users with a tangible item to interact with.	It requires the use of spirulina to function as a working artifact. Multiple tests with spirulina would be necessary to identify the best approach, using gentle methods. Given that spirulina takes about four weeks to cultivate, this idea faces multiple constraints and a broader scope beyond this project. Thus, its feasibility was lower.
Idea 3: Aspiring Chef Specializations	Low impact as it did not fully capture the entanglements of the industry and were less engaging for the experts.	Feasible based on the given timeline and the design researcher's skills, they were categorized.
Idea 4: Chef Opening Algae-Based Restaurant	Low impact as it focused on a specific type of user rather than including a spectrum of people in the restaurant industry.	Feasible based on the given timeline and the design researcher's skills, they were categorized.

Table 1. Comparison of the ideas based on impact and feasibility.

7.3. Narrowing down of ideas

The idea 1: Algacare conference, with high impact and high feasibility (Figure 18) was picked for further development in this project.

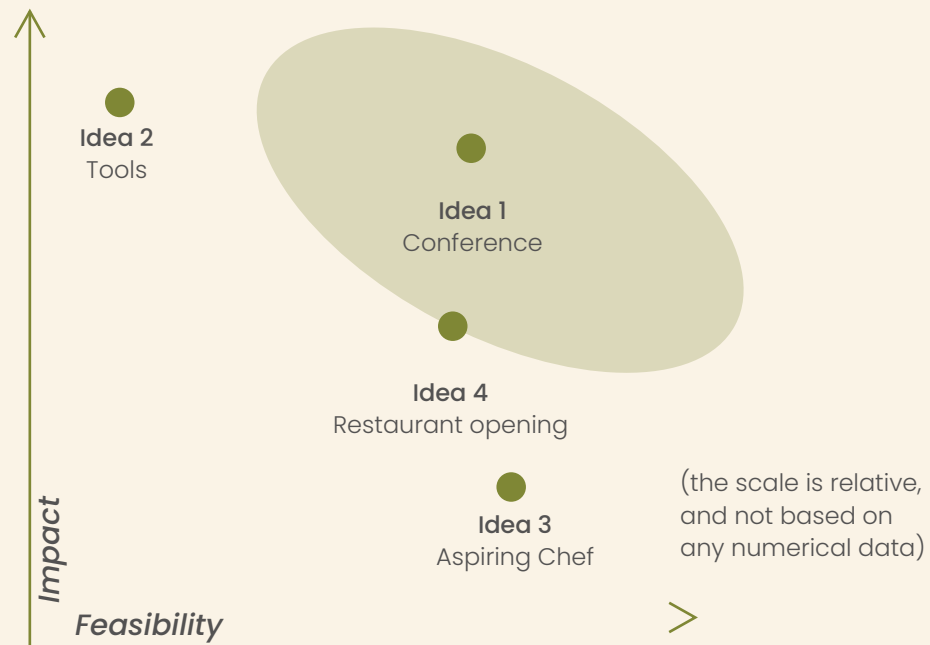


Figure 18. Impact versus feasibility graph for evaluation of concepts: area of interest

However, it was understood that the Algacare Conference would encompass parts of the other ideas as well.

For example:

- **From Idea 2:** It could display the algae-friendly tools on the website.
- **From Idea 3:** It could show opportunities for students at the conference.
- **From Idea 4:** It could include talks about algae-friendly spaces.

Essentially, Idea 1 could be further enhanced by integrating elements from the other ideas. This approach was kept in mind while creating the final design, as visualized in Figure 19. Hence, Idea 1 is the main concept, with elements from the others combined into it.

The next section will explain the final concept in detail.

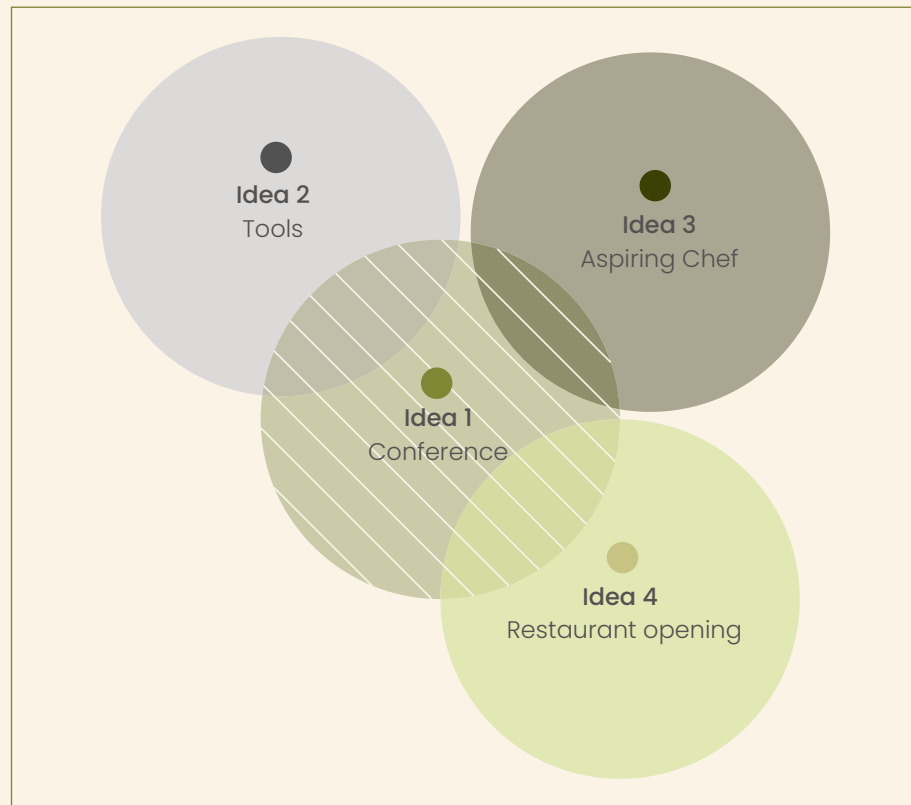


Figure 19. Integration of elements from various ideas into the Algacare Conference.

7.4. Key takeaways from this chapter

- Four primary ideas were generated through brainstorming sessions based on initial findings and design approaches: Algacare Conference, Algae-Friendly Tools, Aspiring Chef Specializations, and Chef Opening an Algae-Based Restaurant.
- Low-fidelity prototypes were developed for each idea to evaluate their potential and allow participants to experience the speculative concepts.
- An impact versus feasibility graph was used to determine which ideas were most viable for further development within the project constraints.
- Algacare Conference was selected as the primary idea for further development due to its high impact and feasibility. The final concept will incorporate components from the other ideas to create a comprehensive experience.



Chapter 8: Final Design

8.1. Final design explanation

The final design is a conference that integrates elements from Ideas 2, 3, and 4 as detailed in the previous section. The AlgaCare conference theme is **'Empathizing with Spirulina'**, that aims to communicate entanglements of the algae-world and the more-than-human philosophy of care.

The design of the conference is entirely algae-centric, enabling participants to experience life from the perspective of spirulina. The biography of spirulina, discussed in the methodology section, was instrumental in understanding the preferences and needs of spirulina, allowing the conference to be tailored according to the ideal conditions that spirulina prefers. Every element of the concept was designed to ultimately keep algae at the center, and caring for its needs.

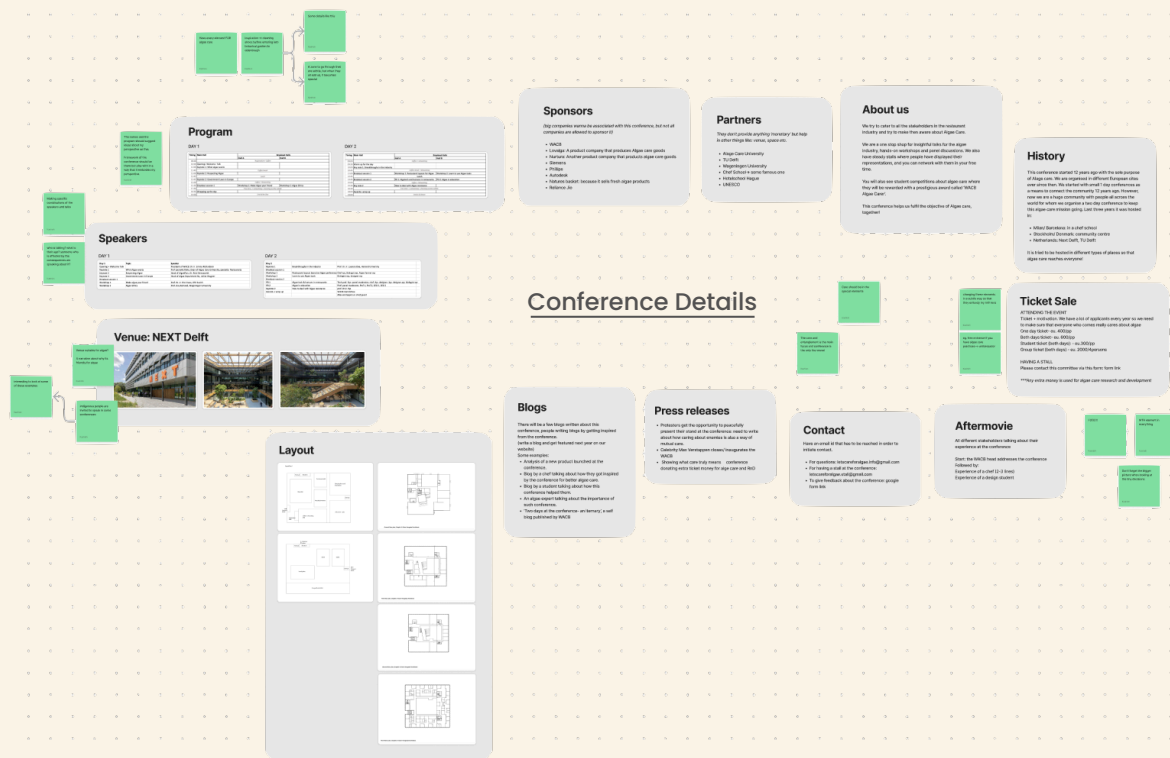


Figure 20. Brainstorming the conference details

Figure 20 illustrates the brainstorming process for the conference. As depicted, every element, from the sponsors to the program and layout, was considered.

Based on the brainstorm, a comprehensive conference proposal document was created. The entire conference details can be found in Appendix A. Some of the details instrumental in

understanding the speculative concept will be explained in brief this section:

Organizers of the Conference

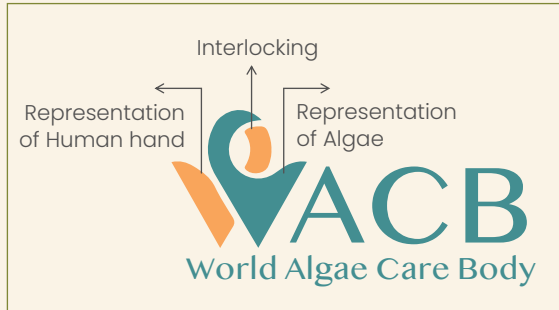


Figure 21. WACB Logo

The conference will be organized by the World Algae Care Body (WACB), a government-affiliated entity dedicated to algae care in Europe. WACB is a UNESCO- supported nonprofit organization advocating for algae rights, with a EU-wide membership exceeding 1 million people. Operating under the principle that humans should care for

the organisms that benefit us, WACB emphasizes reciprocating our gratitude to algae. WACB plays a crucial role in drafting algae-related policies with governments in Europe, ensuring comprehensive care for algae. In addition to policy work, WACB organizes multiple events, with this conference being one of their most significant initiatives. Figure 21 shows the WACB Logo, which is an abstract representation of a human and Algae interlocking hands.

Sponsors

To ensure that sponsors and partners are genuinely passionate about algae care, the following criteria should be used to assess their eligibility:

- **Commitment to Algae Care:** Sponsors and partners must demonstrate a strong commitment to algae care, including sustainable cultivation, research, and innovation in Algae-based products.
- **Proven Track Record:** Companies should have a proven track record in the algae care industry, showcasing successful initiatives, products, or services that benefit algae health and sustainability.
- **Ethical and Sustainable Practices:** Organizations must adhere to ethical and sustainable business practices, ensuring their operations support environmental health and the well-being of algae ecosystems.

- **Support for Research and Development:** Preference is given to entities that invest in research and development specifically related to algae care, contributing to advancements in the field.
- **Community Engagement:** Sponsors and partners should actively engage with and support communities involved in algae care, promoting education, awareness, and practical solutions.

A total of ten sponsors were selected based on these criteria. Detailed reasons for their selection are provided in the conference proposal document found in Appendix A. The selected sponsors are illustrated in Figure 22.

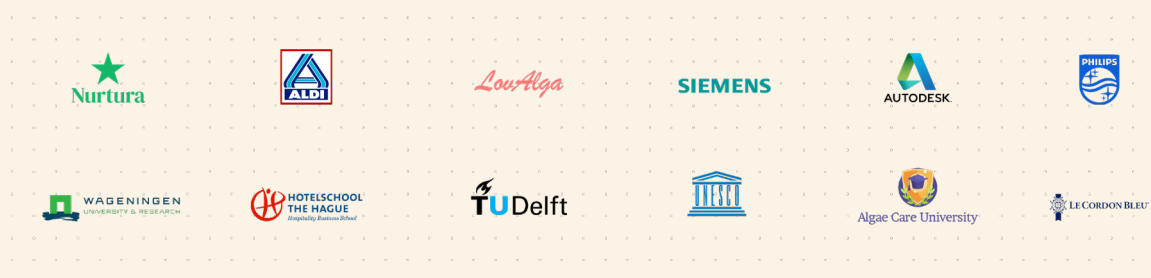


Figure 22. Sponsors of the AlgaCare Conference.

Among the ten sponsors, three were specifically created for the project:

- **Nutura:** An algae-friendly company that manufactures sustainable algae care tools.
- **LovAlga:** A company dedicated to producing sustainable products for algae care.
- **Algae Care University:** A university designed to focus exclusively on algae care, opening a whole new range of possibilities.

The remaining sponsors include existing companies, universities, and culinary schools that are speculated to have initiated algae care programs and have met the specified criteria.

Venue selection and environmental conditions

The venue for this year's conference is NEXT Delft, selected for

its optimal conditions that ensure algae well-being, such as sufficient lighting, ideal temperature, and abundant greenery. Figure 23 below depicts the venue.



Figure 23. Venue of the venue: Next Delft, Netherlands

The conditions of the conference were based on the condition that spirulina thrives in (Jourdan, 2001):

- **Temperature:** Spirulina does not grow below 20°C, with an optimum range of 30°C–35°C. Therefore, the venue maintains a warm temperature of 30°C–35°C, and attendees are advised to wear comfortable clothing.
- **Humidity:** Light rain benefits Spirulina by compensating for evaporation. Humidifiers are used to maintain ideal moisture levels.
- **Airflow:** A gentle breeze aids Spirulina by circulating air, but wind can also introduce dirt. Large fans are used to ensure consistent air movement.
- **Lighting:** Spirulina's growth is proportional to light exposure. NEXT Delft offers ample natural light throughout its rooms, maximizing growth potential.
- **Environment:** While Spirulina is indifferent to shapes, it prefers softer elements over sharp angles. The room design incorporates these softer elements to create a more suitable environment.

By hosting the conference at NEXT Delft, an environment is provided that mirrors the ideal conditions for algae, reinforcing the commitment to algae care.

Program

The conference program is crafted to mirror the 'agitation' that Spirulina thrives on. Just as spirulina likes to be stirred so that the top most portion of algae seeks sunlight by moving around,

the conference encourages the attendees, also known as algae carers, to explore the conference to gain maximum exposure.

To facilitate this, the program is designed to enable the attendees to switch rooms every few hours, promoting movement and ensuring a dynamic experience. The breaks in the schedule to move from one room to another for the next conference activity are referred to as “Movement Moments” During the Movement Moments, attendees can enjoy coffee, tea, or snacks, network, recharge, and explore conference stalls before attending the next session. The conference is structured so that after each Movement Moment, attendees move to a different room for the next activity. This approach disperses the conference activities across various rooms, keeping participants engaged and active. The conference schedule can be seen in Figure 24a and 24b.

Detailed information about the opening ceremony, closing details and the complete program including the speakers and talk descriptions can be found in Appendix A.

Main Hall	Break out room 1	Break out room 2
09.00	Registrations + Movement Moment	
Opening of the Conference+ Welcoming the Algae Carers		
Keynote 1: Listening to the Silent Needs: Understanding Algae's Unspoken Language		
11.45	Movement Moment	
	PD1: Algae Conservation and Biodiversity in the Restaurant Industry	PD2: Algae Ethics: Claiming Algae's Rights
13.00	Fuel up!	
Keynote 2: Restaurant Waste Reduction and Algae Integration		
15.00	Movement Moment	
	Workshop 1: Making Algae Your Friend: Cultivating a Symbiotic Relationship	Workshop 2: Algae Pests and Diseases Management
17.30	Movement Moment	
Wrapping up the day		
19.00		End of the day

Figure 24a. Day 1 Program

Main Hall	Break out room 1	Break out room 2
09.00	Registrations + Movement Moment	
Warm Up for the day: "Algae's Dawn Delight"		
Key note 1: Breakthroughs in AlgaCare for the Restaurant Industryfem		
10.45	Movement Moment	
	Workshop 1: Designing Comfortable Spaces for Algae in Restaurants	Workshop 2: Mastering Algae-Friendly kitchen Tools for Algae care
13.00	Fuel up!	
	PD 1: Where do humans lie in the AlgaCare industry?	PD 2: The Importance of learning about Algae at University
15.00	Movement Moment	
Keynote 2: Government regulations for Algae Care		
16.30	Movement Moment	
Award Ceremony and Closing Ceremony		
19.00		Drinks and dinner

Figure 24b. Day 2 Program

Embracing Algae with Gratitude and Respect

At our conference, we honor and thank the algae for its sacrifice before each meal, ensuring that we approach its consumption with deep gratitude and respect. This mindful practice reminds us of the vital role algae play in our lives and the importance of caring for them.

By focusing on the sustainable and ethical aspects of algae consumption, we aim to promote algae care while also demonstrating how algae can be responsibly incorporated into our diets. We emphasize the use of algae in ways that require minimal quantities, focusing on its extraordinary nutritional benefits rather than overconsumption. This approach helps us incorporate algae care into our daily practices and avoid both overconsumption and wastage.

Through this thoughtful and respectful approach, we can nurture a deeper connection with algae, appreciating its contributions to our health and the environment.

Additional details, such as decorations, history, layout, blogs, and press releases, can be found in Appendix A. The speculative on the website Press releases talk about the involvement of Formula 1 star Max Verstappen, who inaugurated the conference,

highlighting the importance of algae care. These elements, along with various other aspects of the conference, contribute to the holistic experience.

As this conference was conceptual, and could not be executed physically due to the constraints of the project timeline, it was important to find a medium in which the conference could be communicated. This will be explained in the next section.

8.2. Medium

A crucial element in design speculation is establishing a perceptual bridge that connects the audience's understanding of their world with the fictional elements of the concept (Auger, 2013). Additionally, Auger (2013) explains that if a design proposal is overly familiar, it risks going unnoticed. The solution lies in crafting designs that are both provocative and familiar, creating an 'uncanny' effect with careful balance. This approach ensures the design is intriguing while still resonating with the audience's current reality (Auger, 2013).

Creating speculative scenarios is vital for enabling people to experience and envision near futures. This involves integrating elements that are not yet real but include many aspects that are familiar. For instance, Superflux (Jain, 2023b) created drones, 'The Nightwatchman' and 'Madison,' illustrate a futuristic vision of drones patrolling streets and surveilling residents.

While this may seem futuristic, it is firmly rooted in present-day realities (Jain, 2023b). We may not yet see drones in this capacity, but we have seen drones in other capacities, and also the technology behind surveillance, such as facial recognition and data tracking, is already ubiquitous in our lives, from smartphones to city surveillance cameras. This example demonstrates that grounding speculation in current reality helps people envision the future more concretely. Hence, familiar objects create the perceptual bridge, ensuring the concept is relatable yet distinct enough to provoke thought.

To effectively convey the 'uncanny,' two mediums were employed: a website and a video. The website serves to ground the audience in reality, while the content, such as speculative conference images, highlights the differences and speculative nature of the

concept. The video complements this by providing a narrative that explains the conference ideas through a ‘behind the scenes’ format. This approach helps to elucidate the uncanny elements of the website, making the speculative elements more tangible.

The website and video feature highlights from the previous conference, intentionally omitting any specific year to allow the audience to interpret the timing themselves. This approach leverages the concept of FOMO, or Fear of Missing Out, which is the anxious feeling that one might miss exciting events that others are attending, often amplified by social media. As defined, FOMO is “a worried feeling that you may miss exciting events that other people are going to, especially caused by things you see on social media” (“FOMO,” 2024). By showcasing the previous conference, the aim is to evoke FOMO in potential attendees, encouraging them to visit the next event and building anticipation for future conferences.

8.3. Execution- bringing the speculation to life

8.3.a. Website

The medium selected to communicate the conference was a website. Consequently, the conference was transformed into a digital format, preserving all essential details. These details were adapted into various website elements. For example, the explanation of the conference and its history were incorporated into the ‘About Us’ section of the website. This approach ensured that the essence and comprehensive information about the conference were effectively conveyed in a digital medium. The initial step involved designing a flow for the website. Following this, rough wireframes were developed. (refer to Figure 25)

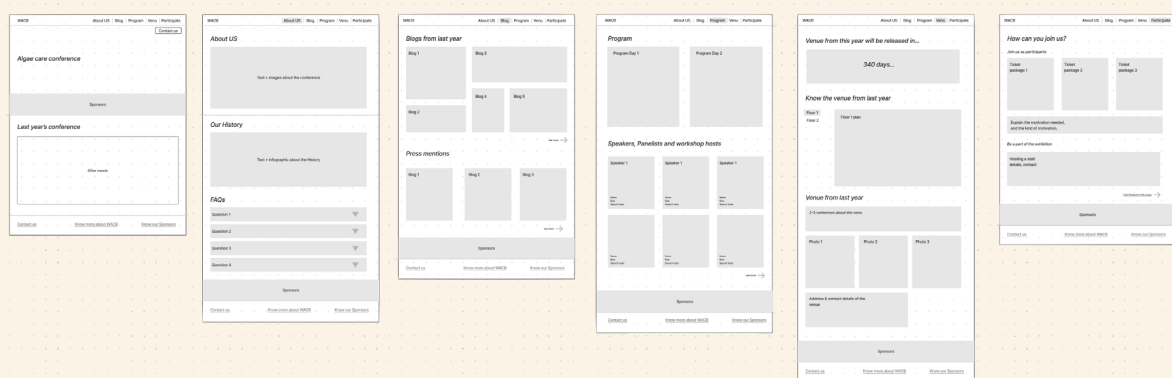


Figure 25. Wireframes created for the website

Subsequently, a style guide and visual design components were established to maintain a consistent design language (refer to Appendix B for the style guide and components).

The logos featured on the website were a combination of custom-designed logos and logos from existing companies. The AlgaCare Conference Logo represents the symbiotic coexistence of Algae and Humans, further elaborated in Figure 26.

Finally, the User Interface (UI) screens were created. Figure 27 showcases the 'Landing page' Figure 28a and Figure 28b showcase the 'Venue Page'. All the photographs incorporated into the website were meticulously sourced from Pexels.com and generated by giving relevant prompts to ChatGPT 4.o. The images are designed to generate curiosity, and maintain the uncannyness of the conference. The UI of the entire website can be found here: <https://rb.gy/tld9jo>



Figure 26. AlgaCare Conference Logo

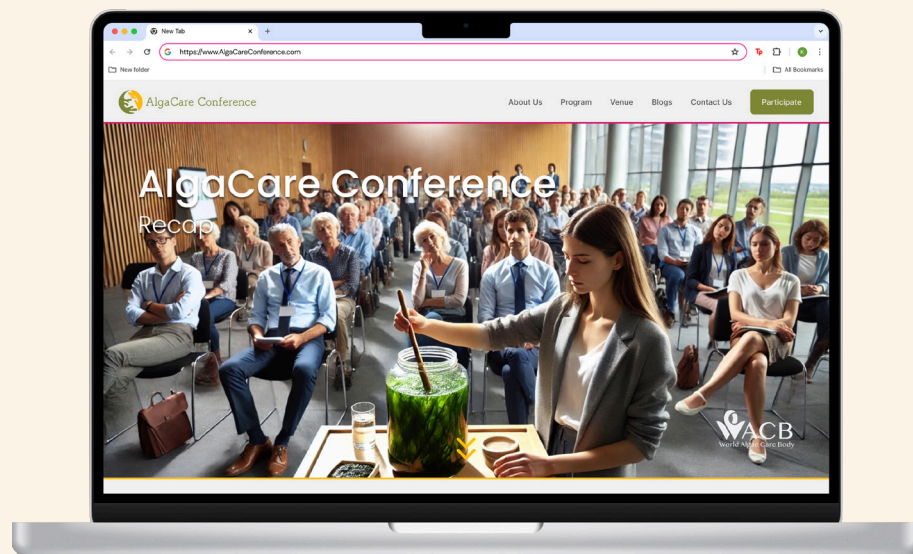


Figure 27. Website Landing Page



Figure 28a. Website page: Venue tab

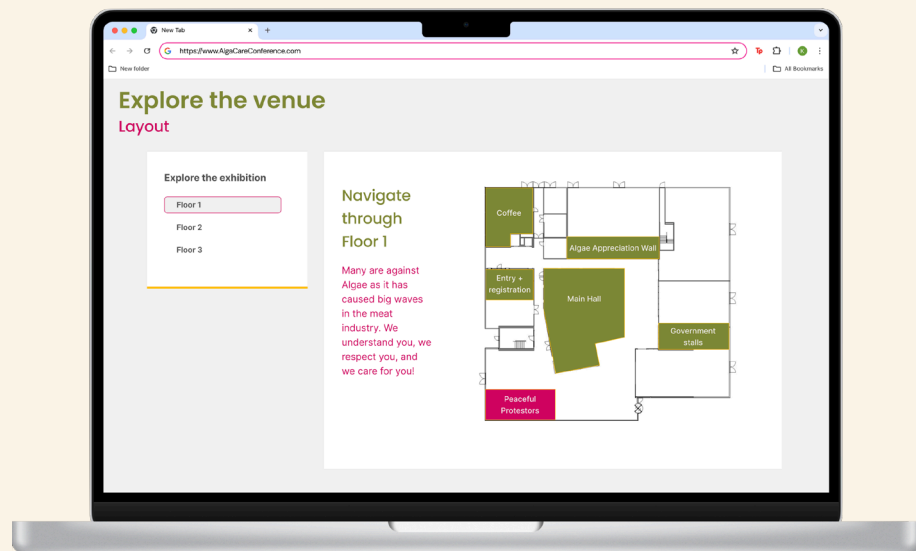


Figure 28b. Website page: Venue tab

8.3.b. Video

The primary challenge in executing the video was to create a realistic and believable environment that aligns with the current conference's needs, without appearing artificial. To address this, a script was initially drafted, which served as the foundation for the storyboard Figure 29 showcases a glimpse of the storyboard; the entire storyboard can be found in Appendix D. The storyboard was meticulously designed to allow manipulation of the necessary shots, enabling the representation of speculative elements without the need to recreate the entire space. This approach effectively addressed the aforementioned challenge.

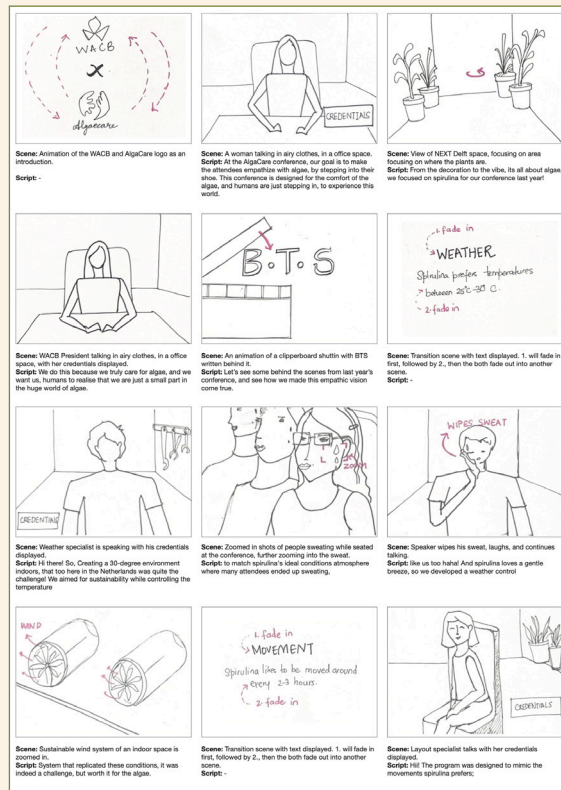


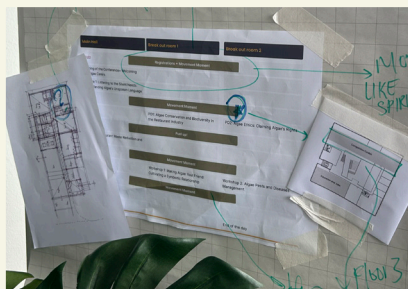
Figure 29. Glimpse of the story board

The video production process involved the use of Adobe After Effects and Adobe Premiere Pro. Animations were crafted using After Effects, while Premiere Pro was employed to seamlessly combine the clips into a cohesive narrative.

Interview segments were filmed using an iPhone 14, with the assistance of acquaintances acting as the talent. Additionally, several venue scenes were captured on location at NEXT Delft on the TU Delft campus.

To ensure the setup appeared authentic, meticulous attention was paid to details. For instance, in the image below (Figure 30), the frame was designed to reflect the environment of a layout specialist at

the conference. Realistic elements such as printouts of layouts and sketches were deliberately incorporated to enhance the authenticity of the speculative characters. The video can be found here: <https://rb.gy/gyvhou>



Layout of the locations and its correlation with the conference schedule



Algae Jar

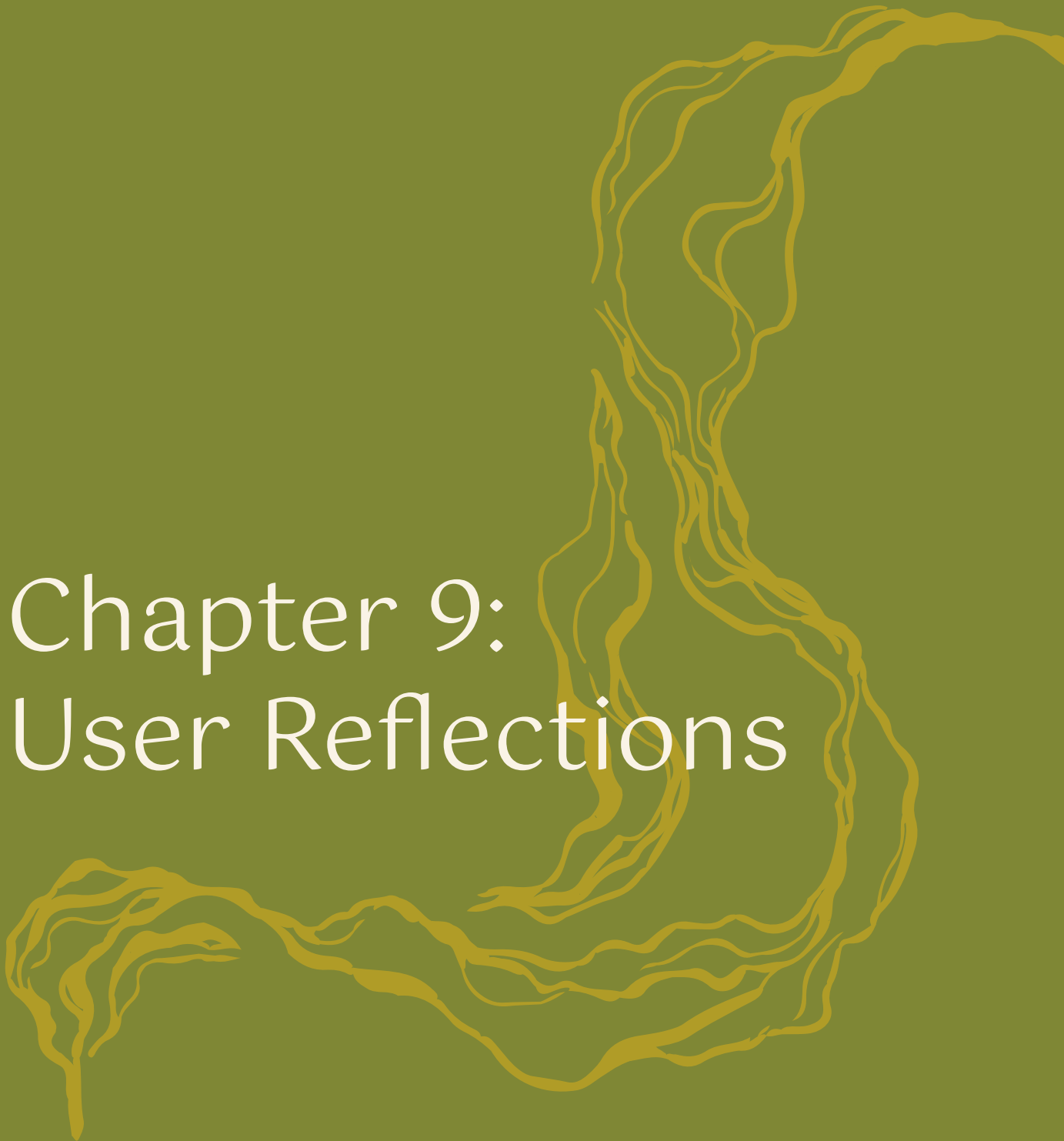


Figure 30. Video setup for the conference Layout Specialist

7.4. Key takeaways from this chapter

- The final design is an Algae-centric conference titled Algacare Conference, with a theme 'Empathising with Algae'. It integrates elements from previous ideas, focusing on the algae-world and the more-than-human philosophy of care.
- Every aspect of the conference, from the venue to the program, was designed with spirulina's preferences in mind, ensuring that the event was tailored to optimal conditions for algae. The conference was designed to allow participants to experience life from the perspective of spirulina, reinforcing the central theme of algae care.
- The conference concept was communicated through a website and a video, carefully crafted to balance familiarity with speculative elements. The website served to ground the audience in reality while introducing speculative aspects, and the video provided a narrative that explained the conference in a "behind the scenes" format.
- The conference, although conceptual, was presented in a way that allowed it to be fully communicated and visualized through digital mediums. The website and video served as effective tools to bridge the gap between the speculative nature of the conference and the audience's current reality, creating a compelling and immersive experience.

Chapter 9: User Reflections

The background is a solid olive green. Overlaid on this is a complex, abstract line drawing in a bright yellow color. The lines are thick and wavy, creating a sense of movement and depth. They form a large, irregular shape that resembles a stylized letter 'L' or a large, flowing '9'. The lines are interconnected, with many loops and curves, giving it a textured, almost organic appearance. The overall effect is modern and artistic.

The AlgaCare conference was presented to stakeholders in the food industry and potential participants through the created video and the website.

9.1. Purpose

This qualitative approach aimed to explore the types of reflections generated by participants. The specific purposes were:

1. **Gather Initial Thoughts:** Assess whether the conference content effectively stimulates participants' reflections and thoughts. Determine if there is a scope for critical reflection regarding the algae-centric world.
2. **Evaluate Immersion:** Evaluate if participants feel immersed in the conference and if it helps them visualize an algae-centric world.
3. **Identify and Address Barriers:** Collect feedback to make immediate changes that enhance the user experience. These immediate changes would polish the final design.

9.2. Methodology

Feedback was obtained from five stakeholders, selected to represent a diverse range of perspectives:

- A pastry chef
- A culinary school student
- A chef with a protein meal business
- A policymaker
- A designer and sustainability enthusiast

These stakeholders were chosen to ensure a variety of opinions and to understand how different participants envision their roles within this emerging industry. A structured approach was adopted to gather reflections and feedback:

1. **Presentation Deck:** A comprehensive presentation deck was created to provide background information about the conference.
2. **Video and Website Overview:** Participants were first shown the conference video, followed by an overview of the website

to gather their initial insights.

3. **Discussion:** A discussion was then facilitated, guided by a set of questions formulated by the researcher to elicit deeper reflections and feedback.

To gain a deeper understanding of the patterns in the discussions, the responses were analyzed using 'affinity mapping' techniques to identify the underlying themes and insights from what people were expressing. Figure 31 demonstrates the affinity mapping performed. These analyzed responses will be discussed in the following section.

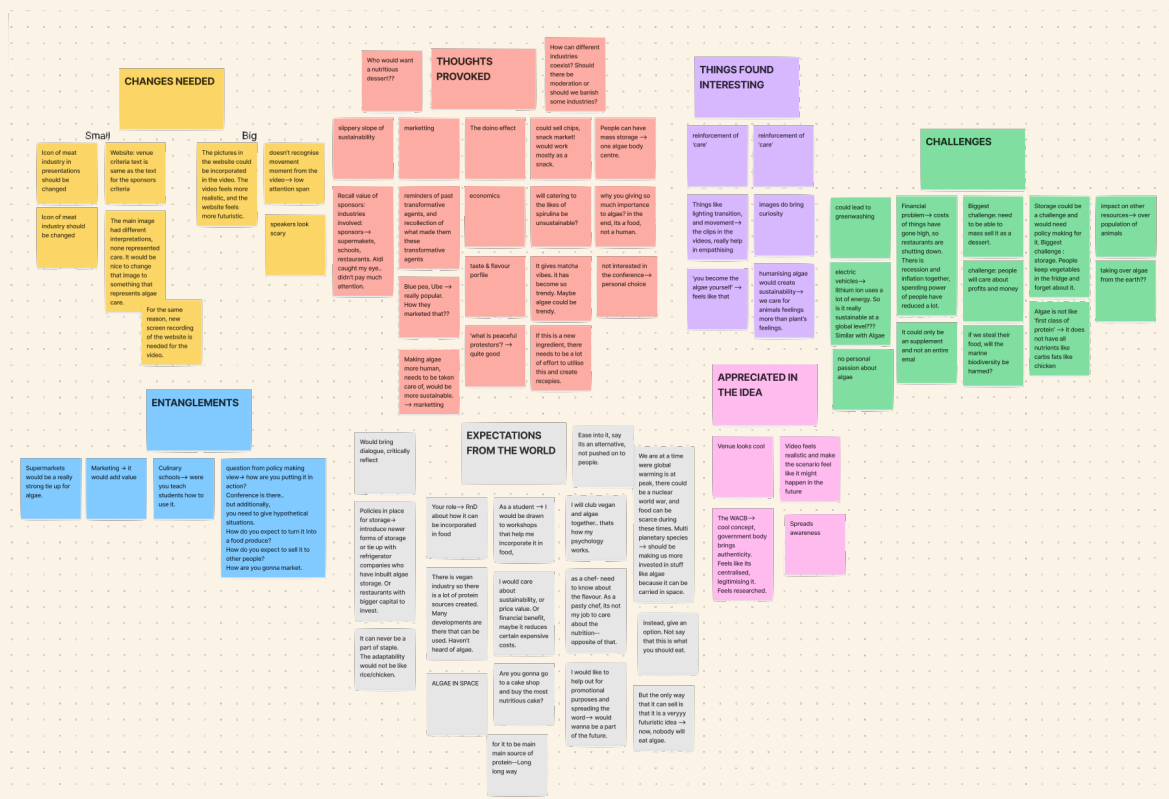


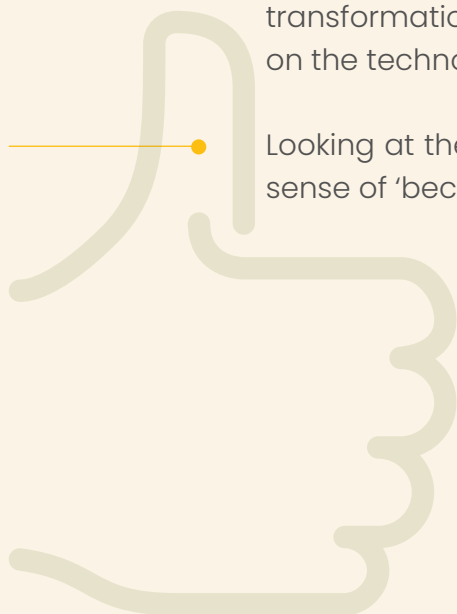
Figure 31. Affinity mapping of user reflections

9.3. Results

Insights from the User Reflections can be summarized as follows:

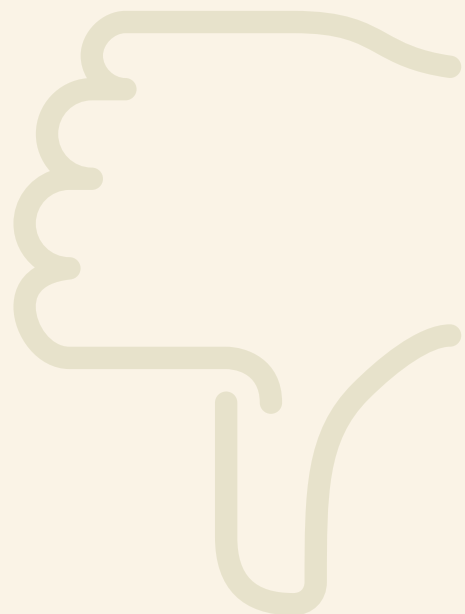
What worked

- Most people thought that the video realistically represented the conference due to the natural tone of the characters, the diverse representation of ethnicities, the shoot locations and the background music of the video.
- The experience got the ball rolling for participants to think about the possibility of Algae as food. It sparked ideas about integrating algae into the food industry, leading to mapping out possibilities, such as using algae in chips or cocktails.
- The creation of the World Algae Care Body (WACB) legitimizes and brings authenticity to the concept.
- Participants considered the possible entanglements within the food industry indirectly, discussing the involvements of other related industries and the potential impact on those industries.
- Many felt immersed in the conference, believing in the plausibility of the conference.
- Website images sparked curiosity among users.
- The video conveyed a sense of 'care' through elements like 'movement moments' and 'lighting transitions,' which stood out to participants.
- Participants could envision their roles in this new world, imagining transformations in their current roles, such as conducting R&D on the technology, creating policies, or developing recipes.
- Looking at the video, participants felt they would experience a sense of 'becoming algae' when attending the conference.



What did not work

- This test identified immediate changes needed in the video and website before presenting it to a wider audience, which included altering certain images. These changes were implemented promptly.
- Some individuals felt a lack of personal passion for algae and were hesitant to give it significant importance.
- Participants could only envision algae being used as food in a dystopian world or in the context of space travel hence, the participants do not find it necessary to start working towards it.
- There was difficulty in imagining algae as a primary food source; it was seen only as a supplement due to its lack of carbohydrates and complete nutrition.
- Participants did not explicitly notice the complexities and entanglements of the concept showcased on the website.



Participant discussions and insights:

- People connected algae to past transformative agents, such as oats and millet, drawing parallels.
- Many expressed concerns about sustainability, questioning if algae is genuinely sustainable or if it could become a case of greenwashing. They wondered if catering to 'algae's likes' is genuinely sustainable.
- There were questions about the effectiveness of marketing, as participants believed it would determine the success or failure of algae as food.
- Economic concerns were prevalent, especially regarding high costs, restaurant closures, recession, inflation, and reduced consumer spending power.
- Storage issues were a common concern, with participants discussing potential solutions such as establishing communal storage facilities for each area and implementing policies to manage storage effectively.
- Participants worried about the potential imbalance in the food chain due to animal overpopulation.
- The chefs were curious about the flavour and mouthfeel of algae and how it could be incorporated into recipes.
- People were interested in the additional benefits of algae beyond its nutritional value, as their customers are more than just looking for nutrition, especially in bakery products. They sought added advantages that could either reduce costs, replace expensive ingredients, or enhance the flavour profile.
- From a policy-making perspective, participants questioned how the concept would be implemented. They believe hypothetical scenarios need to explain how algae would be turned into food products, marketed, and sold.
- Concerns were raised about the potential harm to biodiversity from excessive algae harvesting.
- Most participants felt we are not currently prepared for this concept, viewing it as highly futuristic.

9.4 Changes needed in the Final Design

Based on user reflections discussed in the previous section, the following changes are recommended for the final design:

Reinforce Algae as Solid Food:

Showcase examples of algae being used as real food to help people visualize its potential and accept it as a legitimate food source rather than a supplement. These images can be added to the video or website.

Make Possible Entanglements Explicit:

Clearly illustrate the various entanglements within an algae-centric world. While some entanglements were recognized, reinforcing and detailing a few key ones would enhance understanding and imagination.

Showcase Clear Scenarios for Algae Use:

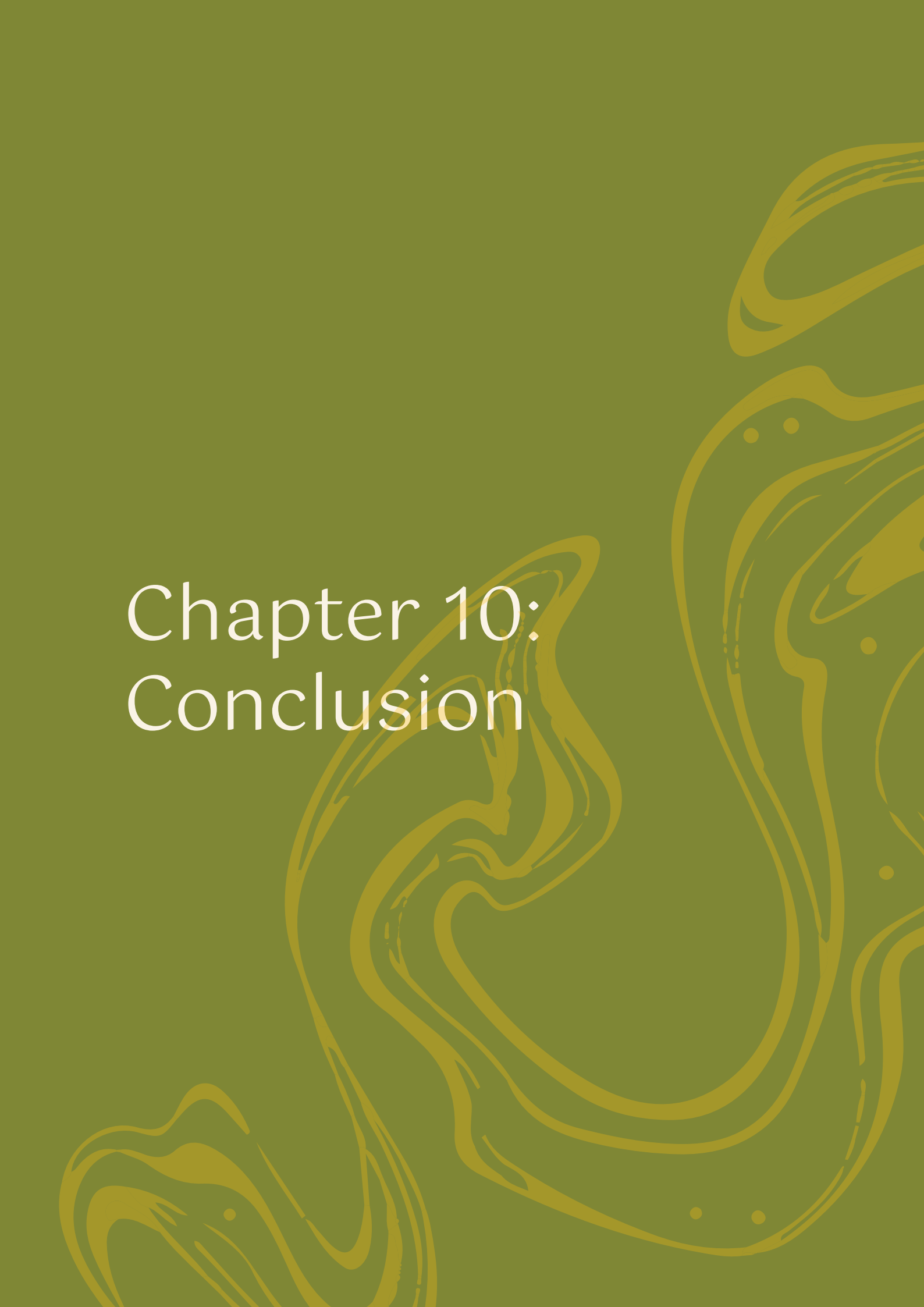
Provide a clear direction on how algae could be used in future scenarios. The previous open-ended approach led to varied interpretations, from utopian to dystopian. A defined scenario would guide people's understanding and emphasize the need for preparation beyond emergencies like nuclear wars or space missions.


Hypothetical Scenarios:

Develop and showcase hypothetical scenarios explaining how algae could be turned into food products, marketed, and sold. This will provide practical examples and help stakeholders envision the process from production to consumer acceptance.

Implementing these changes in future iterations will enhance the clarity and impact of the final design, ensuring it effectively communicates the potential of algae as a transformative agent in the food industry.

Chapter 10: Conclusion

The background of the slide is a solid olive green. Overlaid on this are several thick, wavy, yellowish-gold lines that flow from the bottom left towards the top right, creating a sense of movement. Scattered throughout the background are small, solid yellow dots of varying sizes.



This research aimed to challenge traditional perspectives on food sustainability by integrating algae, a nutrient-rich and environmentally friendly food source, into mainstream culinary practices. Algae is envisioned as an ‘agent’ capable of transforming the future of the food industry. The aim of the study was: *“to provide an experience that helps stakeholders within the food industry to critically reflect on the possibility of Algae becoming a transformative agent in the future of the food ecosystem.”* This aim was accomplished by creating a speculative ‘AlgaCare Conference.’ The conference was communicated through a video and a website, highlighting the need for algae care and showcasing entanglements within the food industry due to algae integration.

This section reflects on its aim, draws insights from the user reflections in Chapter 9, and concludes this research. This chapter also includes the limitations and recommendations.

The reflections indicated a mix of intrigue and skepticism. Stakeholders were intrigued by the concept of algae as a transformative agent but raised concerns about its practical implementation, economic viability, and consumer acceptance. These concerns and intriguing thoughts demonstrate that the speculative approach successfully stimulated critical reflections and discussions about the future of food ecosystems. The experience helped the stakeholders envision their roles in a future ecosystem transformed by algae, sparking ideas and discussions about how algae could be utilized in food.

This study highlighted several actions needed to integrate algae into the food industry. One of the user reflections revealed that algae must be accepted as a ‘good’ food rather than an ‘emergency food’ so that people believe it can be consumed on a daily basis. In order to achieve this, algae need to be marketed in a way that enables acceptance, influencing adaptability towards the texture and mouthfeel. Another critical reflection was about ‘acceptability’ and how it would happen if only a significant advantage appealed to the masses.

Many participants during the test expressed concerns about sustainability, questioning whether algae is genuinely sustainable or if it risks becoming a case of greenwashing. The plausible disbalance in the future animal ecosystem due to the integration of algae was a significant concern and reflects broader

issues within the current food ecosystem. These critical reflections underscore the need for a careful and honest approach to incorporating algae into the food industry, emphasizing true sustainability rather than superficial solutions.

Chefs are interested in exploring how algae can be seamlessly incorporated into their daily diet, focusing not just on its nutritional benefits but also on other aspects that would add value to their culinary practices. People are interested in understanding the “additional benefits” of products, especially how “mouthfeel” and other sensory attributes can be tailored to meet their preferences. This demand is precisely what the commercial industry is currently addressing, resulting in exploratory practices towards algae. As a result, this study provides valuable insights into human ‘wants’ and how marketing and commercial industries seek to align with consumer desires. It is essential for people to recognize this dynamic.

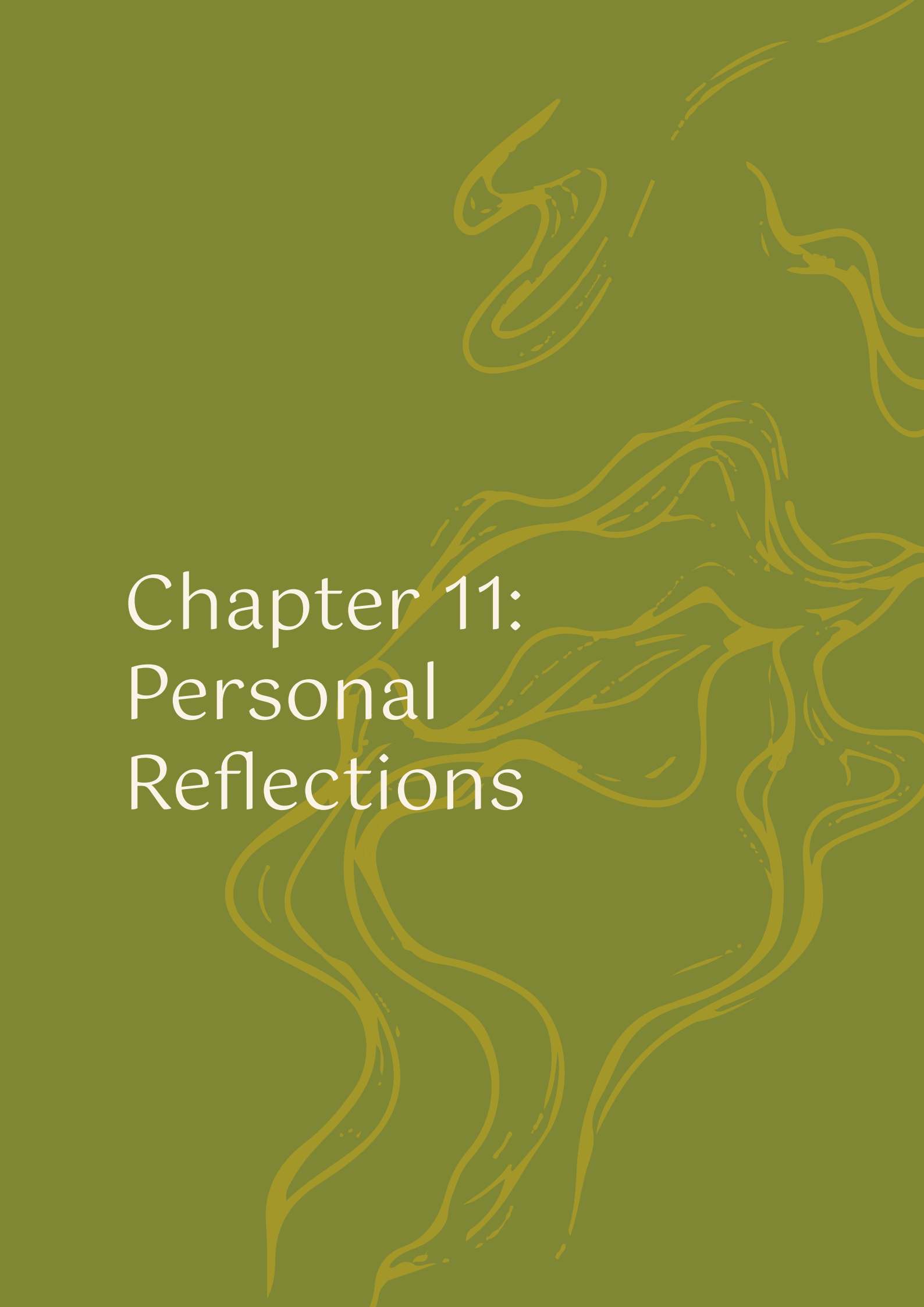
There were also discussions about the economic imbalance and how incorporating a new ingredient like algae would require investments, which could ultimately be passed on to consumers. This gives insight into the ‘perception of the cost of sustainability’. People presume that sustainable alternatives in the food industry would be heavy on the pocket. It also provides a plan of action to start working on the research and development of algae-growing tools that would reduce costs and be sustainable at the same time.

This study was conducted with a limited number of participants, precisely five. Despite the small sample size, the final design probed the participants to generate critical dialogue and actionable items about incorporating algae within the food industry. A larger-scale evaluation involving more experts and detailed discussions, such as group discussions and focus groups, would likely yield further insights into the current state and future potential of the food industry regarding algae and provide actionable items.

To conclude, algae holds significant potential as a transformative agent in restaurant ecosystems. While mainstream adoption may be complex, the insights and speculative scenarios presented in this research provide a foundation for future exploration and innovation in the food industry. Advocating for a more-than-human perspective and speculative design methodologies, this

research emphasizes algae care and challenges traditional hierarchies to enable discussions about sustainable and respectful food practices.





Chapter 11: Personal Reflections

11.1. Reflections about the process

Upon completing this research, I have come to realize that design extends far beyond mere problem-solving. This experience has illuminated the profound depth and breadth of design, revealing that designers can become subject matter experts in virtually any field—even something as unexpected as algae. Throughout this journey, I gained significant insights into speculative design and successfully integrated it with a more-than-human perspective. This combination has transformed my understanding of the world around me.

Before embarking on this project, I had a more conventional view: people were people, and objects were simply objects. However, by applying a more-than-human design lens and integrating sociological concepts of 'agency,' I have come to truly appreciate the agency of things and their importance in design. This shift in perspective has profoundly impacted my approach to design, encouraging me to consider the relationships between objects and humans with much greater nuance.

Conducting ethnographic research in the context provided invaluable insights into the complex dynamics of object-human relationships and how spatial elements influence these interactions. Engaging with people and stakeholders was a critical aspect of this research, as it allowed me to gain a thorough understanding of how things function within specific contexts.

The use of the future wheels methodology was particularly beneficial, enabling me to look beyond the immediate consequences and explore multiple levels of outcomes. This approach, when combined with speculative design and more-than-human thinking, has provided a comprehensive understanding of the real-world implications of design decisions.

This research has been a transformative experience, and I am eager to apply these insights in future projects. Moving forward, I aspire to build a career that integrates these approaches, as they offer a powerful framework for addressing complex design challenges in a holistic and innovative way.

11.2. Limitations

- The study is intentionally open-ended, allowing for diverse interpretations by different individuals. While the intention is to create dialogue, this open-ended nature could also lead to unintended misunderstandings or misconceptions.
- The limitations of More-Than-Human (MTH) design arise when designers lack the understanding and ability to account for the unique perspectives and capabilities of non-human entities (Giaccardi & Redström, 2020). In this study, the author does not possess specialized knowledge of algae. Although a biologist provided assistance, there remains a gap in expertise that could affect the depth of the research.
- A limitation of this study is the inherent human bias present in more-than-human design. While this approach aims to consider perspectives beyond humans, ultimately, humans make the final decisions. Inferences are made based on available literature about non-humans, passing through a layer of human bias.
- This study makes assumptions about the preferences of spirulina based on a book called 'Grow Your Own Spirulina' by Jean-Paul Jourdan. This was treated as an autobiography, where ideal growth conditions of Spirulina were treated as the 'likes' of Spirulina. However, there could be changes in these inferences with additional research and new discoveries about Spirulina.
- This study focuses on the likes of spirulina. However the preferences of different algae species vary, and hence there would need to be research about different algae to have experiences about them.
- The study explores a wide range of possibilities within an Algae-centric world, but the design only addresses one aspect of it. Consequently, there are multiple facets of the entanglements within the speculative Algae-centric world (explored in 4.3.a. Methodology of the Future wheels) that could not be explored during this study.

11.3. Future Scope

The interconnectedness of the speculative world extends far beyond the initial conference, offering vast opportunities for future exploration. To fully bring this world to life, design directions discussed in Chapter 7 could be further developed. These efforts would deepen the understanding of the intricate entanglements within this speculative world.

Work needs to be done to engage attendees and enhance the execution of this conference truly. Future efforts can focus on transforming the current conference into a comprehensive experience, allowing the audience to immerse themselves in the various facets of the algae-centric world. This approach will enable deeper engagement and understanding of the intricate entanglements within this ecosystem. This immersive experience can be showcased and presented in various settings:

1. Industry Conferences and Expos
2. Academic Institutions
3. Public Exhibitions and Museums
4. Corporate Workshops

During the experience, implementing a guided questionnaire or workshop could encourage participants to reflect on their choices related to sustainability, balancing their needs with environmentally friendly practices. This would help find common ground between personal preferences and sustainable actions.

This project combines speculative design with a more-than-human perspective to understand real-life implications and promote mutual care and respect for non-human entities like algae. The study argues that speculative design within a more-than-human framework helps us imagine potential futures and encourages more responsible living. As a future scope, this approach could be applied to other studies to understand the real-world impacts of idealistic scenarios.



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Abstract wavy lines in the bottom right corner of the slide, rendered in a light blue color. The lines are fluid and organic, resembling stylized waves or smoke. They start from the bottom left and curve upwards and to the right, ending near the top right corner. The lines vary in thickness, creating a sense of movement and depth.

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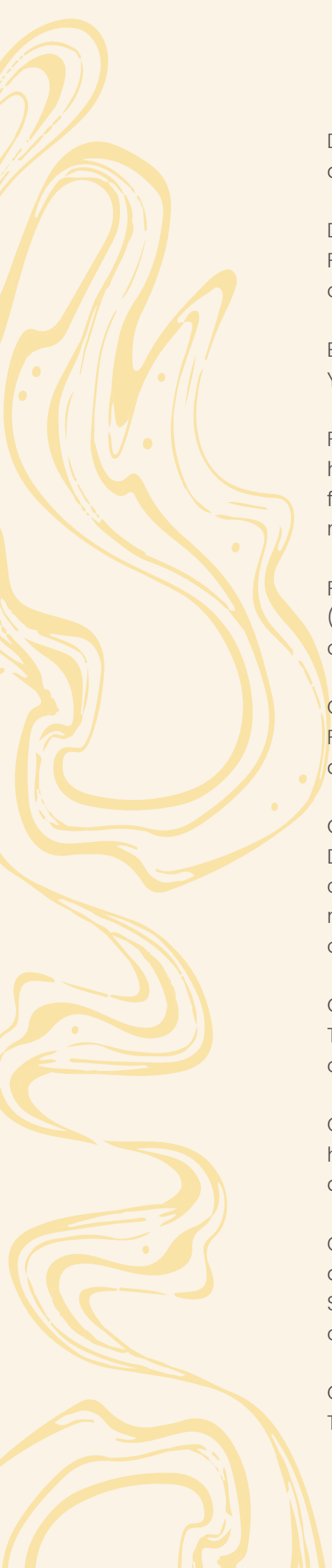
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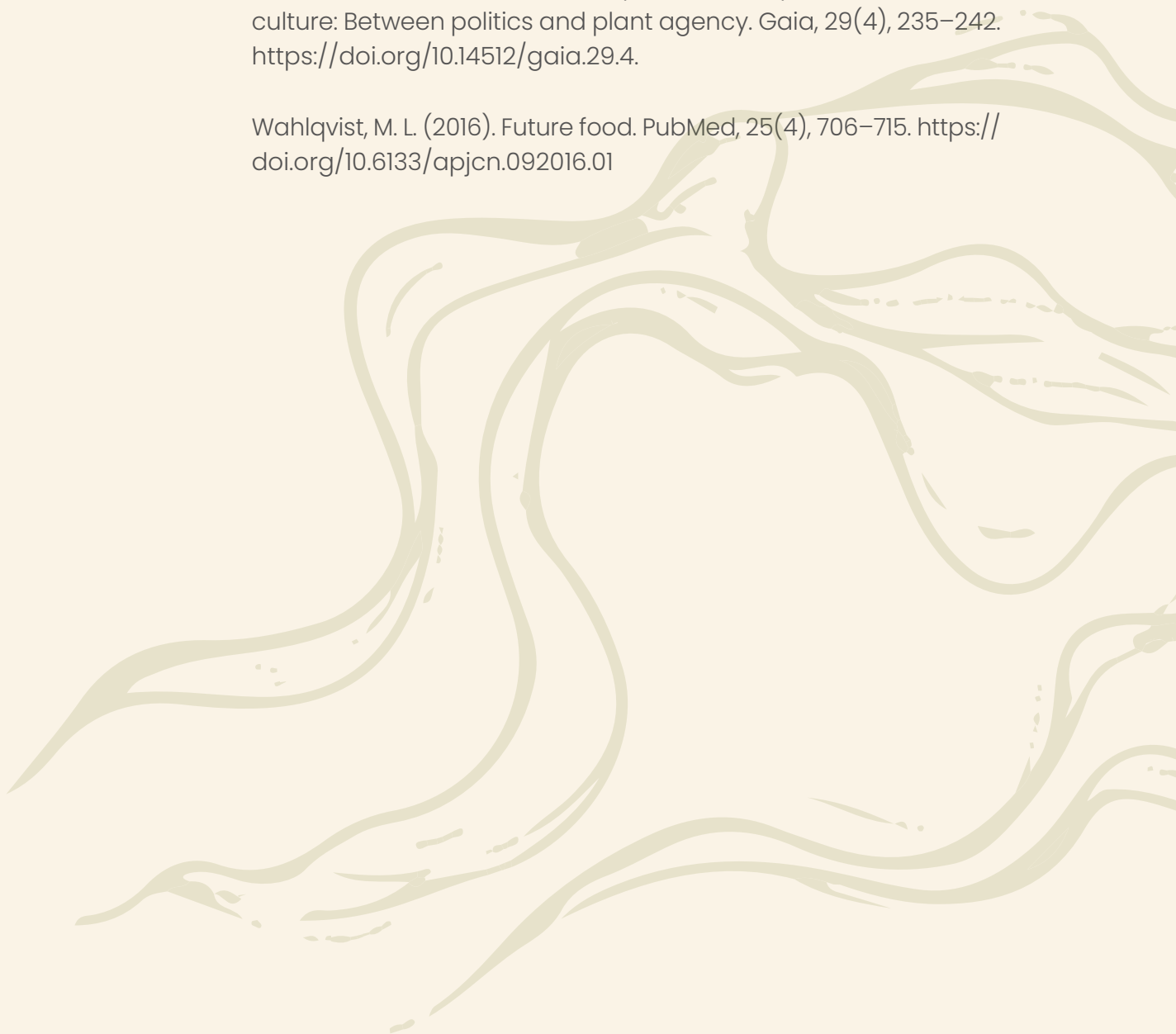
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Appendix



AlgaCare Conference proposal

showing the entanglements and Alage Care

Overarching Theme: Empathise with the Algae

Become closer to the algae by stepping in their shoes
for 2 days, as, everything in the conference is designed
as per the likes of the Algae!

Tickets

(Having stalls and attending the event are only for true Algae Carers)

Attend the event

Free entry for: Algae + 1 (if your algae is attending the event, you can join for free)

Minimum requirement to enter the event:

Ticket + motivation (in any media).

(We have a lot of applicants every year so we need to make sure that everyone who comes really cares about algae)

Pricing for the tickets:

One day ticket- eu. 400/pp

Both days ticket- eu. 600/pp

Group ticket (both days) - eu. 2000/4person

Have a stall

Please contact this committee via this form: [form link](#)

****Any extra money is used for algae care research and development*

History

This conference began 12 years ago with the sole purpose of promoting algae care in the restaurant industry. WACB recognised the power of Algae and how it could revolutionise how food will be consumed. They realised that we need to protect Algae, and care for it as it is such a transformative agent in the Food industry! Since then, we have been organized in various European cities, evolving from small, one-day gatherings aimed at connecting the community to a large, two-day event that draws participants from around the world, all united by our mission of algae care.

Over the past three years, our conference has been hosted in diverse venues:

- Milan/Barcelona: A chef school
- Stockholm/Denmark: A community centre
- Netherlands: Next Delft at TU Delft

We strive to hold our events in locations that attract the most participants while also being ideal for algae cultivation. This approach underscores our commitment to algae care and ensures that our conferences are both impactful and relevant.

About US

Algae offer us so much, enriching our restaurants and our lives without demanding much in return. Algae are highly nutritious, delicious, and remarkably easy to cultivate. All they ask for is our love, care, and respect. This conference is dedicated to promoting the nurturing and appreciation of algae, as it is our duty to care for those that care for us.

Focusing on the restaurant industry, everything in this conference is themed around what algae (spirulina to be specific) likes when you try to grow it yourself, right from the venue to the vibe of the conference.

We offer a comprehensive experience with insightful talks from industry experts, hands-on workshops, and engaging panel discussions. Additionally, our steady stalls provide a platform for networking and exploring innovative representations of algae care.

You'll also witness exciting student competitions focused on algae care, with participants creating innovative algae care ideas for the prestigious 'WACB Algae Care Ambassador' award.

Join us at this conference to collectively advance the cause of algae care and cultivation. Together, we can achieve our goal of nurturing the incredible algae that give us so much.

Venue

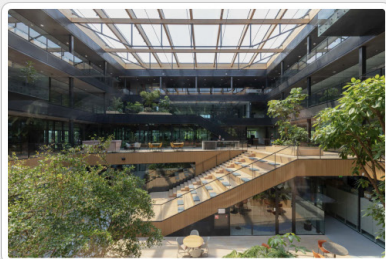


The venue for this year's conference is NEXT Delft, chosen for its ideal conditions that ensure algae happiness—sufficient lighting, perfect temperature, and abundant greenery.

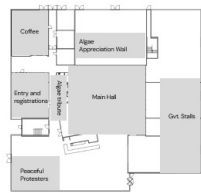
Spirulina thrives under specific conditions:

- **Temperature:** It doesn't grow below 20°C, with an optimum range of 30°C–35°C. Temperatures above 38°C are dangerous. Hence, the venue maintains a warm temperature, so we advise wearing comfortable clothing.
- **Humidity:** Spirulina benefits from light rain to compensate for evaporation, so we use humidifiers to maintain ideal moisture levels.
- **Airflow:** A gentle breeze helps Spirulina by circulating air, but wind can also bring in dirt. Therefore, we use large fans to ensure consistent air movement.
- **Lighting:** Spirulina's growth is proportional to the area exposed to light. NEXT Delft offers ample natural light throughout its rooms, maximizing growth potential.
- **Light/Dark Cycle:** Spirulina prefers 15–17 hours of light daily, with the remaining time in darkness for essential chemical reactions and respiration. One room at the venue is kept darker and cooler (25°C) to meet this requirement.
- **Environment:** Although Spirulina doesn't mind shapes, it doesn't prefer sharp angles. We incorporate softer elements in the room design to create a more suitable environment.

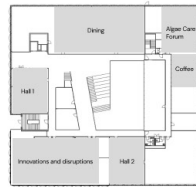
By hosting the conference at NEXT Delft, we provide an environment that mirrors the ideal conditions for algae, reinforcing our commitment to algae care.



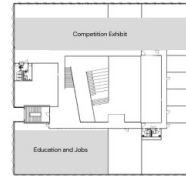
Layout



Ground floor plan, Graphics © Ester Heugstad Architects



First floor plan, Graphics © Ester Heugstad Architects



Second floor plan, Graphics © Ester Heugstad Architects

Program

The conference program is thoughtfully crafted to mirror the agitation that algae thrives on. Just as algae likes to be stirred so that the top most portion of algae seeks sunlight by moving around, we want our "Algae Carers" to explore the conference to gain maximum exposure. We're committed to embodying the concept of agitation!

Hence, every few hours, attendees switch rooms, encouraging movement and ensuring a dynamic experience—we fondly refer to it as the "Movement Moment." By dispersing the conference across various rooms, we aim to keep everyone engaged and active.

During these Movement Moments, you'll have the chance to recharge in the main hall, soaking up sunlight while enjoying coffee and snacks. Additionally, you can explore the exhibition, maximizing your exposure to all facets of the conference.

The talks center around algae care, delivered by speakers who share a deep passion for algae!

Program

Day 1

Timing	Main Hall	Breakout Halls	
		Hall A	Hall B
09:00		Registrations+ Movement Moment	
10:00	Opening of the Conference+ Welcoming the Algae Carers		
11:00	Keynote 1: Listening to the Silent Needs: Understanding Algae's Unspoken Language		
11:45		Movement Moment	
12:00	Breakout session 1	PD1: Algae Conservation and Biodiversity in the Restaurant Industry	PD2: Algae Ethics: Claiming Algae's Rights
13:00		Fuel Up with the Seaweed salad bar!	
13:45	Keynote 2: Restaurant Waste Reduction and Algae Integration		
15:00		Movement Moment	
15:30	Breakout session 2	Workshop 1: Making Algae Your Friend: Cultivating a Symbiotic Relationship	Workshop 2: Algae Pests and Diseases Management
17:30		Movement Moment	
18:30	Wrapping up the day		
19:00		End of the Day	

Program

Day 2

Timing	Main Hall	Breakout Halls	
		Hall A	Hall B
09:00		Movement Moment	
09:30	Warm Up for the day: "Algae's Dawn Delight"		
10:00	Key note 1: Breakthroughs in AlgaCare for the Restaurant Industryfem		
10:45		Movement Moment	
11:00	Breakout session 1	Workshop 1: Designing Comfortable Spaces for Algae in Restaurants	Workshop 2: Mastering Algae-Friendly kitchen Tools for Algae care
12:45		Fuel Up with the "Algal Feast"	
13:45	Breakout session 2	PD 1: Where do humans lie in the AlgaCare industry?	PD 2: The Importance of learning about Algae at University
15:00		Movement Moment	
15:30	Key note 2: Government regulations for Algae Care		
16:30		Movement Moment	
18:00	Award Ceremony and Closing Ceremony		
19:00		Drinks & Dinner	

Program Details – day 1

Keynote 1: Listening to the Silent Needs: Understanding Algae's Unspoken Language

Talk Description:

In this keynote, "Listening to the Silent Needs: Understanding Algae's Unspoken Language," attendees will embark on a journey to uncover the hidden world of algae communication. This session will explore how algae, despite their silent existence, convey their needs and respond to their environment through chemical signals, growth patterns, and subtle changes. By delving into the intricate ways algae interact with their surroundings, participants will gain a profound understanding of how to care for and cultivate these vital organisms. The talk will highlight practical applications for the restaurant industry and beyond, demonstrating the importance of empathy and attention to algae's needs for sustainable practices.

Speaker:

Dr. Marina Greenfield – A renowned marine biologist and algae specialist, Dr. Marina Greenfield has dedicated over two decades to studying marine ecosystems and the pivotal role of algae within them. As a professor at the Oceanic Institute of Marine Science, she has conducted groundbreaking research on algae communication and its implications for environmental sustainability. Dr. Greenfield is an engaging speaker known for her ability to translate complex scientific concepts into accessible and inspiring narratives. Her expertise and passion for algae make her the perfect guide for this insightful keynote.

Program Details – day 1

Panel Discussion 1: Algae Conservation and Biodiversity in the Restaurant Industry

Panel Description:

"Algae Conservation and Biodiversity in the Restaurant Industry" explores how restaurants can support algae conservation and sustainability. Experts will discuss sustainable sourcing, innovative uses in cuisine, and practical strategies for integrating algae into menus to enhance both environmental impact and culinary creativity.

Panelists:

Dr. Emily Waters – Specialist in sustainable algae sourcing and habitat restoration.

Professor James Albright – Expert on algae's ecological role and sustainable culinary use.

Dr. Leila Hussein – Conservation biologist focused on sustainable practices for algae.

Chef Olivia Tran – Chef innovating with diverse algae species in cuisine.

Moderator: Dr. Alejandro Martinez – Marine ecologist and science communicator.

Program Details – day 1

Opening Ceremony: Welcoming the AlgaeCarers

Introduction:

The opening ceremony of the conference, organized by the World Algae Care Body (WACB), sets the stage for a transformative and empathetic experience. With a focus on fostering a connection between attendees and algae, the ceremony welcomes "AlgaeCarers" from around the world who share a dedication to understanding and nurturing algae.

Program:

1. Welcome Address by WACB Representative (10 minutes): A representative from the World Algae Care Body takes the stage to welcome attendees, emphasizing the importance of empathy and care in our relationship with algae.
2. Acknowledgment of Algae's Contribution (5 minutes): A brief presentation highlights the vital role of algae in sustaining life on Earth and the need for collective efforts to protect and conserve these organisms.
3. Honoring AlgaeCarers (5 minutes): Attendees are invited to stand and be recognized as "AlgaeCarers," symbolizing their commitment to understanding, respecting, and caring for algae.
4. Keynote Speech (15 minutes): A distinguished speaker delivers an inspiring keynote speech, setting the tone for the conference theme of empathy and symbiosis with algae.
5. Ceremonial Algae Planting (10 minutes): As a symbol of care and stewardship, attendees are invited to participate in a ceremonial algae planting, where they can place algae cultures in designated habitats.
6. Musical Interlude (10 minutes): A specially curated musical performance, tailored to appeal to algae, features calming melodies and ambient sounds, fostering empathy and symbiosis with these vital organisms.
7. Closing Remarks (5 minutes): The ceremony concludes with closing remarks from the WACB representative, encouraging attendees to embrace the conference's spirit of empathy and care throughout the event.

Program Details – day 1

Workshop 1: Making Algae Your Friend: Cultivating a Symbiotic Relationship

Workshop Description:

In "Making Algae Your Friend: Cultivating a Symbiotic Relationship," participants will learn how to integrate algae into their culinary practices and daily lives. This hands-on workshop will cover the basics of algae cultivation, care, and innovative uses in cooking. Attendees will gain practical skills to foster a symbiotic relationship with algae, enhancing sustainability and culinary creativity.

Workshop Leaders:

Chef Elena Rodríguez – An expert in sustainable cuisine and algae-based dishes, Chef Elena Rodríguez will guide this interactive workshop. With years of experience in incorporating algae into her menus, she will provide valuable insights and practical tips for cultivating and using algae effectively.

Dr. Samuel Greene – A biologist specializing in algae cultivation and ecology, Dr. Samuel Greene collaborates with Chef Elena Rodríguez to integrate scientific knowledge with culinary practices. His expertise in algae biology ensures that participants receive comprehensive guidance on sustainable algae care and utilization.

Program Details – day 1

Workshop 2: Algae Pests and Diseases Management

Workshop Description:

"Algae Pests and Diseases Management" provides practical information on keeping algae free from pests and diseases, and how to treat them without causing harm. Led by a biologist specializing in algae care, participants will learn essential techniques for maintaining algae health and identifying common pests and diseases. Through hands-on demonstrations and interactive discussions, attendees will gain valuable insights into preventative measures and effective treatments for algae health issues.

Note: This is a hands-on workshop, and participants must have a WACB training certificate to participate in the challenge to ensure the safety and well-being of the algae.

Workshop Leader:

Dr. Rebecca Evans – Experienced biologist with expertise in algae care and management, guiding participants through practical strategies for maintaining algae health and managing pests and diseases.

Program Details – day 1

Panel Discussion: Algae Ethics: Claiming Algae's Rights

Discussion Description:

"Algae Ethics: Claiming Algae's Rights" brings together a diverse panel of experts to explore the ethical considerations surrounding algae ownership and recognition in culinary practices. Philosophers and a chef delve into the complex question of who rightfully owns algae-based dishes and recipes, considering the vital role algae play in enhancing flavor and nutrition. Hosted by an algae care university professor, this panel addresses the importance of giving proper credit to algae for their contributions to culinary innovation and fosters discussions on ethical responsibility and environmental stewardship in the realm of food and sustainability.

Panelists:

1. Professor Emma Thompson – Esteemed philosopher and environmental ethicist, providing insights into the ethical dimensions of algae ownership and recognition in culinary practices.
2. Dr. Oliver Rodriguez – Renowned philosopher specializing in bioethics, offering perspectives on the ethical considerations surrounding the treatment of algae in culinary innovation.
3. Chef María Sanchez – Acclaimed chef and culinary innovator, sharing firsthand experiences and perspectives on the importance of recognizing algae's contributions to culinary creativity and flavor enhancement.

Host:

Professor David Garcia – Algae care university professor, facilitating discussions and providing expertise on the ethical implications of algae ownership and recognition in culinary practices.

Program Details – day 2

Keynote 1: Breakthroughs in AlgaCare Technology for the Restaurant Industry

Talk Description:

"Breakthroughs in AlgaCare Technology for the Restaurant Industry" explores the latest advancements in technology that are facilitating a closer relationship between humans and algae in culinary practices. Attendees will delve into cutting-edge innovations, such as algae cultivation systems, bioreactors, and algae-based food processing techniques, that are revolutionizing the way algae are utilized in kitchens. This keynote highlights how technology is enabling a symbiotic relationship between humans and algae, leading to sustainable, nutritious, and innovative culinary creations.

Speaker:

Chef Emma Rodriguez – A pioneering chef and technologist specializing in algae-infused cuisine, Chef Emma Rodriguez is at the forefront of leveraging technology to transform restaurant kitchens. With a passion for sustainability and culinary innovation, Chef Rodriguez has embraced the latest advancements in algae cultivation and processing technology to create groundbreaking dishes. Her expertise and forward-thinking approach offer attendees valuable insights into the intersection of technology and culinary arts, showcasing how these innovations are shaping the future of dining while promoting environmental stewardship.

Program Details – day 2

Workshop 2: Mastering Algae-Friendly Kitchen Tools for Algae Care

Workshop Description:

"Mastering Algae-Friendly Kitchen Tools for Gentle Algae Care" focuses on the responsible and effective use of kitchen tools in algae care. Participants will learn the proper handling and utilization of specialized equipment tailored for gentle treatment of algae in restaurant kitchens.

Workshop Leaders:

Chef Ava Chang – Esteemed chef and advocate for gentle algae care, renowned for her expertise in algae-infused cuisine and commitment to ethical culinary practices.

Professor Jonathan Lee – Distinguished professor of design at Algae Care University and inventor of algae care tools, dedicated to creating equipment that minimizes harm to algae while maximizing their potential in restaurant kitchens.

Program Details – day 2

Panel Discussion 1: The Human Role in the AlgaCare Industry

"The Human Role in the AlgaCare Industry" is a thought-provoking discussion that challenges participants to reflect on the significance of algae care and its relationship to humanity. Panelists will explore philosophical, ethical, and practical dimensions of algae care, considering whether algae holds equal importance to humans and the implications of this perspective. With diverse perspectives from design, philosophy, culinary arts, industry, and sociology, this panel aims to inspire critical thinking and dialogue on the role of humans in caring for algae and fostering sustainable coexistence.

Panelists:

1. Professor Elena Martinez – Design professor and advocate for sustainable design practices, specializing in the integration of algae-friendly technologies into everyday life.
2. Dr. Marcus Reynolds – Philosopher and ethicist, known for his exploration of environmental ethics and the moral status of non-human organisms, including algae.
3. Chef Mia Thompson – Innovative chef and culinary activist, pioneering the use of algae in cuisine and advocating for ethical sourcing and sustainable practices in the food industry.
4. David Chen – CEO and Founder of Lovagla Inc., a leading company in the production of algae-friendly tools and equipment for various industries, including restaurants and food service.

Moderator:

Dr. Sarah Johnson – Sociologist and expert in environmental sociology, facilitating discussions on human-algae relationships and societal attitudes towards environmental stewardship.

Program Details – day 2

Panel Discussion 2: Importance of Learning about Algae at University

Panel Description:

"The Importance of Learning about Algae at University" delves into the vital importance of learning about algae in academic settings. Panelists will explore the rich history of algae as one of Earth's oldest organisms, its crucial role in addressing contemporary challenges such as food security and nutrition, and its promising potential to shape a sustainable future. By highlighting the significance of algae education across historical, present, and future contexts, this panel aims to underscore the urgency and relevance of integrating algae studies into university curricula.

Panelists:

1. Dean Sandra Nguyen – Dean of Culinary Arts at International Culinary Institute, championing the integration of algae education into culinary curriculum to prepare future chefs for sustainable culinary practices.
2. Professor Michael Thompson – Esteemed professor of environmental science, advocating for the inclusion of algae studies in university programs to address pressing environmental challenges and promote ecological literacy.
3. Chef Emily Clarke – Acclaimed chef and culinary educator, incorporating algae education into culinary training programs to empower aspiring chefs with knowledge and skills for sustainable cooking practices.

Moderator:

Dr. Emily Parker – Researcher and educator specializing in algae ecology and environmental education, facilitating discussions on the importance of algae learning at universities and its broader implications for society.

Program Details – day 2

Keynote 2: Government Regulations for Algae Care

Talk Description:

"Government Regulations for Algae Care: Safeguarding Algae's Vital Role" delves into the essential government regulations aimed at ensuring the responsible care and utilization of algae. Attendees will explore how government laws and policies are designed to protect and promote the well-being of algae, recognizing its crucial importance in ecological balance and sustainability.

Speaker:

Dr. Samantha Roberts – Legal expert specializing in environmental law and regulations, and a prominent member of the World Algae Care Board (WACB). With her extensive experience in regulatory compliance and policy advocacy, Dr. Roberts provides invaluable insights into the development and implementation of government regulations for algae care. As a member of the WACB, she works tirelessly to advocate for policies that prioritize the protection and sustainable management of algae resources.

Program Details – day 2

Warm Up for the day: "Algae's Dawn Delight"

Overview:

"Algae's Dawn Delight" offers attendees a relaxing start to the day, inspired by the smooth transition preferred by algae from cool nights to warmer mornings. This session aims to awaken the senses, foster connection, and cultivate a profound mental symbiosis between participants and algae.

Program:

1. Guided Breathing and Mindfulness (7 minutes): Participants are guided through a brief session of deep breathing exercises and mindfulness practices. This allows attendees to center themselves, cultivate awareness, and open their minds to the upcoming activity focused on building a mental connection with algae.
2. Algae Mental Connection Exercise (7 minutes): Participants are guided in a visualization exercise, immersing themselves in an underwater world surrounded by algae. Through this, they foster empathy and appreciation for algae's vital role in sustaining life.
3. Interactive Icebreaker (8 minutes): An interactive icebreaker activity is facilitated to encourage connections and conversations among attendees.
4. Reflection and Intent Setting (8 minutes): Attendees take a moment to reflect on their mental connection with algae and silently set positive affirmations or intentions for the day.

Blogs

Attendees often leave our conference brimming with inspiration, and many channel this into writing insightful blogs about their experiences. Here are some standout examples from last year's attendees:

1. **"Revolutionizing Algae Care: A Deep Dive into the Latest Product Unveiled at the Conference"**
2. **"Culinary Innovation: How a Chef Found New Inspiration in Algae Care at the Conference"**
3. **"From Curiosity to Passion: A Student's Journey into the World of Algae Care"**
4. **"The Vital Role of Conferences in Advancing Algae Care: Insights from an Expert"**
5. **"Two Days Immersed in Algae: An Insider's Itinerary at the WACB Conference"**

We look forward to seeing how this year's conference sparks new ideas and stories from our attendees!

Press Releases

Every year, our conference garners significant media attention, attracting numerous news outlets and press coverage. Here are some notable news and press releases from last year:

"Protesters Present Their Stand Peacefully at the Conference: A Lesson in Mutual Care"

Emphasizing that caring for our opponents is a form of mutual respect and understanding, the conference provided a platform for protesters to express their views peacefully. This act of inclusivity highlights the broader message that caring for algae goes hand-in-hand with fostering a community of mutual care and respect.

"Celebrity Max Verstappen Inaugurates the WACB: Highlighting the Importance of Algae Care"

Formula 1 star Max Verstappen's presence at the conference underscored the universal significance of algae care. His involvement brought widespread attention to our cause, demonstrating how algae care is vital and relevant to everyone, including high-profile figures.

"Showing What Care Truly Means: Conference Donates Extra Ticket Revenue to Algae Care and R&D"

In a heartfelt gesture, the conference donated surplus ticket revenue to support algae care and research and development. This initiative not only advances algae science but also embodies the true spirit of care and generosity that defines our community.

Contact

Feel free to reach out to us in case of any questions, suggestions, or just to be in touch!

For questions: letscareforalgae.info@gmail.com

For becoming a sponsor: letscareforalgae.stall@gmail.com

To give feedback about the conference: [google form link](#)

Sponsors & Partners

Criteria

To ensure that sponsors and partners are genuinely passionate about algae care, the following criteria should be used to assess their eligibility:

- 1. Commitment to Algae Care:** Sponsors and partners must demonstrate a strong commitment to algae care, including sustainable cultivation, research, and innovation in algae-based products.
- 2. Proven Track Record:** Companies should have a proven track record in the algae care industry, showcasing successful initiatives, products, or services that benefit algae health and sustainability.
- 3. Ethical and Sustainable Practices:** Organizations must adhere to ethical and sustainable business practices, ensuring their operations support environmental health and the well-being of algae ecosystems.
- 4. Support for Research and Development:** Preference is given to entities that invest in research and development specifically related to algae care, contributing to advancements in the field.
- 5. Community Engagement:** Sponsors and partners should actively engage with and support communities involved in algae care, promoting education, awareness, and practical solutions.

Food– Ethical and Sustainable Algae Consumption

Embracing Algae with Gratitude and Respect

At our conference, we honor and thank the algae for its sacrifice before each meal, ensuring that we approach its consumption with deep gratitude and respect. This mindful practice reminds us of the vital role algae play in our lives and the importance of caring for them.

By focusing on the sustainable and ethical aspects of algae consumption, we aim to promote algae care while also demonstrating how algae can be responsibly incorporated into our diets. We emphasize the use of algae in ways that require minimal quantities, focusing on its extraordinary nutritional benefits rather than overconsumption. This approach helps us incorporate algae care into our daily practices and avoid both overconsumption and wastage.

Through this thoughtful and respectful approach, we can nurture a deeper connection with algae, appreciating its contributions to our health and the environment.

Decoration

Algae Care Appreciation Wall: Set up an appreciation wall where attendees can express their gratitude and appreciation for algae and the natural world.

Algae Tribute: At the entrance there will be a sculpture that will pay tribute to Algae. It will represent Algae as a superhero.

Algae-themed Artwork: Commission local artists to create wall paintings that depict scenes of algae care and conservation.

Greenery and Plants: Incorporate live plants and greenery throughout the venue to enhance the natural ambiance.

Sponsors

1. WACB – The organizing body of the conference, ensuring all sponsors meet the high standards set for algae care.
2. Lovalga – A leading company producing algae care goods, committed to sustainable and innovative algae care solutions.
3. Nurtura – Another prominent company in the algae care industry, known for its high-quality products and dedication to algae health.
4. Siemens – Known for its sustainable technologies and contributions to innovative algae care solutions.
5. Phillips – A pioneer in sustainable practices, supporting algae care through advanced lighting and cultivation technologies.
6. Autodesk – Provides advanced design software that supports sustainable algae farming and innovative solutions in the industry.
7. Nature's Basket – A retailer specializing in fresh algae products, promoting the nutritional and culinary benefits of algae.

Partners

1. Algae Care University – Offers academic support and expertise in algae care, contributing to the educational aspect of the conference.
2. TU Delft – Provides research insights and venue support, fostering innovation and sustainability in algae care.
3. Wageningen University – Known for its agricultural research, contributing valuable knowledge and resources to the conference.
4. Chef School – A renowned culinary institution, contributing expertise in integrating algae into culinary practices and supporting chef-led workshops.
5. Hotelschool The Hague – Offers logistical support and venue space, enhancing the hospitality aspect of the conference.
6. UNESCO – Supports the conference by promoting educational and cultural aspects of algae care, emphasizing its global importance.

Additional ideas

Algae Care Forum: Facilitate a moderated forum or panel discussion where attendees can share their experiences, ideas, and best practices for algae care and conservation. Open dialogue and collaboration to foster a sense of community among participants is encouraged.

Appendix B - Design System and Components

Colors

Main Colors



#366B01



#808836



#525252



#F0F0F0

Accent Colors



#FFBF00



#D10363

Fonts

Header

Subheader


Body text

Footer

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Blogs

Blogs

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Participate

Ticket Prices


Waitlist

Feedback Form

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Header

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Footer

Title

Tab 1

Tab 2

Title and subtitle

| Title

Subtitle: lorem Ipsum

Layout

Explore the exhibition

Floor 1

Floor 2

Floor 3

Navigate through Floor 1

Go to the elements for more information



Floor 1 layout diagram showing various exhibition areas: Coffee, Algae Appreciation Wall, Entry + registration, Main Hall, Government stalls, Peaceful Protestors, and a staircase.

Explore the exhibition

Floor 1

Floor 2

Floor 3

Navigate through Floor 2

Go to the elements for more information



Floor 2 layout diagram showing various exhibition areas: Dining, Algae Care Forum, Coffee, Hall 1, Hall 2, and Innovations and disruptions.

Explore the exhibition

Floor 1

Floor 2

Floor 3

Navigate through Floor 3

Go to the elements for more information



Floor 3 layout diagram showing various exhibition areas: Competition Exhibition and Education and Jobs.

Layout

Navigate through Floor 1

Go to the elements for more information

Navigate through Floor 1

Get fresh coffee all day, but you cannot visit the same coffee corner again in the next break, you need to head to the other one!

Navigate through Floor 1

Make sure to get your badge and Goodie bag here!

Navigate through Floor 1

Many are against Algae as it has caused big waves in the next industry. We understand you, we respect you, and we care for you!

Navigate through Floor 1

Write your appreciation for Algae here, and see what other's have written too!

Navigate through Floor 1

All the keynote talks, the opening and closing ceremonies were held here!

Navigate through Floor 1

Know more about policies and new laws regarding Algae. Get free consultation for personal queries.

Navigate through Floor 2

Go to the elements for more information

Navigate through Floor 2

Panel discussions and workshops will be held here!

Navigate through Floor 2

Explore the Innovations and disruptions in the Algae Care Industry!

Navigate through Floor 2

Fuel up with meals that will show you how to care for algae even when you consume it.

Navigate through Floor 2

Panel discussions and workshops will be held here!

Navigate through Floor 2

Share your algae care insights in the forum, and also get insights from other people.

Navigate through Floor 2

Get fresh coffee all day, but you cannot visit the same coffee corner again in the next break, you need to head to the other one!

Navigate through Floor 3

Go to the elements for more information

Navigate through Floor 3

Students from different universities had displayed their innovations and ideas about Algae Care.

Navigate through Floor 3

Get information about job opportunities in the field of Algae Care!

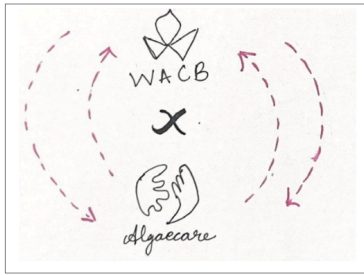
Schedule

Main Hall		Break out room 1	Break out room 2
09.00		Registrations + Movement Moment	
Opening of the Conference+ Welcoming the Algae Carers			
Keynote 1: Listening to the Silent Needs: Understanding Algae's Unspoken Language			
11.45		Movement Moment	
		PD1: Algae Conservation and Biodiversity in the Restaurant Industry	PD2: Algae Ethics: Claiming Algae's Rights
13.00		Fuel up!	
Keynote 2: Restaurant Waste Reduction and Algae Integration			
15.00		Movement Moment	
		Workshop 1: Making Algae Your Friend: Cultivating a Symbiotic Relationship	Workshop 2: Algae Pests and Diseases Management
17.30		Movement Moment	
Wrapping up the day			
19.00			End of the day

Main Hall		Break out room 1	Break out room 2
09.00		Registrations + Movement Moment	
Warm Up for the day: "Algae's Dawn Delight"			
Key note 1: Breakthroughs in AlgaCare for the Restaurant Industryfem			
10.45		Movement Moment	
		Workshop 1: Designing Comfortable Spaces for Algae in Restaurants	Workshop 2: Mastering Algae-Friendly kitchen Tools for Algae care
13.00		Fuel up!	
		PD 1: Where do humans lie in the AlgaCare industry?	PD 2: The Importance of learning about Algae at University
15.00		Movement Moment	
Keynote 2: Government regulations for Algae Care			
16.30		Movement Moment	
Award Ceremony and Closing Ceremony			
19.00			Drinks and dinner

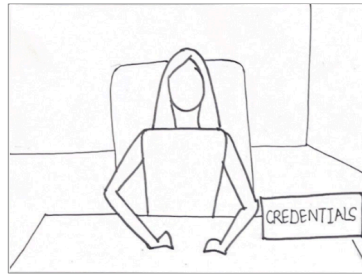


Appendix C: Storyboard for the Video

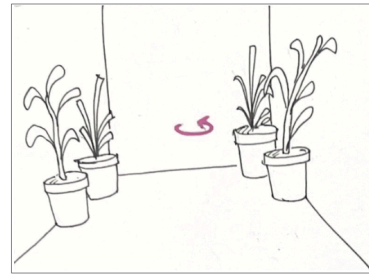


Scene: Animation of the WACB and AlgaCare logo as an introduction.

Script: -



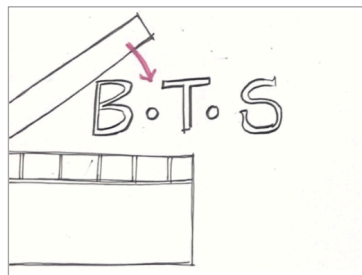
Scene: A woman talking in airy clothes, in a office space.
Script: At the AlgaCare conference, our goal is to make the attendees empathize with algae, by stepping into their shoe. This conference is designed for the comfort of the algae, and humans are just stepping in, to experience this world.



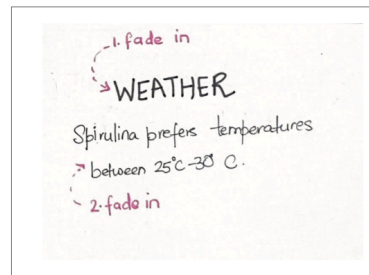
Scene: View of NEXT Delft space, focusing on area focusing on where the plants are.
Script: From the decoration to the vibe, its all about algae, we focused on spirulina for our conference last year!



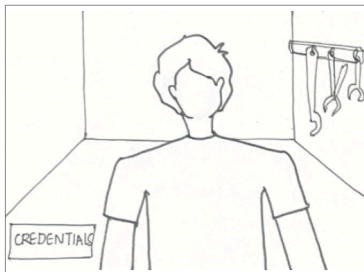
Scene: WACB President talking in airy clothes, in a office space, with her credentials displayed.
Script: We do this because we truly care for algae, and we want us, humans to realise that we are just a small part in the huge world of algae.



Scene: An animation of a clipboard shuttin with BTS written behind it.
Script: Let's see some behind the scenes from last year's conference, and see how we made this empathic vision come true.



Scene: Transition scene with text displayed. 1. will fade in first, followed by 2., then the both fade out into another scene.
Script: -



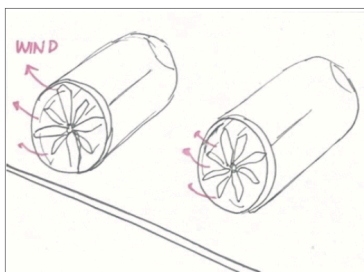
Scene: Weather specialist is speaking with his credentials displayed.
Script: Hi there! So, Creating a 30-degree environment indoors, that too here in the Netherlands was quite the challenge! We aimed for sustainability while controlling the temperature



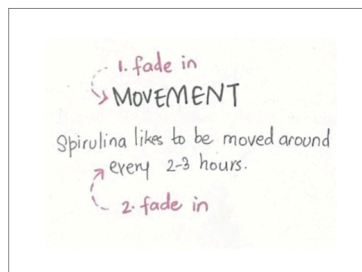
Scene: Zoomed in shots of people sweating while seated at the conference, further zooming into the sweat.
Script: to match spirulina's ideal conditions atmosphere where many attendees ended up sweating,



Scene: Speaker wipes his sweat, laughs, and continues talking.
Script: like us too haha! And spirulina loves a gentle breeze, so we developed a weather control



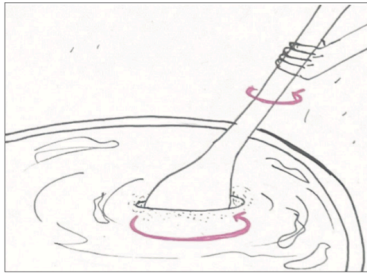
Scene: Sustainable wind system of an indoor space is zoomed in.
Script: System that replicated these conditions, it was indeed a challenge, but worth it for the algae.



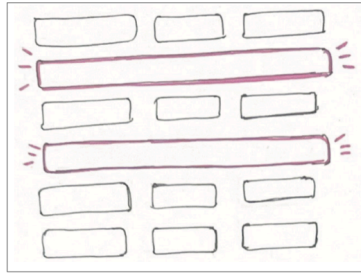
Scene: Transition scene with text displayed. 1. will fade in first, followed by 2., then the both fade out into another scene.
Script: -



Scene: Layout specialist talks with her credentials displayed.
Script: Hi!! The program was designed to mimic the movements spirulina prefers;



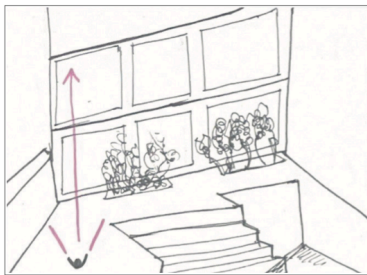
Scene: Zoomed in video of algae being moved.
Script: they prefer to be moved in every 2-3 hours so that the ones at the bottom also get the sunlight.



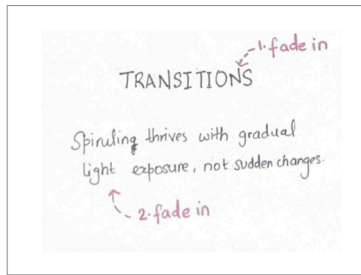
Scene: Schedule of day 1 being shown with 'Movement Moments' highlighted.
Script: Hence, we had incorporating 'movement moments' which serve as our breaks.



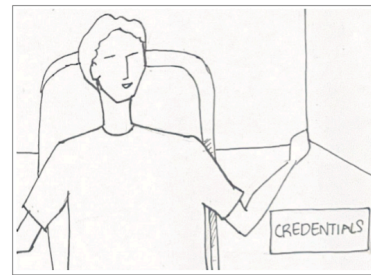
Scene: Layout expert continues talking.
Script: Just as algae move to get sunlight exposure, these breaks allow you to absorb the most from the conference. Our team designed the layout of the conference in a way that one can experience and benefit maximally during these moments.



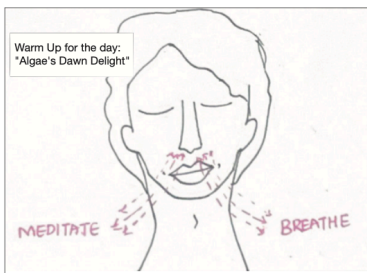
Scene: Panning the three floors of Next Delft from bottom to top.
Script: We used three floors of our Venue, and different areas of the building for maximum movement.



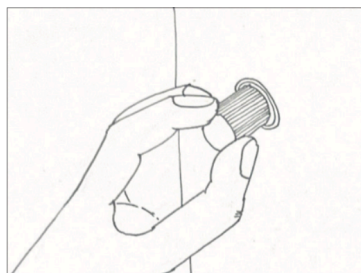
Scene: Transition scene with text displayed. 1. will fade in first, followed by 2., then the both fade out into another scene.
Script: -



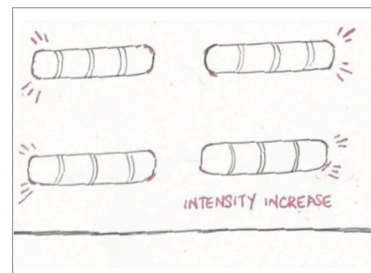
Scene: Lead technician talks with his credentials displayed.
Script: Ok, lets go, Hello all. Spirulina thrives with gradual light exposure, not sudden changes. We mirrored this throughout



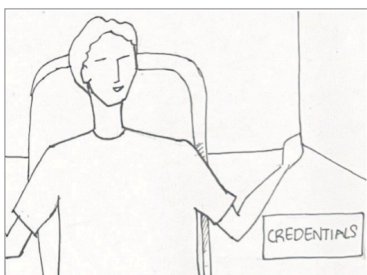
Scene: A zoomed in person doing meditation at the conference is shown with the activity name displayed at the top.
Script: our conference schedule with smooth transition moments in the morning to ease into the day.



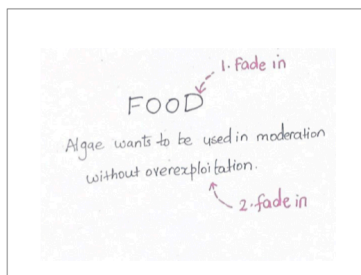
Scene: A zoomed in hand is shown, adjusting the regulator.
Script: We also used lighting transitions to ensure a gentle experience whenever



Scene: The focus is on ceiling lights where the intensity of light gradually increases.
Script: gentle experience whenever a lecture started



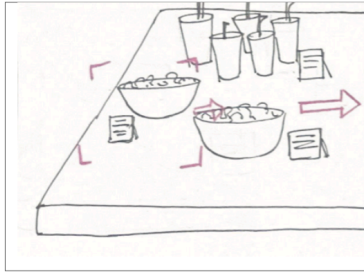
Scene: Technician continues talking.
Script: Building this was a careful process, using various sensors and motor equipment to get it just right.



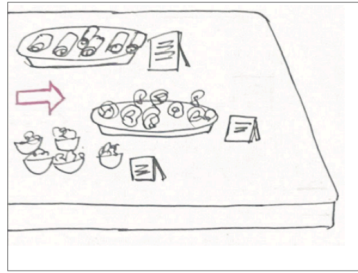
Scene: Transition scene with text displayed. 1. will fade in first, followed by 2., then the both fade out into another scene.
Script: -



Scene: Headchef talks in an Algae-friendly kitchen setting, with her credentials displayed.
Script: Haha, the challenge I was given was to serve algae for the AlgaCare conference! At first, I was like, NO WAY!



Scene: A table with food is shown, and the focus is on one food item, slowly panning throughout the table.
Script: But my team and I worked together to create versatile algae options that show



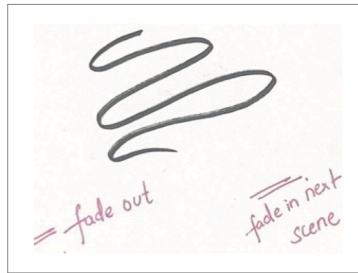
Scene: Panning continues.
Script: we can use algae in moderation and not overexploit it.



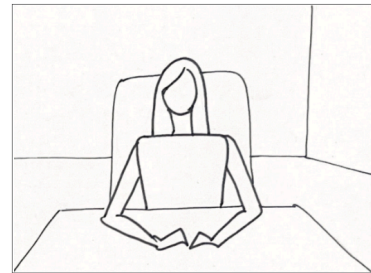
Scene: A nutrition card is shown, kept on a table with other food.
Script: We included the nutrition score on every item to demonstrate that careful use is key.



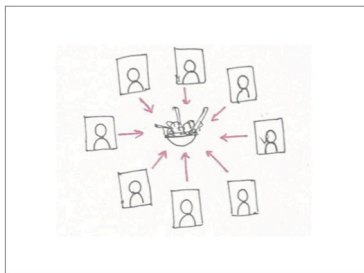
Scene: Head chef continues talking, and eats dessert from a bowl.
Script: People absolutely loved our algae desserts. In fact, I have some with me right now!



Scene: Previous frame fades out and the next scene fades in.
Script: -



Scene: WACB President speaks.
Script: This conference is more than just a series of talks and presentations; it's an experience designed to make you step into the shoes of algae, it is an experience that builds appreciation for algae.





Scene: The team members from different teams surround Algae, which is in the centre.
Script: Each year, our algae-caring team puts in tremendous effort into creating this unique environment for different types of algae.



Scene: Logo and text appears.
Script: We hope to see you all—both algae and algae carers—next year!



Appendix D: Project Brief



IDE Master Graduation Project

Project team, procedural checks and Personal Project Brief

In this document the agreements made between student and supervisory team about the student's IDE Master Graduation Project are set out. This document may also include involvement of an external client, however does not cover any legal matters student and client (might) agree upon. Next to that, this document facilitates the required procedural checks:

- Student defines the team, what the student is going to do/deliver and how that will come about
- Chair of the supervisory team signs, to formally approve the project's setup / Project brief
- SSC E&SA (Shared Service Centre, Education & Student Affairs) report on the student's registration and study progress
- IDE's Board of Examiners confirms the proposed supervisory team on their eligibility, and whether the student is allowed to start the Graduation Project

STUDENT DATA & MASTER PROGRAMME

Complete all fields and indicate which master(s) you are in

Family name	Ramrakhiani	IDE master(s)	IPD <input type="checkbox"/>	Dfi <input checked="" type="checkbox"/>	SPD <input type="checkbox"/>
Initials	Ashish	2 nd non-IDE master			
Given name	Kashish	Individual programme (date of approval)			
Student number	5710189	Medisign	<input type="checkbox"/>		
		HPM	<input type="checkbox"/>		

SUPERVISORY TEAM

Fill in the required information of supervisory team members. If applicable, company mentor is added as 2nd mentor

Chair	Dr.Nazli Cila	dept./section		<div>! Ensure a heterogeneous team. In case you wish to include team members from the same section, explain why.</div> <div>! Chair should request the IDE Board of Examiners for approval when a non-IDE mentor is proposed. Include CV and motivation letter.</div> <div>! 2nd mentor only applies when a client is involved.</div>
mentor	Laurens Kolks	dept./section		
2 nd mentor				
client:				
city:		country:		
optional comments				

APPROVAL OF CHAIR on PROJECT PROPOSAL / PROJECT BRIEF -> to be filled in by the Chair of the supervisory team

Sign for approval (Chair)

Nazli Cila - IO

Digitally signed by Nazli Cila - IO
Date: 2024.03.01 09:27:42 +01'00'

Name Nazli Cila Date 1-03-2024 Signature _____



Personal Project Brief – IDE Master Graduation Project

Name student Kashish Ramrakhiani

Student number 5710189

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT

Complete all fields, keep information clear, specific and concise

Project title Speculating evolving restaurant dynamics with Algae as a transformative agent

Please state the title of your graduation project (above). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

Introduction

Describe the context of your project here; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)

Food practices are studied in HCI under the term of human-food interaction are defined as “the interconnection between the self and food” (Choi et al., 2014). Human-Food Interaction (HFI) is a growing research area that traverses multiple disciplines and draws on diverse approaches to bring focus to the interplay between humans, food, and technology. Food practices that common in daily life: like eating and cooking, are relatable and occur at the body scale. Unlike typical design materials, food is edible, perishable, and compostable, thus extends to more-than-human life as a key concern in creating sustainable living systems (Dolejšová et al., 2020).

Future of food is a fascinating intersection of biology, technology, and human experiences. With evolution in the food industry, the space around the chefs will be impacted by all three factors where they will need to adapt their skills according to the biology of the material, work with the cutting-edge technology advancements in the hospitality sector and cater to provide well designed experiences to their customers. As the creative processes of chefs will modify, their relationships with the world around them will also transform.

Algae, a promising food source, offers sustainability and nutrition benefits. It's versatile and gradually making its way onto menus beyond avant-garde restaurants, into casual and mid-range restaurants (Pérez-Lloréns, 2020).

Scope of the project:

In this project, we envision Algae becoming a common ingredient in restaurant menus. The focus is looking at the journey of Algae as a transformative agent in the restaurant from the time chefs receive the material to the time that they are cooked and served to the customers. The aim of this speculative project is to explore possible futures of restaurant kitchens with introduction of Algae in their daily menus. By adopting a 'More-than-Human Food Interaction' lens, wider implications of the material transition will be explored.

→ space available for images / figures on next page

introduction (continued): space for images

References:

Choi, J. H., Foth, M., & Hearn, G. (2014). Eat, Cook, grow: Mixing human-computer interactions with human-food interactions. The MIT Press.

Dolejšová, M., Wilde, D., Altarriba Bertran, F., & Davis, H. (2020). Disrupting (more-than-) human-food interaction. Proceedings of the 2020 ACM Designing Interactive Systems Conference. <https://doi.org/10.1145/3357236.3395437>

Pérez-Lloréns, J. L. (2020). Microalgae: From staple foodstuff to avant-garde cuisine. International Journal of Gastronomy and Food Science, 21, 100221. <https://doi.org/10.1016/j.ijgfs.2020.100221>

click to add picture

image / figure 1

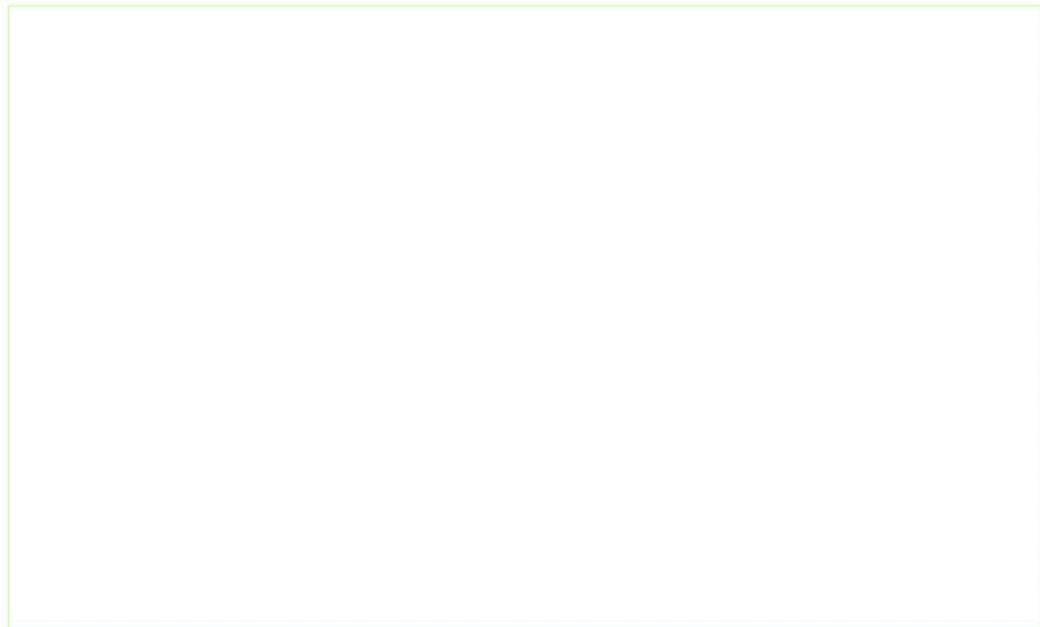


image / figure 2



Personal Project Brief – IDE Master Graduation Project

Problem Definition

*What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice.
(max 200 words)*

Picture a future where chefs regularly use Algae in their food. As Algae gains popularity as an ingredient, it brings about changes in the restaurant ecosystem from the moment it arrives at the restaurant to when it reaches the customer's plate. These changes could involve new stakeholders entering the scene (eg. Biologists working with the chefs), shifts in how the kitchen operates (eg. growing algae in the kitchen), and adjustments in how chefs work with it. This project dives into the exploratory journey of Algae from delivery to dining table, seeking to grasp the transformations it sparks in the restaurant ecosystem.

Assignment

*This is the most important part of the project brief because it will give a clear direction of what you are heading for. Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project. (1 sentence)
As you graduate as an industrial design engineer, your assignment will start with a verb (Design/Investigate/Validate/Create), and you may use the green text format:*

A speculative study that examines a future scenario where Algae becomes a prevalent in restaurant kitchens. Understanding Algae's journey from kitchen entrance to serving a customer, a "more than human" viewpoint is adapted. The goal is to explore the possible future of the restaurant kitchens and the ripple effects that it might cause on the ecosystem around it.

Then explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words)

This study adapts a "more-than-human" lens, by considering Algae as an agent instead of an ingredient. This will help to understand the agentic capacity of Algae and lead to a comprehensive understanding of the relationship of Algae with other elements in its surrounding.

Drawing upon methodologies from the Human-Food Interaction and speculative design domain, a tailored method will be created for this study.

Field research and interviews with chefs and food enthusiasts will be conducted to further refine our understanding of the subject matter.

Project planning and key moments

To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include a **kick-off meeting**, **mid-term evaluation meeting**, **green light meeting** and **graduation ceremony**. Please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any (for instance because of holidays or parallel course activities).

Make sure to attach the full plan to this project brief.
The four key moment dates must be filled in below

Kick off meeting	28th Feb 2024
Mid-term evaluation	2nd May 2024
Green light meeting	11th July 2024
Graduation ceremony	26th Aug 2024

In exceptional cases (part of) the Graduation Project may need to be scheduled part-time. Indicate here if such applies to your project

Part of project scheduled part-time	<input type="checkbox"/>
For how many project weeks	
Number of project days per week	

Comments:

Motivation and personal ambitions

Explain why you wish to start this project, what competencies you want to prove or develop (e.g. competencies acquired in your MSc programme, electives, extra-curricular activities or other).

Optionally, describe whether you have some personal learning ambitions which you explicitly want to address in this project, on top of the learning objectives of the Graduation Project itself. You might think of e.g. acquiring in depth knowledge on a specific subject, broadening your competencies or experimenting with a specific tool or methodology. Personal learning ambitions are limited to a maximum number of five.
(200 words max)

My ambition is to learn to conduct and develop research in design areas such as speculative design and more than human design, exploring futuristic possibilities.

I have a keen personal interest in the food industry and a strong motivation to contribute to the current imperative for food transformation.

I am intrigued by the Human-Computer Interaction (HCI) domain and see an exciting opportunity to work in this field in the future, exploring its diverse aspects.





fin.