Supporting Change: Exploring the Potential of Speculative Design for Science Research

Design lessons from within AgResearch

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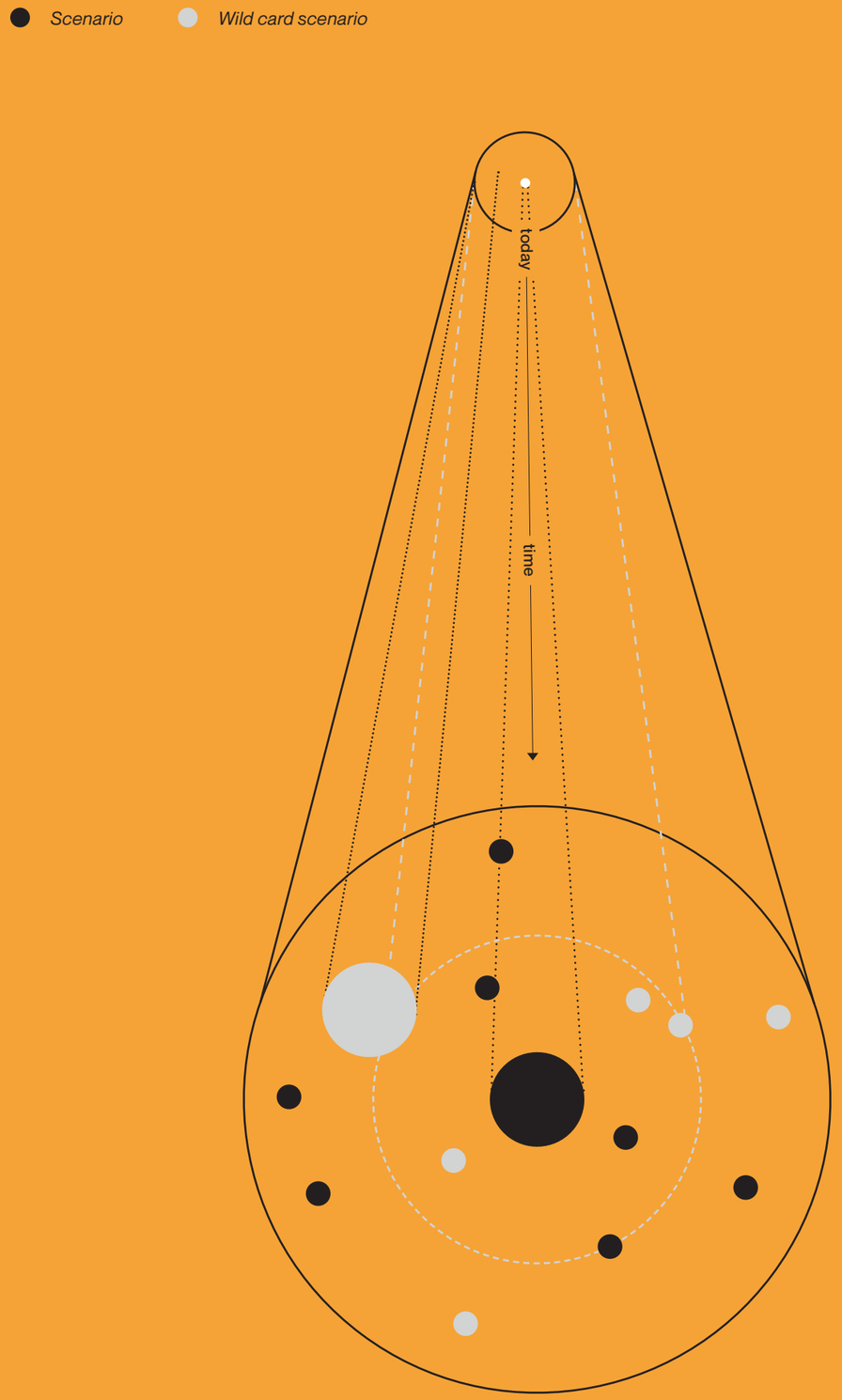

Fig. 1. *Futures Cone* representation, digital image by author. Image based on *http://www.researchgate.net/figure/The-Future-Cone-Voros-via-Dunne-and-Raby-via-Revell-A-diagram-of-potential-futures_fig3_276917770*, 25 November 2021.

Abstract

We are living in increasingly uncertain times and the burden of sustainability is great. The call for transformation towards sustainability is nowhere louder than in New Zealand's agri-food sector. As the reconciliation between social, cultural, environmental and economic domains continues, there is a need to shift away from a vision of disaster to one of hope. Existing narratives of change need to be challenged to allow space for desirable futures to flourish.

Currently, there is pressure for science research to deliver real-world impact. Speculative design can help steer the direction of science research to deliver on it's ambition for impact by identifying desirable futures to work towards. Within this practice-based research, a speculative design approach is explored as part of science research programme development. Speculative design can enable collective dreaming about possible futures to guide present-day decisions with future aspirations and development towards transformation.

With tenets in sustainability transitions theory, this project reinterprets design concepts like the Ethnographic Experiential Futures cycle and Experiential Futures Ladder to generate sustainability scenarios with a live science programme. The role of design(er) and the potential of a speculative design approach is investigated within a science research organisation.

Lessons from this research are synthesised into a prototype toolkit for aid strategic thought and generate speculative visions of transformation within AgResearch. Design is used throughout this project to challenge the status quo of how science research is conducted, specifically in the initial stages of research programme design and organisational strategy development. By creating hopeful visions that challenge the current mindset and compel action towards sustainability within a science research organisation, design can play a crucial role in sustainability transitions by intentionally leveraging organisational strategy as an intermediary for catalysing long-term visions of change.

Key terms

- Visioning
- Speculative design
- Scenarios
- Science research
- Sustainability transitions
- Mindsets and paradigms
- Design and science collaboration
- Designers agency
- Workshops
- Alternative proteins
- Toolkit

Acknowledgments

To say the past year or so has been tumultuous is an understatement. Amid a global pandemic and subsequent lockdowns, the completion of this study is in large part thanks to a very special group of people who challenged, supported and stuck with me through all the highs and lows, for which I am immensely grateful.

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Introduction

For some time now, sustainability has been synonymous with the future. However, how we achieve sustainability and what alternative futures it leads to remains unknown. The growing field of design for sustainability transitions (more recently known as transition design) offers a promising way to approach the sustainability imperative.

Within the transition design framework, speculative design is highlighted as a way of constructing future visions and scenarios to explore sustainability transition pathways. The premise being, in order to create change, we must first imagine what it could be, and more importantly, what it enables, and then work backwards to link our day-to-day actions with future aspirations. Sustainability is limited by our ability to imagine compelling futures.

The central inquiry of this project is: how might design-led approaches support transformative science research and research leading to transformation towards sustainability? More specifically, this study seeks to investigate the roles that design(er) can play within science research and a science research organisation.

As the global focus shifts away from incremental change to big system transformation, AgResearch, in particular the Agricultural Sustainability Transitions Action Research (Agri-STAR) programme, is reconsidering what research they do and how they do it. Design-led approaches can challenge the status quo of science research and provide new ways of seeing, thinking and being.

(Meadows 6)

“At a time when the world is more messy, more crowded, more interconnected, more interdependent, and more rapidly changing than ever before, the more ways of seeing, the better.”

Design ethos

I began this Master of Design research project with the belief that design can change the world. I still think it can, but it certainly won’t be alone. Collaboration is much more than just a synergy between individuals’ hard skills and experience. We each bring a unique worldview, attitude and ethos that imprints on our work.

I come to this project as a first-generation Asian New Zealander born and raised in Auckland, Aotearoa. With an interest in design, I moved to Wellington to get my Bachelor in Design (Hons) and spent a year on exchange in Singapore exploring my interest in art curating.

Before this undertaking, I had been reflecting on my learnings from design school. We were taught to solve problems and be useful, but I’ve found myself wondering about who design actually serves and what is the greater mission behind it all? As a relatively new academic domain, design has been fighting for recognition. Increasingly, designers work to add value beyond the bottom line or the corporate interests that design usually serves.

To me, design belongs at the intersection of things. Its value is in bringing together disciplines, people, and moments in time. Design is an activity, not a product. There’s much to say about the optimism, disruption and intentionality it wields, but perhaps more than anything, doing design is about acting with an open mindset and willingness for change, than applying any technical skillset or aesthetic sense.

Project source

The genesis of this Master of Design research project occurred at the end of my internship at AgResearch and was subsequently undertaken in partnership with AgResearch.

AgResearch is one of New Zealand’s largest Crown Research Institutes (CRIs) and specialises in pastoral, agri-food and agri-technology research. New Zealand’s Ministry of Business Innovation and Employment states that CRIs carry out research for the public good are aligned with a productive economy sector or a grouping of natural resources to carry out research for the public good. CRIs produce the bulk of scientific research for New Zealand and have strong links with their respective industry. This industry-research relationship puts CRIs, like AgResearch, in a strong position to provide thought leadership for sustainability efforts within their respective sectors.

Precursor

In the summer of 2019-2020, I had the opportunity to intern at AgResearch through the Te Pūnaha Matatini—Centre of Research Excellence for Complex Systems internship scheme.

During my 10-week internship, I was tasked with translating the complex concepts of transition and transformation in the context of science through design. The two concepts stem from sustainability transitions theory and are particularly difficult to grapple with due to their abstract and multifaceted nature. Transition and transformation are significant to AgResearch as they are the types of change required for a more sustainable agri-food sector within New Zealand.

There is no right or wrong way to interpret transition and transformation, nor is there an authoritative definition. The concepts are perceived, understood and experienced differently by different people. Through two workshops and a drawing session with AgResearch staff, I identified distinctive transition and transformation characteristics and created an infographic resource to communicate a more refined understanding of transformation.

A key learning from my time as an intern was that differences in understanding are opportunities for collaboration, not barriers. The design process can be used to create the conditions for collaboration to flourish and facilitate constructive dialogue between people to develop shared understanding. This Master of Design research project continues to investigate the roles of design(er) within science research and AgResearch.

Project funding

Funding for this research was obtained through AgResearch's Agricultural Sustainability Transitions Action Research Programme (Agri-STAR).

The research field of sustainability transitions studies how complex adaptive systems, like the agri-food system, can be redirected into more sustainable pathways. When coupled with an action research approach, sustainability transitions research produces knowledge on how systems can become more sustainable through practice instead of theory.

Sustainability transitions action research is of importance to AgResearch as it's a shift towards transdisciplinary research and implies changes to the traditional western science model that conducts studies out of context and in an isolated manner. Transdisciplinarity requires the integration of non-science participants and implementation of findings as part of the knowledge production process. As a result, the Agri-STAR programme is interested in utilising design approaches as part of their value delivery for supporting transformational research and research leading to transformation towards sustainability.

Audience

The primary audience of this project is the Agri-STAR programme. The secondary audience is AgResearch more broadly and its industry stakeholders. This study responds to the lack of practice-based research exploring the application of emerging design approaches, like speculative design, for science research.

> For clarification, the users of science research and commercialised science are typically industry stakeholders (next-to-end-users) and not necessarily product consumers (end-users) or the general public of New Zealand per se. While design could certainly help bridge this user gap for AgResearch, engagement with industry, stakeholders, consumers and the general public was identified as outside this research project's scope.

Project scope

This research project's scope is limited to the application of a speculative design approach within AgResearch with staff over the course of a year and touches on the potential of the transition design framework for science research. The significance of this study is in the lessons generated from testing a design approach within an alternative design space like a science research organisation. See fig. 1 for a map of the intersection of interests for this Master of Design research project in relation to its funding programme and case study.

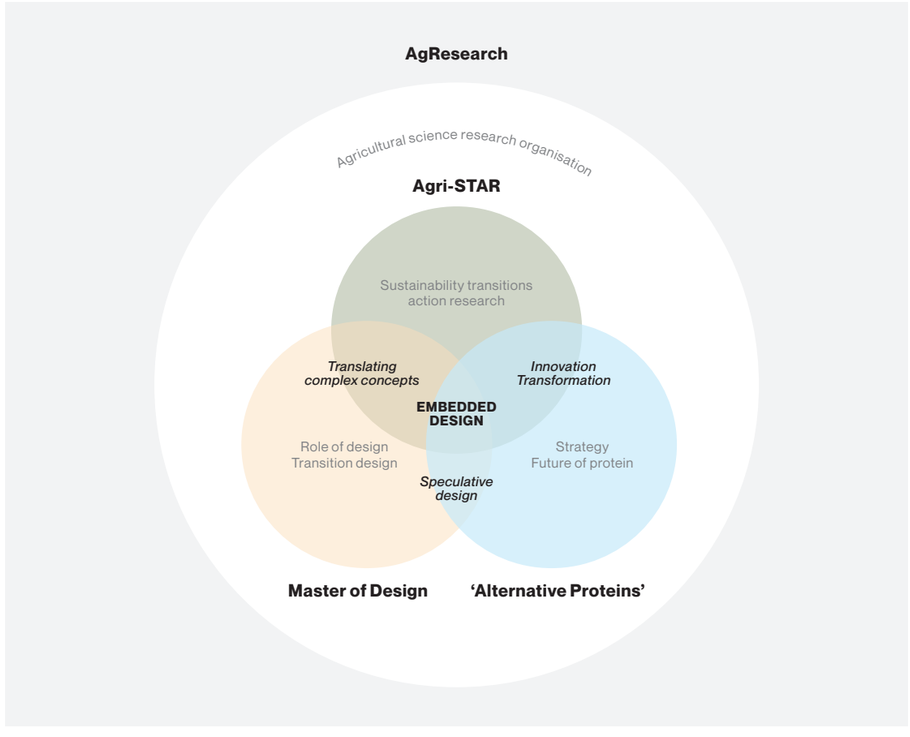


Fig. 1. *Project nesting chart*, digital image by author, 25 November 2021.

Approach

This Master of Design research project began with a literature review of design for sustainability transitions and design and science collaboration. The literature review identified transition design, systemic design and futures design as possible directions for this project (Irwin; Buchanan; Bespoke). Starting with the 'Alternative Proteins' case study, the immediate focus of this research project was to create future scenarios to test organisational strategy against.

The 'Alternative Proteins' case study responded to the increasing consumer demand for sustainable food options. AgResearch was developing an organisational strategy to enter the alternative proteins space in New Zealand. As part of their organisational strategy development process, AgResearch was interested in using future scenarios to explore how they might respond in various circumstances.

Research suggested that speculative design was a design-led approach for envisioning future scenarios to further thinking about development trajectories. Speculative design explicitly focuses on imagining alternative realities and possible future scenarios through design representations and objects (Mitrović). As a provocative practice, speculative design seeks to create discourse about what the future *should* be.

Utilising the UK Design Council's double diamond framework allowed space for broad exploration of the context before narrowing in on a speculative design approach to test and refine (see fig. 2). Through the 'Alternative Proteins' case study, this project sought to catalyse new ways of working for science research by providing an design-led approach to direction-setting for science research progammes.

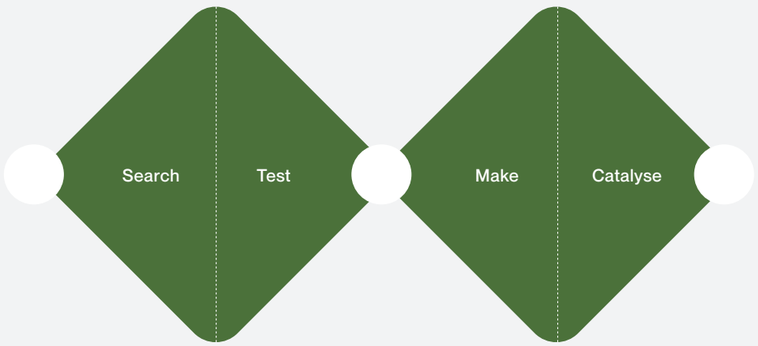


Fig. 2. *Systemic Design Framework representation*, digital image by author. Adapted from *Beyond Net Zero - A Systemic Design Approach*, UK Design Council, p. 46, 28 November 2021.

Process

As an embedded and process-driven design project, there were many moving parts that influenced it's direction. Fig. 3 illustrates the formative moments of this project and the various activities that constitute to its completion. A major activity was interviewing staff at AgResearch and design practitioners with experience in systemic design. These interviews were carried out to gain a broader perspective on how design is perceived within the organisation and how systemic design works in practice. The final deliverable of the broader project is an interview report for the Agri-STAR programme. This report is an internal document and not included as part of this submission.

Fig. 3. *Project process flowchart*, digital image by author, 25 November 2021.

Background

In 2015, New Zealand, alongside 192 other member states of the United Nations, committed to the Sustainable Development Goals (SDGs) for 2030. The SDGs present a ‘blueprint’ for a more sustainable future and signal the need for established systems to shift into new pathways (United Nations). According to sustainability transitions literature, a way to meet the SDGs is to transform the agri-food systems that underpin the global economy into more sustainable pathways (Hall and Dijkman). However, what these pathways entail and what alternative futures they lead to remains unknown, especially in New Zealand. As part of a futureproofing effort, AgResearch is reconsidering what research they do and how they do it in response to the systems transformation agenda.

A prevalent description of sustainability is the interconnected four-pillars concept which consists of social, environmental (or ecological), economic and cultural factors (Hawkes 25). The four pillars of sustainability are evident in the corporate world through the uptake of the quadruple bottom line (QBL) concept. The QBL measures the impact of business operations on people, planet, profit, and purpose, and reflects the Māori values of Tikanga (Paul). AgResearch uses the QBL as part of its corporate responsibility.

Transformation is widely understood as intentional large-scale changes towards delivering a more balanced set of economic, cultural, social and environmental outcomes. A major catalyst of transformation is vision (Duncan et al. 11). Visions create collective purpose across a broad and sometimes disparate group of people. The visioning process is a participatory, human-centered and transdisciplinary inquiry into what the future should be (Gaziulusoy and Ryan 1305). Terry Irwin, an early proponent of ‘Transition Design’, writes “visioning is crucial; it creates spaces for discussion and debate about alternative futures and ways of being, and it requires us to suspend disbelief and forget how things are now” (233). In the case of AgResearch, visioning can help steer research direction to deliver science research that enables or creates agri-food system transformation.

Design-led approach

The importance of visions is reiterated in the transition design framework. Transition design is similar to the UK Design Council's systemic design proposal and explicitly aims to shift existing socio-technical systems into more sustainable pathways through backcasting (Irwin; UK Design Council). The backcasting method emphasises visioning as a means to create sustainability transition pathways by collectively imagining a desirable future to work backwards from (see fig. 4). Irwin states that future visions need to focus on betterment rather than disaster if they are to motivate substantial change. Irwin illustrates this point with the ongoing 'environmental movement', which uses visions of 'impoverishment and absentation', rather than a higher quality of life and has only resulted in incremental changes (Irwin 233). In this sense, visioning should not focus on *predicting* a singular future that is the most likely but on radical and hopeful futures that compel action.

Fig. 4. *Transition Design's Backcasting method* representation, digital image by author. Image based on *http://www.researchgate.net/figure/Backcasting-from-a-co-created-future-vision-creates-a-transition-pathway-along-which_fig7_329155155*, 25 November 2021.

Transition design leans on various design approaches and proposes speculative design as an approach to provoke future visions (Irwin 233). Dunne and Raby, two of the leading scholars of speculative design, locate the practice at the critical end of the design spectrum — and understand design as a medium to problem find, ask questions to provoke, and conduct research about how the world could be through design (vii) (see fig. 5). Ivica Mitrović, a design professor at the University of Spilt, states that speculative design focuses on the "imagination and visions of possible scenarios" and uses fiction and speculation to reflectively examine the impact of current paths of development before they become a reality. The objective of speculative design is to provoke and propose possible worlds to stimulate reflection and action towards a more desirable future.

Speculative design differs from foresight, futuring and other future-oriented fields in the sense that it does not seek to forecast the future or dismiss non-viable future scenarios (see fig. 6). Instead, speculative design uses whimsical or critical scenarios to inspire and facilitate discourse about what *could* happen in the future (DiSalvo 325). For AgResearch, speculating through design enables unconstrained thinking about transformations beyond the dominant view and help bridge where they are now to where they want to be through tangible representations of possible futures to motivate change.

Affirmative design	**Critical design**
Problem solving	Problem finding
Provides answers	Asks questions
For how the world is	For how the world could be
Makes us buy	Makes us think
Normative attitude	Critical attitude
Information based	Speculation based
Pragmatic mindset	Idealistic mindset
Productive	Dreaming
Commercial purpose	Discursive purpose
Serves a user	Provokes an audience
Uses clarity	Uses ambiguity

Fig. 5. *Comparison of Affirmative and Critical Design*, digital image by author. Image based on '*A/B Manifesto*', Dunne and Raby, p. VII and includes information from Johannessen 3-5, 25 November 2021.

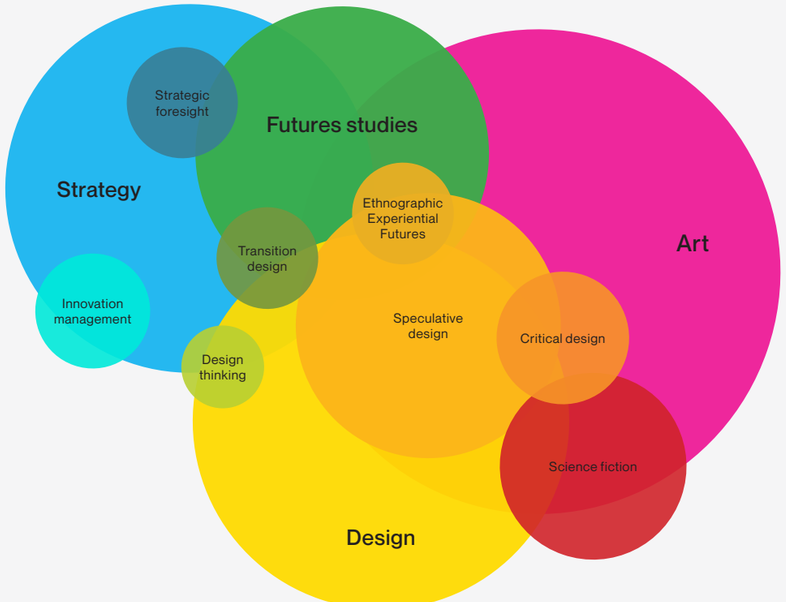


Fig. 6. *Unresolved Mapping of Speculative Design*, digital image by author. Image based on *https://epmid.com/Mapping-Speculative-Design*, 25 November 2021.

Mindsets and paradigms

Systems-shifting design practice targets people's mindsets and paradigms about the change through storytelling. Systems, like the agri-food system, are dynamic. A small change in one part of the system can cause a drastic change in another and/or a reconfiguration of the entire system. A prominent systems theorist, Donella Meadows, states that systemic interventions can be intentionally targeted at leverage points to catalyse transformation. The most impactful leverage points within a system are the mindsets and paradigms from which the system arises (Meadows and Wright 162).

Mindsets and paradigms are the beliefs that help humans make sense of our world and surroundings; they can be interpreted as one's worldview or mental model. The way we see, think and behave is heavily influenced by these beliefs. However, the beliefs we hold are often only assumptions or ideas and not facts, yet they remain deeply entrenched and difficult to change. Hall and Dijkman illustrate the depth of mindsets and paradigms through the instance of innovation: "despite the evidence that innovation is a systemic, messy and a long-term process, with complex, unpredictable cause-effect relationships that operate across scales, it is a more simple narrative that prevails [...] it is the view of innovation as a predictable process with simple cause-effect relationships that persists" (6).

Once a certain mindset or paradigm of something is established, they are resistant to new narratives, even with favorable evidence. The inability to see or refusal to go beyond the status quo stifles systemic change efforts as it reinforces the current situation and deepens path dependency within a system. It's for this reason that mindsets and paradigms are the most powerful points to intervene. If we can fundamentally change the beliefs about what the future can be and how change occurs to get there, then we can transform the system to align with a more desirable future. This fundamental change in beliefs is foundational to transformation, and in turn, sustainability transitions. Design approaches like speculative design can challenge and reshape beliefs about the future by generating multiple scenarios that could become a reality to aid strategic thought and action.

The designer's agency

Designers are important actors in sustainability transitions as they construct products, services and meanings for new systems. However, the roles and agency of designers vary across system levels. The designer's agency is high at the product development level but decreases as they approach the regime and landscape (see fig. 7) (Gaziulusoy and Öztekīn 1047-1048). The regime can be interpreted as the status quo and is typically made up of organisations and businesses that reinforce the current paradigm. The landscape-level encompasses government and politics. Pressure from the landscape level can reshape the regime. Innovation occurs as niches become adopted into the regime and shift the status quo.

Moreover, the short timelines of design projects tend to limit designers' ability to influence sustained change. A way for designers to increase their agency in a system is to embed themselves within organisations that make up the regime. Designers can catalyse societal change by using organisational strategy as an intermediary to translate "diffuse, long-term, societal-level visions of sustainability into concrete decisions" (Gaziulusoy and Öztekīn 1048). In this sense, designers can create impact downstream by helping to steer the direction of research within science research organisations. In this context, working with the 'Alternative Proteins' case study increased my agency within the agri-food system.

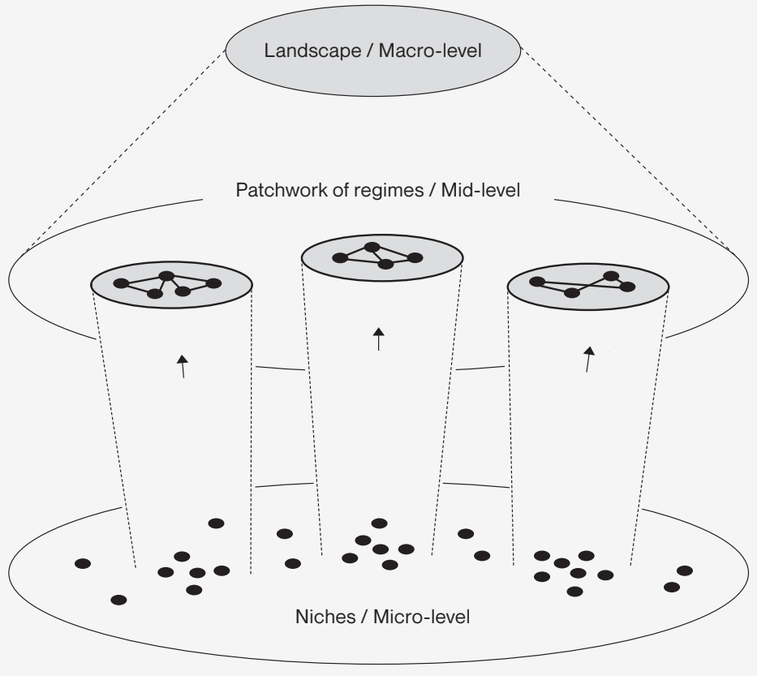


Fig. 7. *Multi-level Perspective*, digital image by author. Image based on *https://www.researchgate.net/figure/Multi-level-framework-for-the-analysis-of-socio-technical-transitions-Source-Adapted_fig1_222253897*, 25 November 2021.

Design and science collaboration

Design can be a powerful co-collaborator with science research due to its contextual awareness, human-centered process focus and ability to attune to different audiences. However, the benefits of design and science collaboration for science research differ depending on whether the purpose is oriented towards industry, research or the general public (see fig. 8).

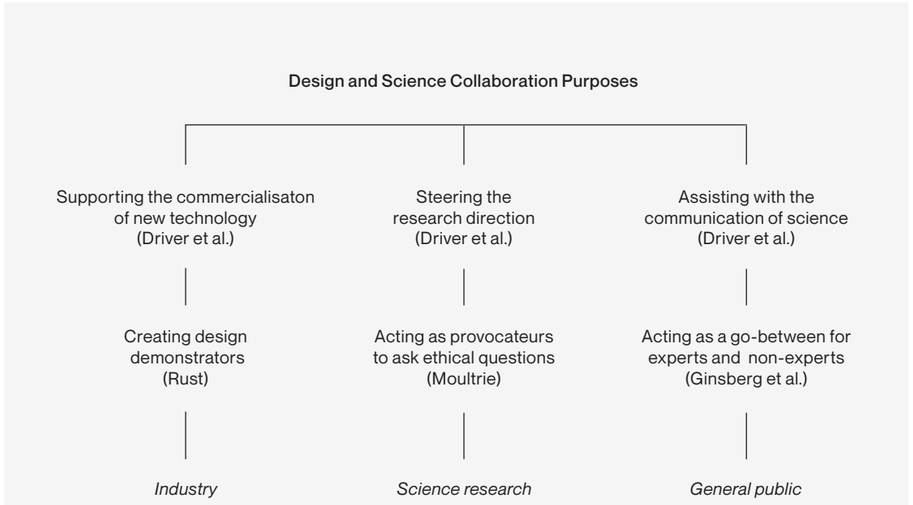


Fig. 8. *Design and Science Collaboration Purposes*, digital image by author. Image based on Beony and Maudet p. 21, 25 November 2021.

For science research purposes, the responsibilities of the designer in design and science collaborations can be interpreted as 1) designing artefacts for testing and experimentation, 2) ideating scenarios (or visions), 3) finding applications for scientific research outcomes and 4) visualising scientific ideas (Peralta et al. 1647). This project used design-science collaboration for research purposes and ideated scenarios to challenge perceptions, unlock tacit knowledge, provide a means of reflection and encourage the pursuit of new research directions for science researchers.

Simone Rödder, in a discussion about art-science projects for cross-boundary communication of climate change, observed that as artists got closer to research practice, “affirmative as well as critical re-imaginations of research practices” occurred (93). Rödder also found that “artists and scientists acted as publics for another, as resources to draw on for reflection and self-identification” (93). The same can be assumed for collaboration between designers and science researchers. The synergy between design and science can be harnessed to advance each others disciplines, which is of particular importance as design and science both play a crucial role in catalysing change. For example, fundamental science needs to be applied through design to be useful, and design needs scientific discoveries to actualise ideas into feasible outputs. Applying a design approach within AgResearch helped me understand design practice better through experiencing first-hand the strengths and weaknesses of each discipline.

Additionally, research suggests the design process and subsequent artefacts (materials for design and designed things) are ‘boundary objects’ that facilitate dialogue and translate knowledge across disciplinary boundaries and groups of people (Pierre Johnson et al.; Tharchen et al.; Rödder). I used speculative design to set the conditions for creating the shared language, linked values and common ground required for sustainability transitions and transformation through my mediation and facilitation of various disciplines towards the common goal of a better future.

While research evidence is primarily favourable for design and science collaboration, there are risks and challenges to design and science collaboration. Risks include tokenism, one-sided collaboration, ambiguity and unfamiliarity with the multi/transdisciplinarity approach to research and misalignments in concerns and focus (Benony and Maudet; Peralta et al.). Challenges include unfamiliarity with the multi/transdisciplinarity approach to research, ‘disciplinary defaulting’, lack of shared language and disciplinary literacy (understanding each other’s jargon and processes), fixed perceptions of status, roles and aims of each other’s disciplines and interpersonal or organisational issues (Benony and Maudet; Peralta et al.; Duncan et al.)

Moreover, scientists may also be skeptical about design’s ability to contribute to the early stages of research, fail to recognise design’s contribution to research, resist innovation, or be unwilling to take risks. Designers may see contributing to scientific research as outside of core business and, therefore, not a worthy pursuit (Peralta et al. 1647). However, as the disciplines of science and design have a dialogic relationship —early and consistent collaboration in the research process is crucial to the development and implementation of impactful science research.

Attitudes and mindsets play a crucial role in ensuring the success of a design and science collaboration. Co-collaborators need to be receptive, open-minded, ready and proactive in learning from others (Peralta et al. 1650). To minimise any risks and overcome challenges of design and science collaboration, it was crucial for me to gain leadership commitment (and community champions) within the organisation, set a realistic time frame and budget, clearly communicate the projects value, rules of engagement and output expectations from the start (Duncan V).

Utilising design approaches like speculative design helps science “move beyond classic disciplinary approaches” and “effectively link knowledge and action” by recontextualising research within the bigger picture of sustainability and the end goal of transformation (Duncan 1). Furthermore, I used design to help science researchers understand the application and the implications of their work for the future through speculation. By implementing a speculative design process in the initial stage of direction-setting in science research programme development, I asked science researchers to take their ‘expert hat’ off and become a co-producer of the speculative scenarios to encourage reflection and collective dreaming about the future through a thinking-through-making approach in a series of three workshops.

Changing Tack

This Master of Design project was situated within AgResearch and used live programmes and projects as case studies to explore the application of design in real-life circumstances. At the outset, I was working alongside a large research team called the ‘New Zealand Bioeconomy in the Digital Age’ (NZBIDA) who were seeking to work in transdisciplinary ways to deliver integrated research.

NZBIDA went through a co-design process to develop its research briefs and was in the final planning stages when I joined. A formative moment was collaborating with one of the programme leads to design and facilitate a work plan development workshop. The idea of using design workshops to work laterally across work streams, disciplines and levels of the organisation to enable collaboration, reflection, and visioning stemmed from here (see fig. 9).

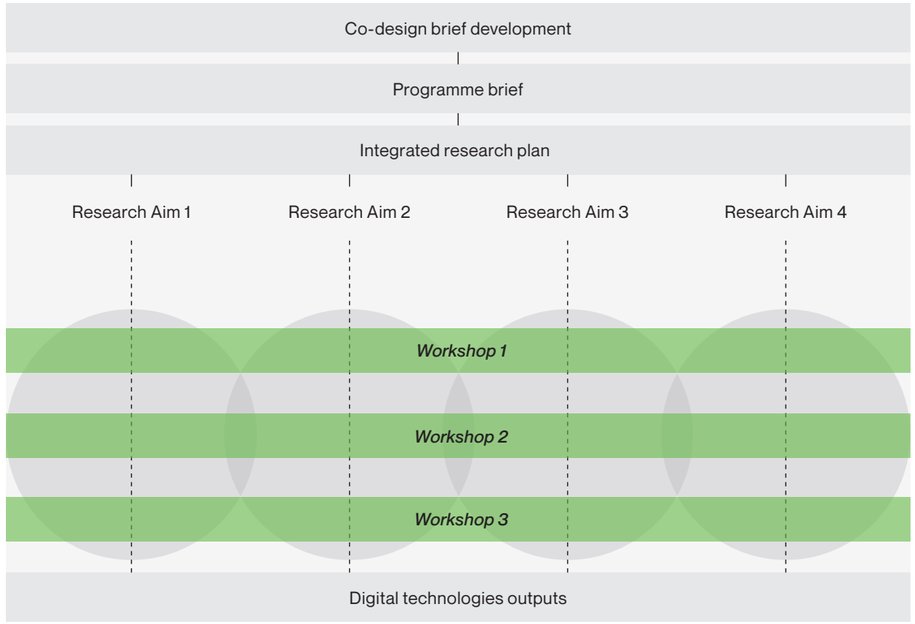


Fig. 9. *NZBIDA Workshops*, digital image by author, 18 January 2021.

However, due to the complexity of NZBIDA and the stage it was at, reintroducing a design approach was considered too difficult to achieve before the end of this study.

The most poignant questions raised from the NZBIDA case study were:

1. What science research programme phase is design most suited to?

2. How might a design approach be reintroduced into a science research programme?

3. How might design contribute to a multi-year programme with a much shorter timeline?

In a relatively quick turn of events, an opportunity to collaborate with the ‘Alternative Proteins’ case study emerged. To contribute to the alternative proteins discussion, it was essential for me to understand how alternative proteins are made as the different methods of production colour what the future of protein could entail.

Alternative proteins can be plant-based, cultured and edible insects and are more sustainable as they are less resource-intensive to produce than meat and fish (Antedote 10). Currently, there are four ways of producing alternative protein:

1. Mixing plant-based protein together (e.g. Sunfed Chicken).

2. Extracting protein at a molecular level and reconstructing a product (e.g. Impossible Burger).

3. Culturing meat products using stem cell technology (e.g. lab meat) (see fig. 10).

4. Sourcing or farming novel alternatives and using a process to create a protein-rich ingredient (e.g. cricket powder).

(Antedote 10)

The future of protein, more broadly the future of food, has been the subject of much research and speculation already. Among many others, Deloitte, Alpha Food Labs, the Centre of Genomic Gastronomy, BBC’s Science Focus magazine and CSIRO have all carried out explorations into the topic. While these precedents provided insight into explorations in various contexts, this research project specifically explores the visions of the future of protein within AgResearch.

Fig. 10. *Meat sample in open disposable plastic cell culture dish in modern laboratory or production facility. Concept of clean meat cultured in vitro from animal somatic cells*, Adobe Stock, https://stock.adobe.com/search?k=shmeat&asset_id=248647515. Accessed 25 November 2021.

Precedents

Many precedents acted as a springboard to guide the inquiry into possible alternative protein futures. Foundational approaches — such as illustrations, narratives and storytelling, working with an extended-timescale, participatory speculative design workshops, prototyping and thinking-through-making technique were identified through precedents.

Some key precedents for this project were the ‘Future of Meat’ report, *The World We Made* book, ‘99¢ Futures’ project and the ‘Room for Alternative’ workshop as they all used design-led approaches to strategically explore the future through the construction of scenarios, stories or products.

Future of Meat

As part of a larger report commissioned by Beef and Lamb New Zealand, Antedote investigated the global future of meat and the implications for New Zealand's red meat sector. As a result, four plausible future scenarios, responding to the industry supply and consumer demand, were created to consider the industry's strategic actions in each future (see fig. 11 and fig. 12). 'Future of Meat' exemplifies the use of visual scenarios as a valuable tool for initiating thought about the future.

While this precedent used foresight and trends analysis tools to *predict* the future instead of asking questions about what the future *should* be, it still explored multiple possible future scenarios as part of a strategic exercise. This precedent affirmed the potential of speculative design as a method to challenge current thinking and stimulate dialogue about current paths of development.

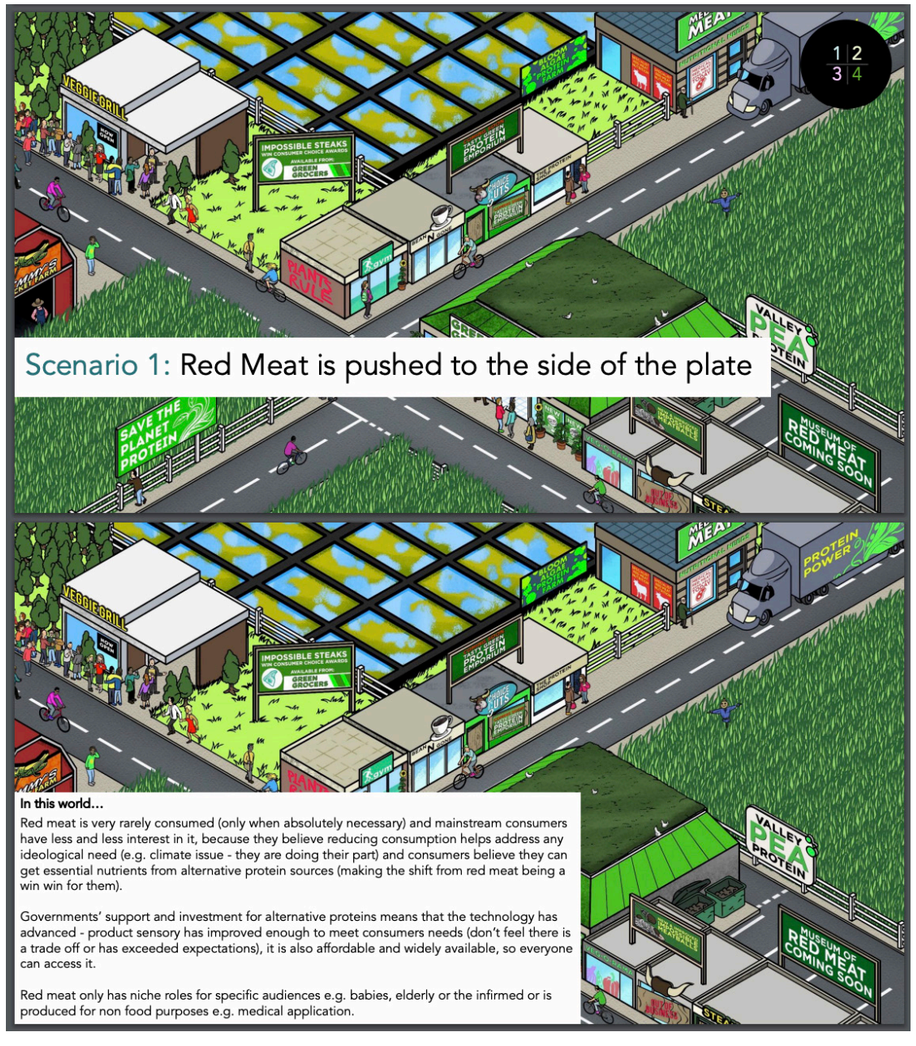


Fig. 11. *Scenario 1*, digital screenshot by author, *Future of Meat*, Beef and Lamb New Zealand, https://beeflambnz.com/news-views/shaping-future-red-meat-sector-report. Accessed 15 November 2021.

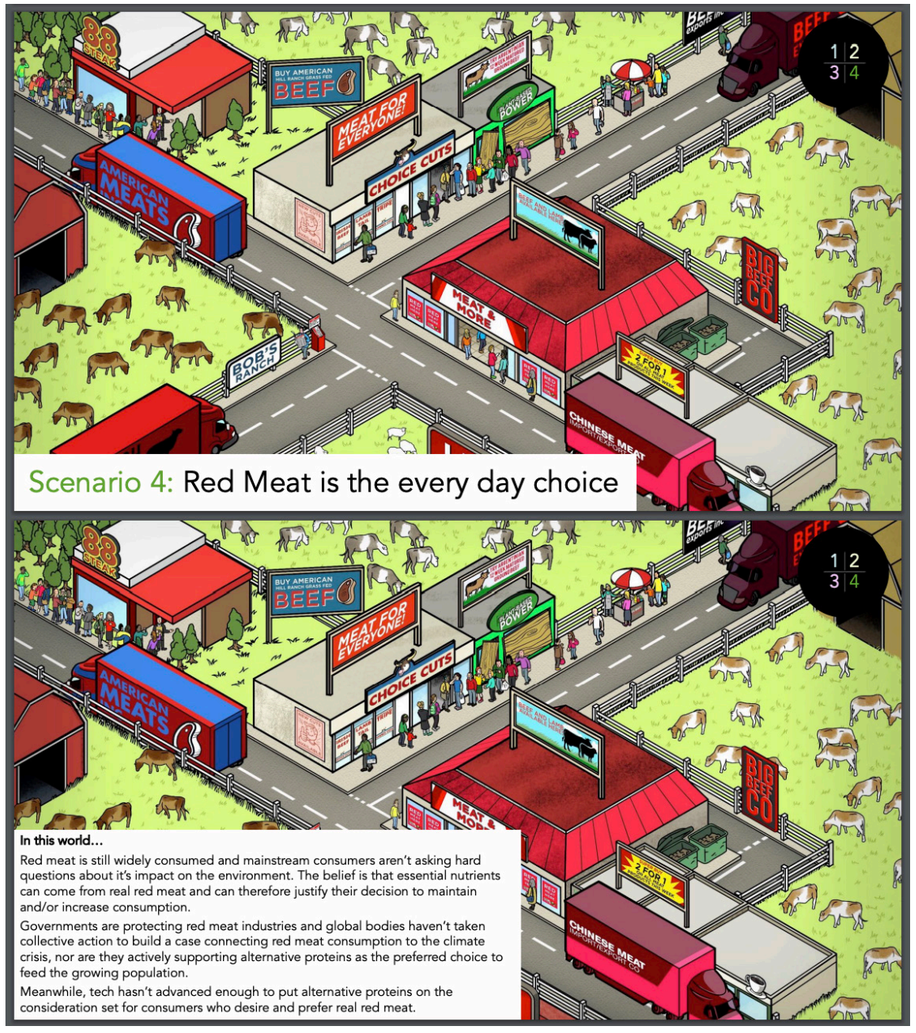


Fig. 11. *Scenario 1*, digital screenshot by author, *Future of Meat*, Beef and Lamb New Zealand, https://beeflambnz.com/news-views/shaping-future-red-meat-sector-report. Accessed 15 November 2021.

An important aspect of the 'Future of Meat' scenarios is the visual medium accompanied by a story. The illustrations made the future scenarios more tangible and more accessible to think about. The static and digital medium also enables easier circulation than video or experiential mediums like films and exhibitions. Another salient aspect of the 'Future of Meat' scenarios was grounding the narratives with 'supply' and 'demand' drivers as it captured the cause and effect of actions leading up the world each scenario depicts. For my scenarios, I visualised future worlds using illustration and used a 'supply' and 'demand' driver as the starting point for each scenario story.

The World We Made

Jonathan Porritt, environmental activist, teacher and founder of Forum for the Future, a global sustainability non-profit, tells a story of a desirable 2050 world. *The World We Made* book recounts an imagined series of events, lifestyle revolutions and technological breakthroughs that result in sustainability. Porritt's students acted as his research team. Together, they co-created 50 snapshots of the future and compiled them as an alternative history book that offers glimpses into speculative sustainability transition pathways (see fig. 13 and fig. 14).

Fig. 13. *The World We Made book*, Amazon, https://images-na.ssl-images-amazon.com/images/I/71DIn2IVfML.jpg. Accessed 15 November 2021.

Fig. 14. Catalogtree, *The World We Made Infographic*, October 2013, https://www.catalogtree.net/projects/the_world_we_made?t=illustration. Accessed 15 November 2021.

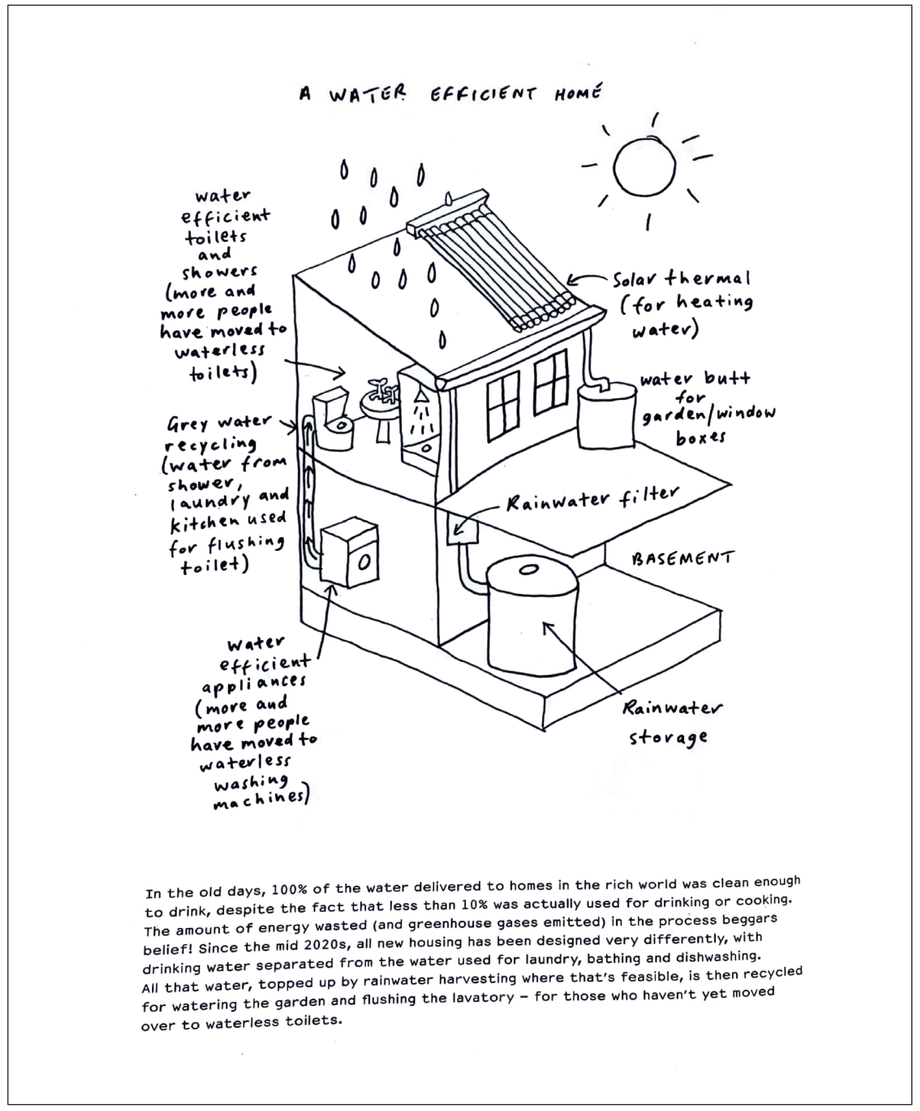


Fig. 15. Wu, Annie. *Water for All* scan, 20 July 2021. Auckland. *The World We Made*, Jonathan Porritt, Phaidon, 106.

Readers of Porritt's book are consistently confronted with the 'what if?' question and prompted to bridge each speculative snapshot with current reality through photographs, dates and hand-drawn sketches (see fig. 15). *The World We Made* highlighted the power of storytelling to elicit emotion and action for sustainability. As a reader, I felt hopeful about the future and motivated to do something, instead of discouraged and overwhelmed about the state of our world.

Additionally, the extended 20+ year timescale of 2050 used in *The World We Made* reflects the fact that sustainability transitions often occur over decades and are the result of a vast variety of innovations and efforts linking together. I used an extended time scale of 20 years for my speculative design process and asked participants to imagine worlds based off their own innovation ideas that had the potential to trigger complete world transformation if linked together. Participants in my speculative design process played a similar role to Porritt's students as they generated ideas and insights for a story to be woven from.

(Nicolay Boyadjiev qtd. in Bespoke 43)

“Thinking about the future is essential, but not in the way it’s often being defined: it’s necessary for designers to move away from the idea of one “given” future which needs to be “predicted” or “discovered” to the idea of multiple possible futures which are all simultaneously “made” in the present.”

99¢ Futures

In 2013, Extrapolation Factory ran their first participatory speculative design project — ‘99¢ Futures’ (see fig. 16, fig. 17 and fig. 18). Extrapolation Factory is a prominent design-based research studio that studies the future through experimental participatory methods. A distinctive method used by Extrapolation Factory is the creation and deployment of hypothetical future props in familiar contexts. As part of the 99¢ Futures project, Extrapolation factory ran a workshop where participants were asked to rapidly imagine their own scenarios and construct 99¢ products from it (Extrapolation Factory). The products were then transported into a real-life 99¢ store and available for purchase. Initially, I wanted to use a ‘create and deploy’ method as part of my speculative design process design. I didn’t use the experiential method in the end because this projects focus was on creating visual scenarios that could be easily shared, not experiential encounters.

Fig. 16. Extrapolation Factory, *99¢ Futures*, 2013, https://extrapolationfactory.com/99-FUTURES. Accessed 15 November 2021.

Fig. 17. Extrapolation Factory, *99¢ Futures*, 2013, https://extrapolationfactory.com/99-FUTURES. Accessed 15 November 2021.

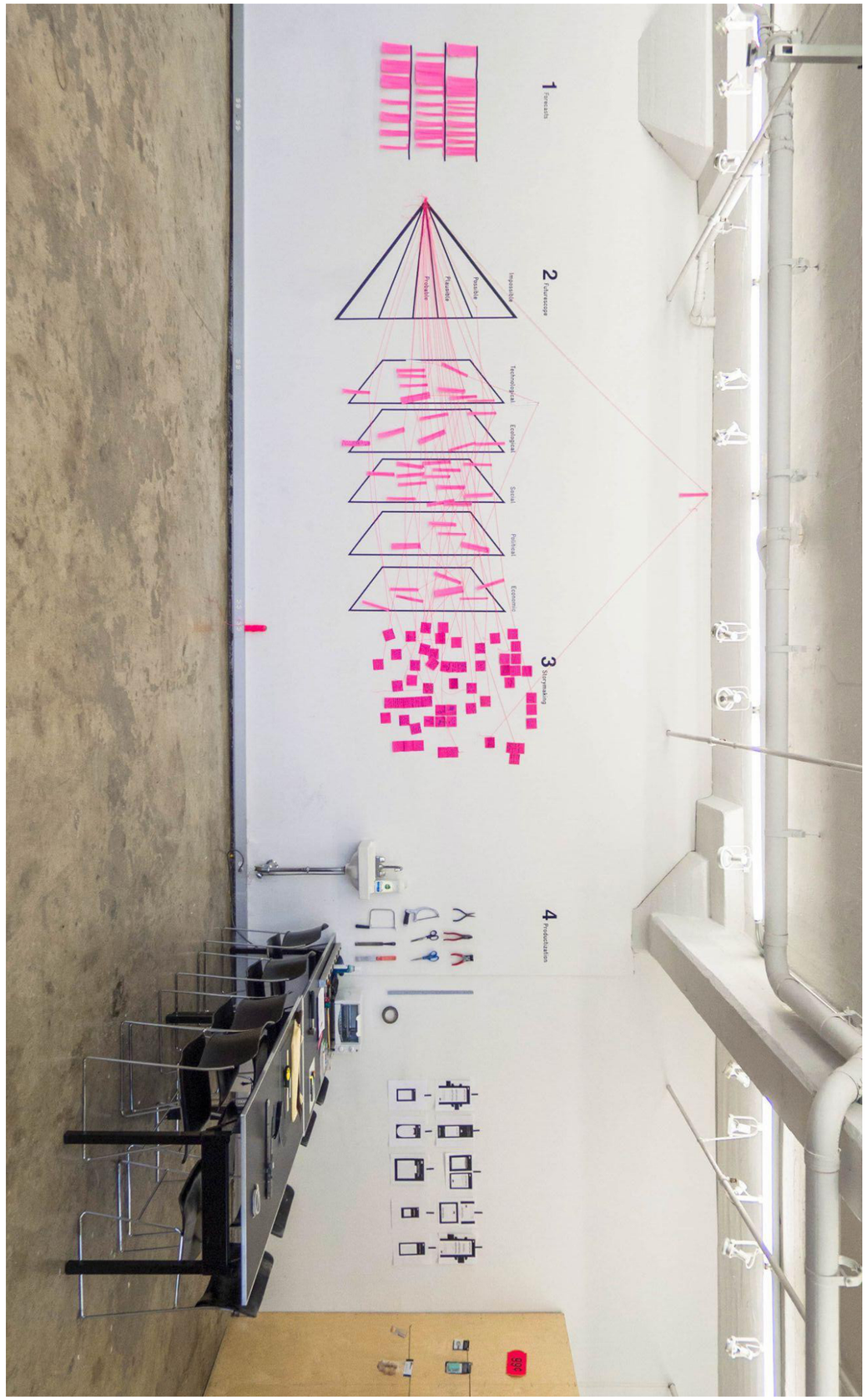


Fig. 18. Extrapolation Factory, *99¢ Futures*, 2013, https://extrapolationfactory.com/99-FUTURES. Accessed 15 November 2021.

By utilising workshops as part of the speculative design process, '99¢ Futures' leveraged collective imagination and creativity to generate many different future scenarios and speculative products (see fig. 19). The notion of materialising the future through prototyping helps to reduce the ambiguity and abstractness that often comes with thinking about the future. I used the workshop format and prototyping approach in my speculative design process to collaboratively imagine future scenarios with AgResearch staff.

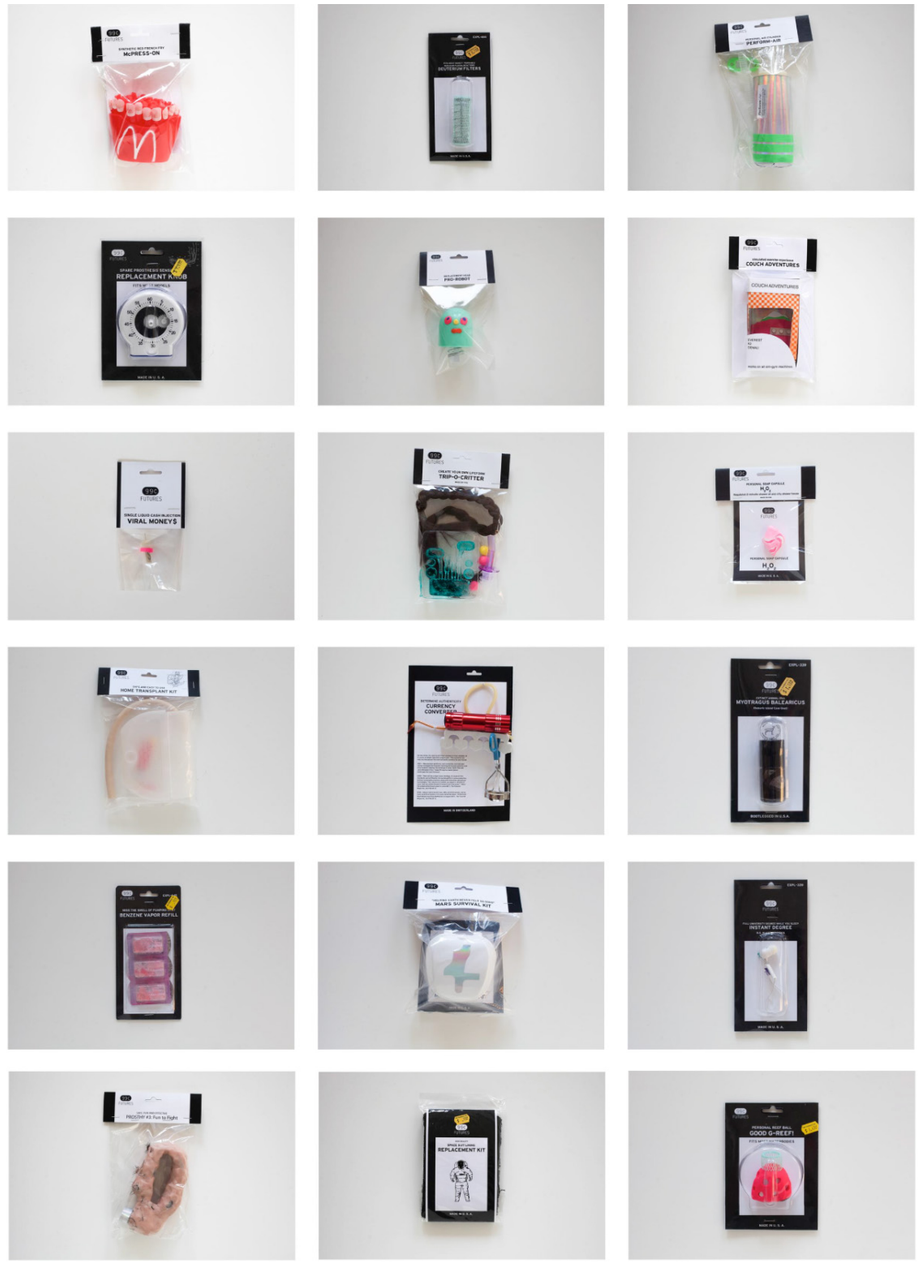


Fig. 19. Extrapolation Factory, *99¢ Futures*, 2013, https://extrapolationfactory.com/99-FUTURES. Accessed 15 November 2021.

Room for Alternative

Ted Hunt and Peter Davidson, as part of the Royal College of Art's world-famous Design Interactions course, use a thinking-through-making approach to explore mental health in participants day-to-day experience in the 'Room for Alternative' workshop (see fig. 20, fig. 21, fig. 22 and fig. 23). The workshop invited participants to imagine solutions to a 'problem' of their choosing. In this sense, the participants became the experts of their ideas and experiences and had complete autonomy and creative freedom to think about and make something important to them.

I applied the notion of thinking-through-making to enable the speculative design workshop participants to intuitively and collaboratively imagine and explore their ideas of a desirable future through a variety of different means, such as writing, drawing and modeling. I also incorporated an exhibition space idea from 'Room for Alternative' through a 'show and tell' discussion at the end of some of the workshop activities so workshop participants could gain inspiration and challenge each other's ideas.

Fig. 20. Hunt, Ted, *Room for Alternative Workshop,* 6-7 February 2016, http://ted-hunt.com/RoomForAlternative/workshop.html. Accessed 22 March 2021.

Fig. 21. Hunt, Ted, *Room for Alternative Workshop,* 6-7 February 2016, http://ted-hunt.com/RoomForAlternative/workshop.html. Accessed 22 March 2021.

Fig. 22. Hunt, Ted, *Room for Alternative Workshop,* 6-7 February 2016, http://ted-hunt.com/RoomForAlternative/workshop.html. Accessed 22 March 2021.

Fig. 23. Hunt, Ted, *Room for Alternative Workshop,* 6-7 February 2016, http://ted-hunt.com/RoomForAlternative/workshop.html. Accessed 22 March 2021.

The 'Room for Alternative' precedent reminded me of a paper by Paasche and Österblom, who urge for novel arenas for scientists as a means for reflection, dialogue, collaboration and play (41). Speculative design workshops can act as a playground for exploring possibilities, opportunity for connection and untethered imagination to exercise thinking beyond the usual frame of reference for AgResearch staff.

Reflections on a deep literature dive

In retrospect, I explored many tangents that helped me gain a clearer understanding of design and the sustainability imperatives inherent in my project. However, there aren't many practical examples or studies of transition design and literature on speculative design is often inconsistent with no agreed best practice.

A significant challenge of the context scan was identifying what literature was peripheral to the project and where the limits of a designer's contextual knowledge should be. I used mapping to sense make and navigate the ground I had covered to identify areas requiring further exploration (see fig. 24). Adopting the 'Alternative Proteins' case study helped to narrow the scope significantly.

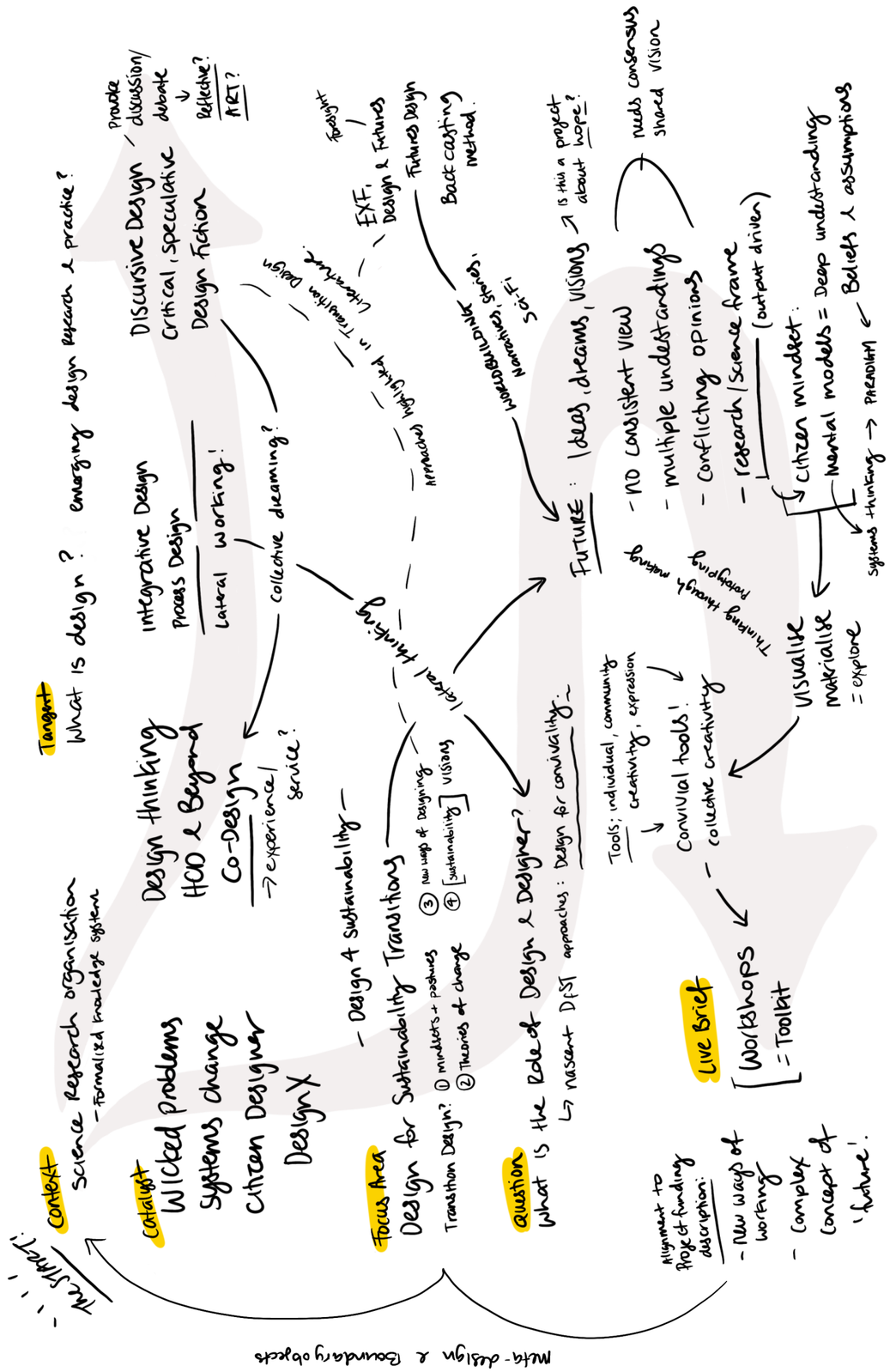


Fig. 24. *Literature Process Map,* digital drawing by author, 3 March 2021.

Practice

During my time with the ‘Alternative Proteins’ team, I delivered three workshops. Minor refinements, like tweaks to the workshop agenda and activities, were made after each workshop based on feedback. However, I avoided making significant changes to ensure all workshop participants went through a similar process.

Workshop participants were asked to prototype a radical alternative protein idea and ‘suspend disbelief’ to imagine a transformed New Zealand in 2041. The purpose of the workshops was to generate scenarios beyond the current frame of thinking as part of an organisational strategy development process (see fig. 25).

I used ideas generated to guide the development of four future illustrated scenarios; probable, preferable, plausible and possible. The ‘Future of Meat’ report and *The World We Made* book precedents were used as inspiration for constructing a narrative to accompany each illustration. The scenarios were later adapted to be used in an ‘Integrated Foods Initiative’ workshop as a thought starter for strategy development.

My context scan, conversations with design practitioners and previous experience running workshops with AgResearch staff informed the workshop approach and design. In addition, meetings with my supervisors, the Agri-STAR programme team and Master of Design critiques acted as a sounding board for ideas. They offered gentle critique on the direction of the work as it evolved, especially in the initial workshop ideation stage.

Title	Future of protein
Purpose	Engagement with design-led approaches to explore future scenarios beyond current frames of thinking with AgResearch staff for the ‘Alternative Proteins’ case study.
Description	Globally there are transitions underway to a more bio-based economy of which plant-based and alternative protein sources play a major part. However, what is the role of AgResearch in responding to this transition in the New Zealand context? Within AgResearch, there are conflicting internal and external opinions as to the strategy AgResearch should pursue in responding to global consumer demand for meat and milk alternatives, alternative proteins and plant-based foods. To help with future foresighting that will guide the early stages of the strategy development, AgResearch staff will be invited to engage in a speculative design process to explore future scenarios beyond the current frame of thinking.
Action	Design and facilitate a series of future-focused workshops to generate ideas and scenarios of a sustainable future through the exploration of mental models (e.g. beliefs and assumptions about the topic).
Point of difference	Design-led process and a thinking-through making approach resulting in possible future scenarios.
Requirements / deliverables	• Case study to run workshops with (MDes project to contribute in a supporting capacity). • 3-4 hours to run the workshops with approximately 10 participants. • Time keeper and note-taker for workshop support. • Minimum of 3 workshops completed before the end of June 2021. • Workshops to be face-to-face, unless unable to, e.g. Covid-19 lock-downs, location to be determined in conjunction with the project team. • Programme/project to organise logistics of the workshops, i.e., who will be there, location/venue, catering, invitations, etc.
Contribution to research question	• Explore the role of design as facilitator and enabler of lateral thinking and working. • Workshops as generative research opportunities for the development of a toolkit.
Goals	• Introduces novel ways of working with AgResearch staff. • Exploration of workshops as an alternative space for design within AgResearch. • Generation of radical ideas and scenarios. • Leverages collective creativity to clarify the scope and vision of the topic.
Key dates	• 24/3/2021 - Pilot workshop • 8/4/2021 - Lincoln workshop • 14/4/2021 - Grasslands workshop • 21/4/2021 - Ruakura workshop

Fig. 25. *‘Alternative Proteins’ live brief*, digital image by author, 3 March 2021.

Process design

Through my research on speculative design, I came across the Ethnographic Experiential Futures (EXF) cycle and found similarities in purpose with speculative design practice. Stuart Candy, one of the field’s leading scholars, describes the field of ethnographic experiential futures as “a family of approaches for vivid multisensory, transmedia, and diegetic representations of images of the future”. The EXF cycle builds on top of Stanford anthropologist Robert Textor’s work to look for “what’s present but often hidden in people’s heads” (Candy).

The five phases of EXF cycle are:

1. **MAP**
   Inquire into and record people’s actual or existing images of the future (e.g. possible; probable; preferred; a combo).

2. **MULTIPLY**
   Generate alternative images (scenarios) to challenge or extend existing thinking (optional step, but recommended).

3. **MEDIATE**
   Translate these ideas about the future/s into experiences: tangible, immersive, visual or interactive representations.

4. **MOUNT**
   Stage experiential scenario/s to encounter the original subject/s or others (or both).

5. **MAP**
   Inquire into and record responses to the experiential scenario/s.

(Candy and Kornet 11)

Similarly, the three phases of speculative design are:

1. **DEFINE**
   Frame a context and topic for debate.

2. **IDEATE**
   Find problems through a series of ‘what if?’ questions.

3. **CREATE**
   Materialise scenarios to provoke the audience.

(Johannessen 9-10)

The EXF cycle compared to the speculative design process outlined by Johannessen highlights that both use design as a medium to provoke thought about the future. Critical differences between EXF and speculative design are audience participation, the role the designer plays and the emphasis on experience to catalyse insight and change. EXF explicitly seeks participation from the audience at the start of the process to generate scenarios and utilises experience design to engage the audience actively.

In the EXF cycle, the designer assumes the role of translator. In contrast, speculative design tends to centralise the designer and uses visual representations and objects to provoke the audience passively. Speculative design renders the designer's primary role as a critic and less as a translator — this prompted me to question whether speculative design loses some of its criticality when it adopts a more participatory design approach.

I adopted the EXF cycle phases as a framework for my speculative design process to create future scenarios as i was unable to find an consistent framework for speculative design (see fig. 26). I tailored the speculative design process activities to align with EXF cycle phases to inquire about workshop participants' ideas about the future of protein, ideate radical ideas, prototype their ideas and world-build.

Ethnographic Experiential Futures Cycle (EXF)		Activity
Map	Inquire into and record people's actual or existing images of the future (probable; preferred; non-preferred; a combination).	Speculative Design Workshop
Multiply	Generate alternative images (scenarios) to challenge or extend existing thinking (optional especially in the first iteration)	
Mediate	Translate these ideas about the future/s into experiences: tangible, immersive, visual or interactive representation.	Scenario generation
Mount	Stage experiential scenario/s to encounter for the original subject's or others, or both.	Scenario test workshop
Map 2	Investigate and record response	

Fig. 26. *Reinterpretation of the Ethnographic Experiential Futures Cycle (EXF) for Supporting Change,* digital image by author, information from Candy and Kornet, p. 11. 3 May 2021.

(Candy)

"EXF offers a way to take the invisible and make it senseable."

Workshop design

To apply the EXF cycle phases as the framework for the overarching speculative design process, I surveyed methods that would Map, Multiply and Mediate workshop participants' ideas about the future. Activities like the 'Vision Ladder', 'Opportunity Matrix' and 'Landscape of Possibility' questions aligned with the intent of the three phases of Map, Multiply and Mediate.

As the term 'alternative protein' is open to interpretation, I drew from my previous workshops translating complex concepts at AgResearch to adapt workshop activities that would capture the breadth and depth of understandings of 'alternative protein'. I adapted and used the 'Word Association' and 'Visualisation' activities created during my internship as part of the speculative design workshops. In my previous experience at AgResearch, I found the 'Word Association' and 'Visualisation' activities particularly useful for opening up the conversation, setting the workshop tone and capturing the core of participants' understandings of contested terms.

From my exploration on nascent speculative design methods, a core concept was the experiential futures ladder that proposes a hierarchy of details about a future from abstract to concrete (see fig. 27). Similarly to the EXF cycle, the experiential futures ladder seeks to create a tangible experience instead of high-level narratives and descriptions. Moving down the ladder entails defining a setting or future archetype (the type of future under exploration), a scenario (a specific narrative and sequence of events), a situation (details of "the circumstances in which we encounter this future") and finally, the stuff (tangible artefacts like products) that populates all the rungs above (O'Regan).

Even though the immediate focus was on creating static scenarios for the 'alternative proteins' case study, the premise of using concrete 'stuff' to ground the abstract details of the future struck me as a logical approach to visioning and constructing future scenarios. In a literal sense, ladders can be used two ways. Instead of moving down the experiential futures ladder, what if we move up it and use 'stuff' to imagine worlds? By reworking the experiential futures ladder into a workshop activity, workshop participants created tangible products and imagined a world scenario around their speculative offering.

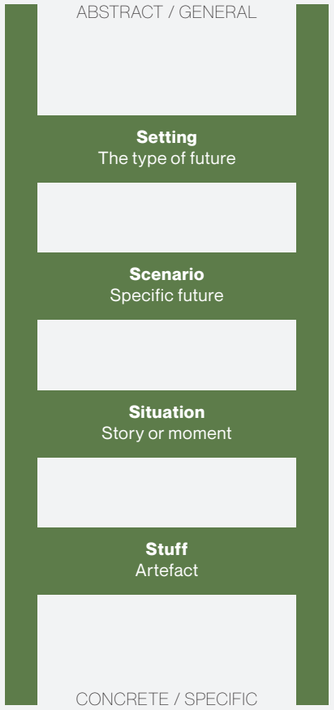


Fig. 27. *Experiential Futures Ladder*, digital image by author. Based on https://www.researchgate.net/figure/The-Experiential-Futures-Ladder_fig1_311910011. 15 May 2021.

Phase	Activity	
Map	Workshop	Word association, visualisation, vision ladder
Multiply		Opportunity matrix
Mediate		Futures ladder
Mount	Scenario generation	
Map 2	Scenario test workshop	

Fig. 28. *Ethnographic Experiential Futures Cycle (EXF) for Supporting Change workshops*, digital image by author. Information adapted from Candy and Kornet, p. 11. 10 May 2021.

Activities

In the last section, I discussed my reinterpretation of the EXF cycle for this speculative design process. This section discusses the workshop activities I utilised for the Map, Multiply, and Mediate phases.

Map

1. Word Association
2. Visualistion
3. Opportunity Matrix 1
4. Vision Ladder

Multiply

5. Opportunity Matrix 2

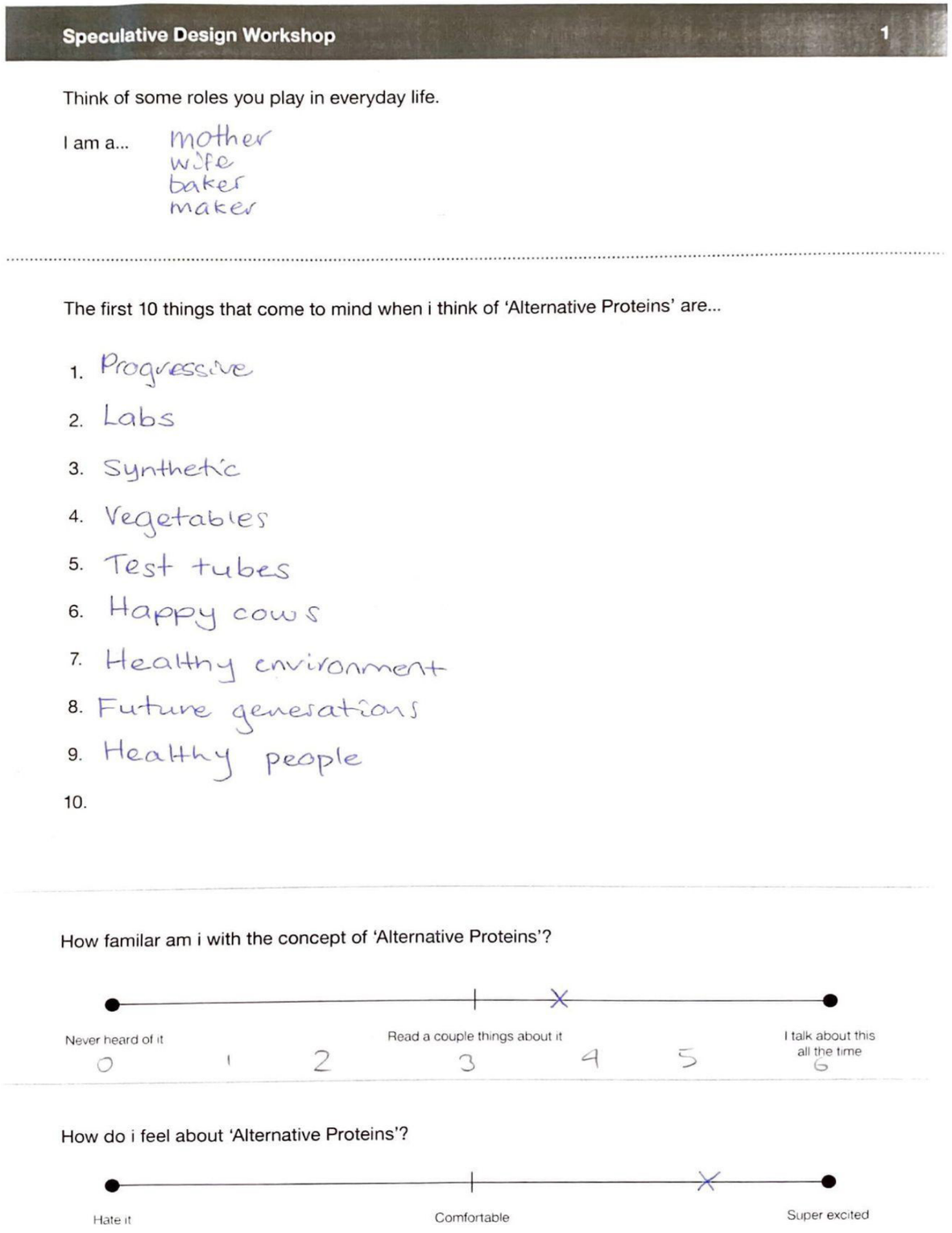
Mediate

6. Future Canvas

1. Word Association

After a brief introduction about the broader project, myself and the workshop structure, I framed word association as the first activity of the workshop. Participants were prompted to fill out the word association worksheet, which asked them to think of some roles they play outside of work, list the first ten things that come to mind when they think of 'alternative proteins' and reflect on their familiarity and feeling about the concept.

I designed the first iteration 'Word Association' activity during my internship and used it for my workshops which unpacked the complex concept of 'transformation'. This activity aimed to ease participants into the workshop space, open their thinking beyond their usual frame of thinking as a science researcher and capture the association range of 'alternative proteins'. Participants shared three of their listed associations with the broader group before moving on to the next activity.



Speculative Design Workshop 1

Think of some roles you play in everyday life.

I am a... mother
wife
baker
maker

The first 10 things that come to mind when i think of 'Alternative Proteins' are...

1. Progressive
2. Labs
3. Synthetic
4. Vegetables
5. Test tubes
6. Happy cows
7. Healthy environment
8. Future generations
9. Healthy people
10.

How familar am i with the concept of 'Alternative Proteins'?

Never heard of it — Read a couple things about it — I talk about this all the time

0 1 2 3 4 5 6

How do i feel about 'Alternative Proteins'?

Hate it — Comfortable — Super excited

Speculative Design Workshop 1

Think of some roles you play in everyday life.

I am a... mum (kids + animals) Chef. Exercise Trainer,

The first 10 things that come to mind when i think of 'Alternative Proteins' are...

1. Plants
2. Insects
3. ~~Diversification~~ Diversification.
4. Accessing protein - dietary/dysfunction/antinutrient — Accessing protein - dietary
5. hydrols. Hydrols.
6. ~~[illegible]~~ Fungus — Fungus
7. Taste issues. — Taste issues
8. Ultra processed. — ultra processed
9. Sustainability. sustainability
10. Opportunities — opportunities

How familar am i with the concept of 'Alternative Proteins'?

Never heard of it — Read a couple things about it — I talk about this all the time

How do i feel about 'Alternative Proteins'?

Hate it — Comfortable — Super excited

Speculative Design Workshop 1

Think of some roles you play in everyday life.

I am an ordered thinker.
big-picture thinker.

The first 10 things that come to mind when i think of 'Alternative Proteins' are...

1. Plants
2. Hamburgers
3. Nutrition
4. Thin people
5. Malnourished
6. Amino acid limitations.
7. Tasteless
8. Seaweed
9. Monoagriculture
10. Fake meat.

How familar am i with the concept of 'Alternative Proteins'?

Never heard of it — Read a couple things about it — I talk about this all the time

0 1 2 3 4 5 6

How do i feel about 'Alternative Proteins'?

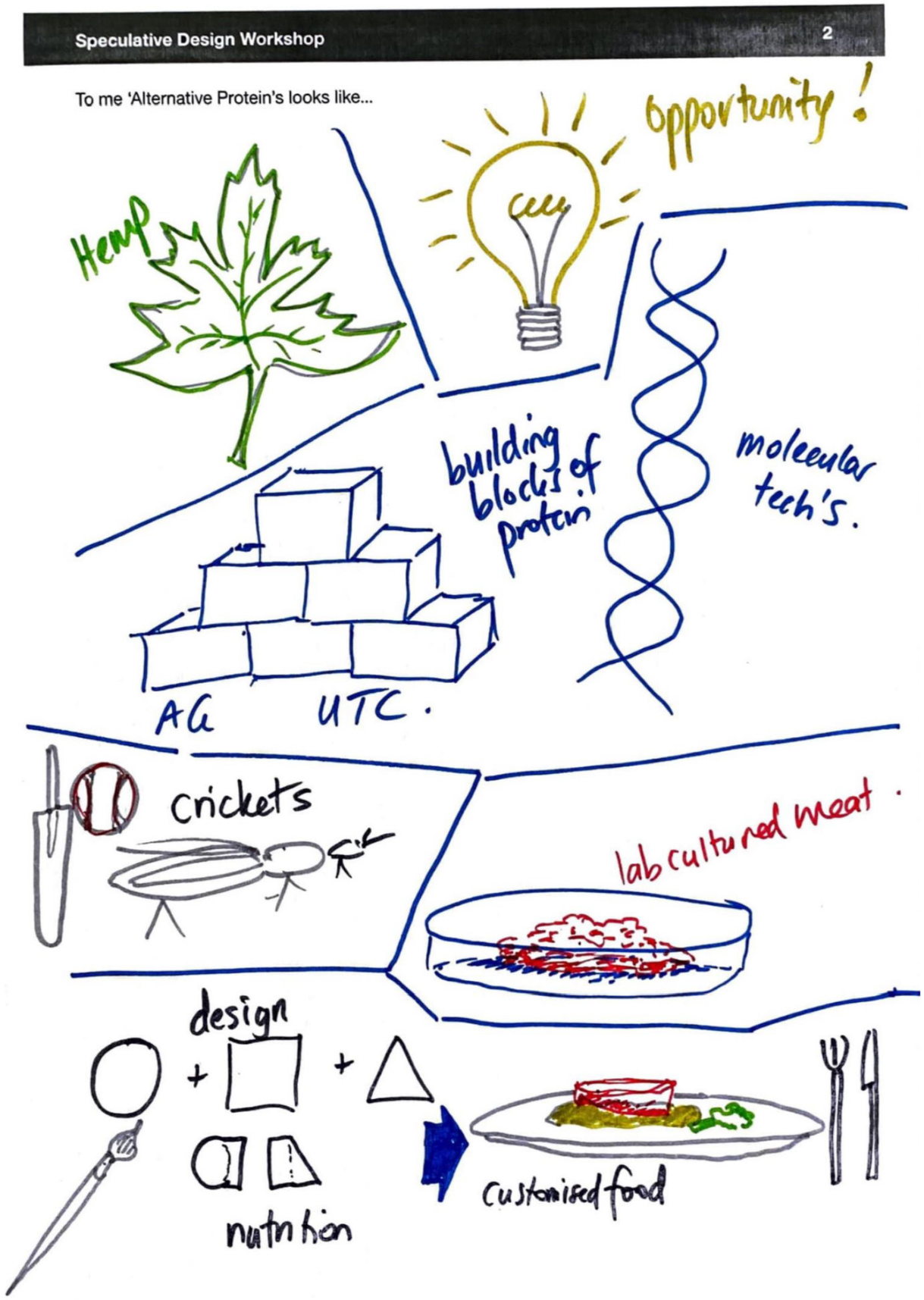
Hate it — Comfortable — Super excited

3

2. Visualisation

The drawing process requires people to capture the core of their understanding in the simplest form. The ‘Visualisation’ activity is also an iteration of an activity I designed during my internship. Participants were asked to visualise what alternative proteins looked like to them. During one of my Master of Design critiques, I tested this activity to feel out what some responses about ‘alternative protein’ might be.

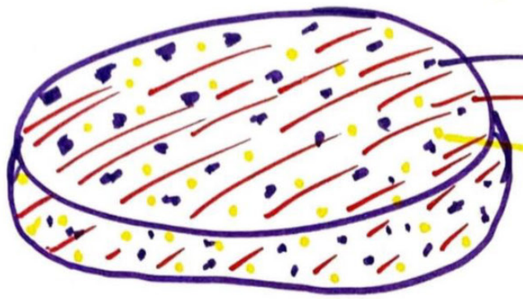
During the workshop, I emphasised that this activity is not about what the picture looks like, but the ideas they represent as drawing can be daunting for some. This activity captured participants core understanding and preconceived notions about the future of protein. At the end of this activity, participants shared with the whole workshop group one by one what they drew to inspire and challenge their own and other participants perspectives on the future of protein.



To me 'Alternative Protein's looks like...

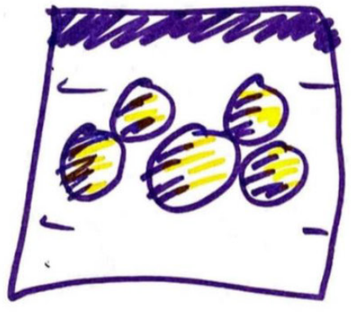
Enriched biscuits, with additional plant protein + chocolate & insect flour drops

'Alternative protein patty'

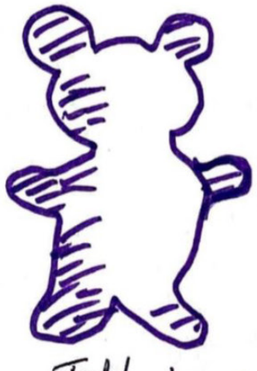


lentils
ground insect flour
coarsely ground chickpeas

Wasabi flavoured fried crickets

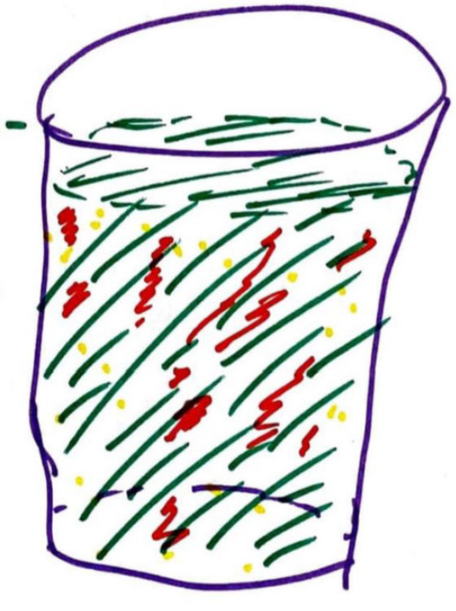


Insect flour, & fruit, & nut protein balls



Teddy bear-shaped steaks, grown in the lab

Protein shake- with greens + insect & plant protein powder

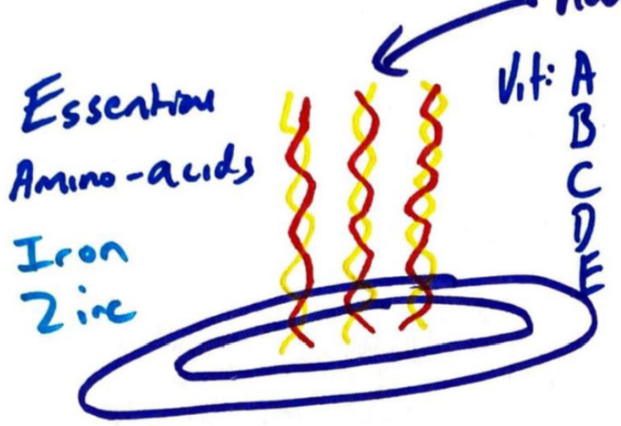


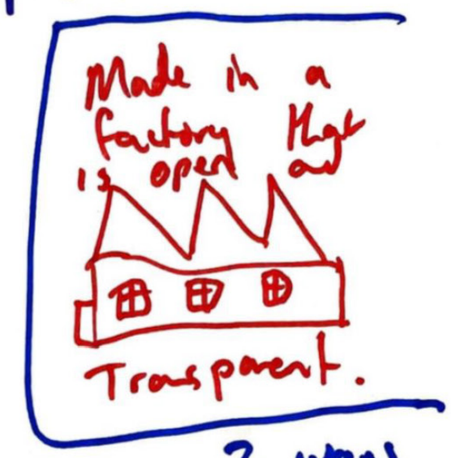
Speculative Design Workshop 2

To me 'Alternative Protein's looks like...

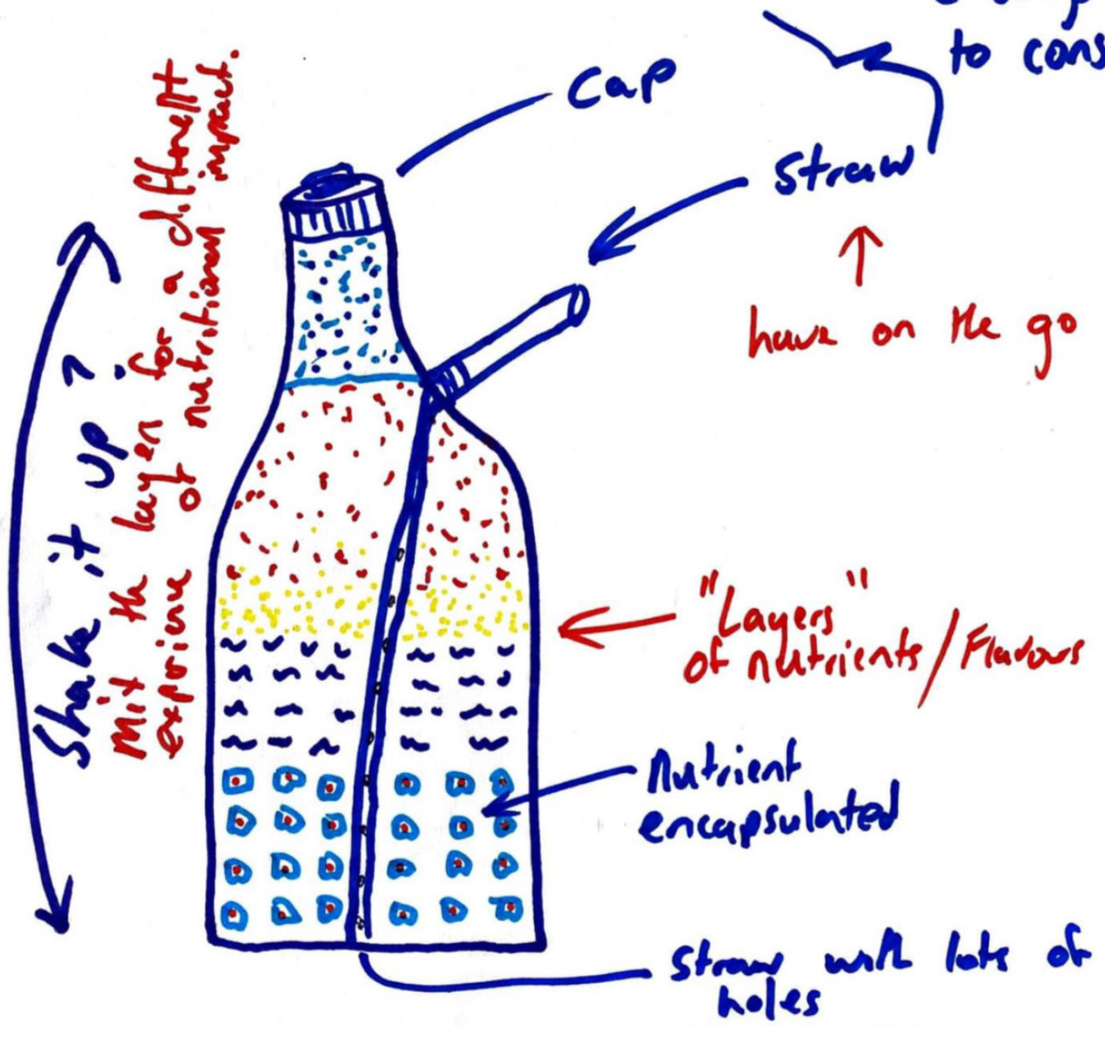
novel Presentation

Essential Amino-acids
Iron
Zinc
Vit: A B C D E





2 ways to consume



3. Working Definition

‘Alternative proteins’ is an umbrella term for various production methods and products. As a workshop cohort, I facilitated participants to construct a working definition of ‘alternative proteins’ for their workshop. I gave complete control to the participants to explore each other understandings of ‘alternative proteins’. However, I gently reminded participants that the focus is what ‘alternative protein’ could and should be in the future and not necessarily what it is currently.

During the workshops, when the conversation stalled, I directed the discussion towards noticing the commonalities emerging between each participant’s understanding. A critical insight from this activity was that the term ‘alternative’ also signifies something other than the mainstream or dominant.

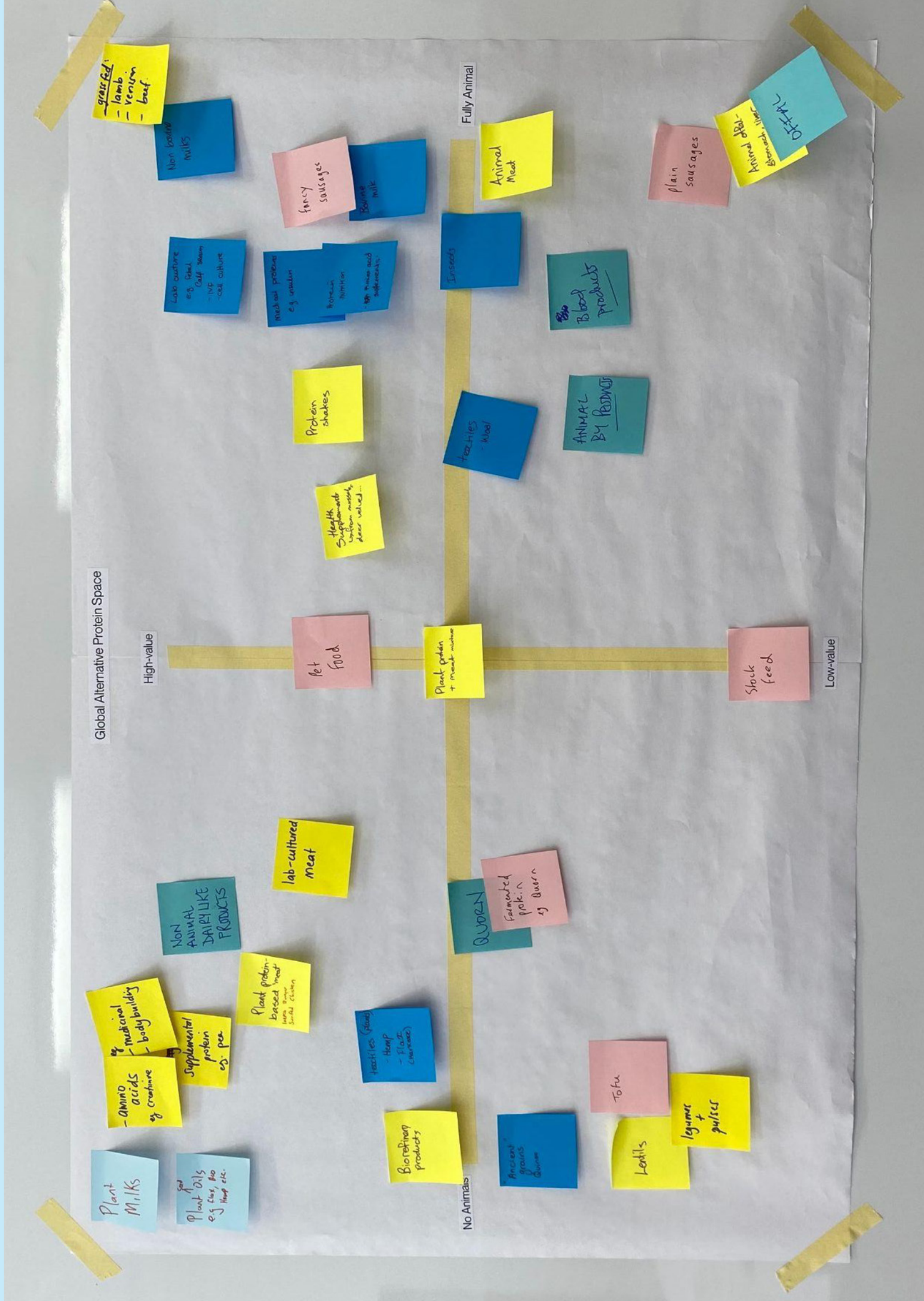
Once the group established a working definition, I pinned the activity on one of the workshop walls for the participants to refer back to should they need to quickly. Creating a working definition was essential to get all the participants on the same page and establish common ground for the conversation to move forwards.

4. Opportunity Matrix 1

As AgResearch is designing an organisational strategy to enter the alternative proteins space in New Zealand, I adapted the ‘Ocean of Opportunities’ activity from the Visual Toolbox for System Innovation to identify opportunities and market gaps within the global market by mapping out existing products and services (Matti and De Vicente 112-117).

Workshop participants noted their thoughts on alternative proteins on post-it notes and plotted them on the canvas. The canvas space was rationalised using a value (high value-low value) and source (no animal-fully animal) axes. After each participant had plotted 2-3 examples of alternative proteins on the ‘Opportunity Matrix 1’, they were asked to reflect on the gaps in the canvas to start thought about possible propositions that would for fill the gap. I pinned the canvas on a wall for participants to refer back to quickly.

> I removed this activity after the first AgResearch workshop as participants found that thinking of current examples constrained their creativity.



5. Vision Ladder

The ‘Vision Ladder’ activity by Orikamilab was originally intended for product development teams to create impactful products. However, asking ‘why’ multiple times can help science researchers establish a vision of a desirable future for them, a common goal for AgResearch and identify the different levels of impact from science research required to get there. The impact levels in the ‘Vision Ladder’ activity are the grand landscape, societal landscape, emotional landscape and functional landscape.

The purpose of this activity was to generate insight into why and how should AgResearch respond to consumer demand for alternative proteins. Participants were given post-it notes and asked to contribute at least twice to each landscape level. The notes were clustered into themes to identify key points for further discussion during the workshop.

> “The Vision Ladder Canvas breaks down your vision into four different stages of impact to help you and your team to align on the intended value of the process outcome. We recommend filling this canvas right at the start of something new to help trigger critical conversations around assumptions, expectations and challenges.”
>
> (Orikamilab)

6. Opportunity Matrix 2

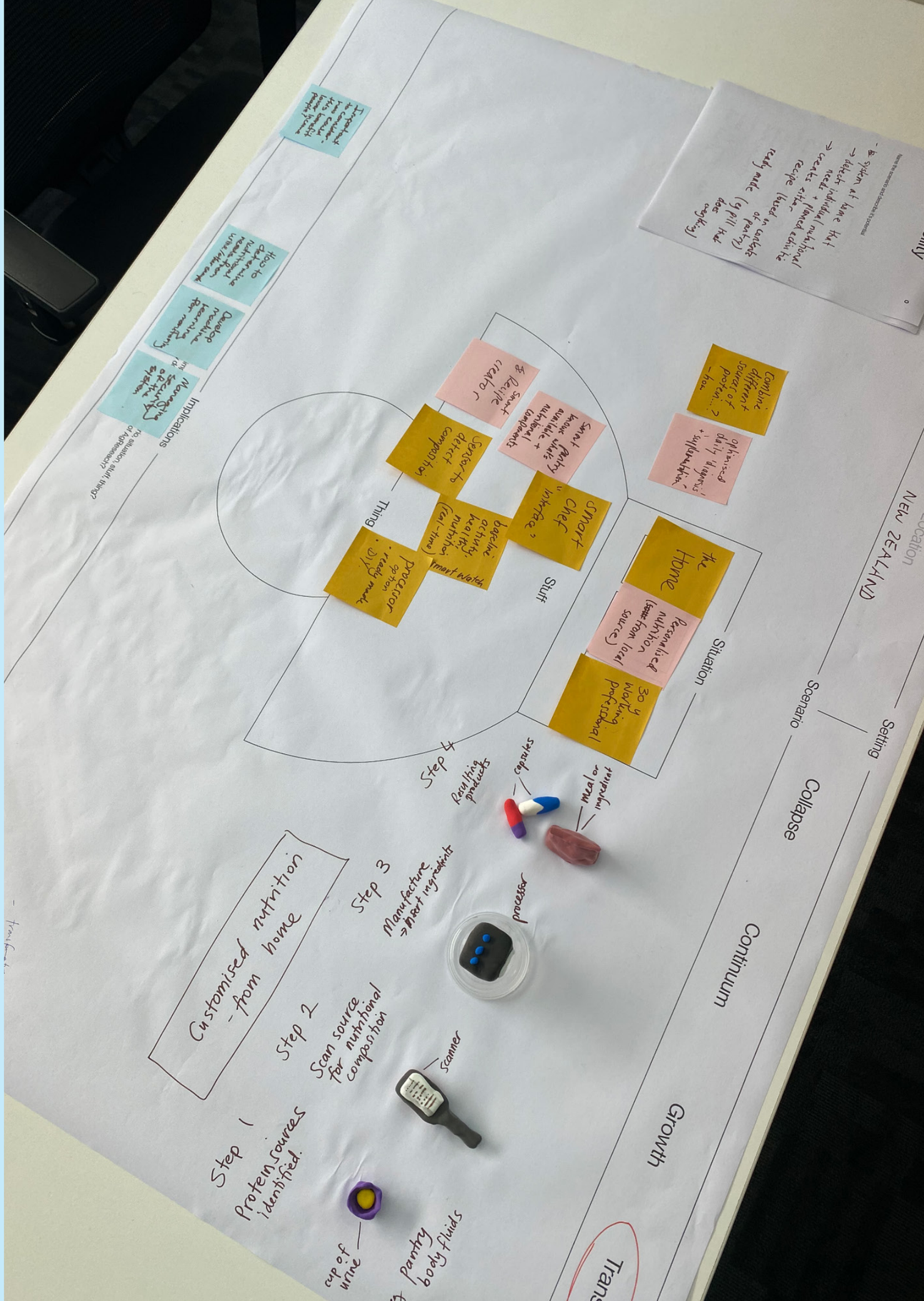
After a break, the participants refreshed themselves with the prior canvases and then, I introduced a blank ‘Opportunity Matrix’ canvas for participants to rapidly ideate alternative protein ideas. I framed the ideas as speculative alternative protein offerings like products, services, experiences, or all three-in-one. The ‘Opportunity Matrix 2’ space was rationalised using a function axis of ‘raw material’-’experience’ and production-consumption axis.

Throughout this activity, I emphasised that this activity was about the number of ideas, not the quality. Radical ‘blue-sky’ ideas were encouraged. Participants were encouraged to think beyond the constraints of reality and reimagine every-day-life with alternative protein. Participants could refer back to the previous canvases pinned around the workshop if they got stuck. This activity aimed to generate ideas that they could build out and prototype in the next activity.

7. Future Canvas

Guided by the Experiential Futures Ladder, the ‘Future Canvas’ asked participants to prototype an alternative protein idea from the previous Opportunity Matrix 2 activity to imagine a world twenty years from now in which their prototype is a reality. I provided the setting and generic scenario archetype to outline the intention for this canvas. I used the four future archetypes by Jim Dator, a prominent future studies scholar, to highlight the focus of a ‘transformative’ scenario.

In pairs or small groups of three, participants started at the top centre point of ‘world-building’ and followed the prompts on the canvas. I provided each group with a multicoloured set of modeling clay and markers to prototype their idea and detail a specific place (e.g. home, restaurant, factory, etc.), the offering (product, service, experience) and the lens (persona or target audience) guiding their thinking.



7. Landscape of Possibility

Next, the groups filled out a series of ‘landscape of possibility’ questions sourced from Bespoke’s Book of Futures to detail their world’s key players, context, challenge, mood and vibe, technology, trends and counter-trends, culture and values and possibility (114-115). This activity required participants to ‘suspend disbelief’ and imagine what they would like to see in the future. The groups shared their creations with the whole workshop and discussed the implications of each group’s idea for AgResearch.

Players

- Who is involved in this scenario?
- What communities, organisations and institutions are included?
- What do they value and treasure the most?
- What do they fear?

Challenge

- What need, problem or pain is this scenario addressing?

Context

- Where is this scenario taking place?
- When in the future is this happening?
- What is the historical, socio-political and economic landscape like?

Mood and vibe

- How does this scenario feel and look?
- What are its emotional qualities?
- Describe the scene and ambiance?

Technology

- What technological advancements are impacting this scenario?
- What is the relationship between people and technology?

Trends and counter trends?

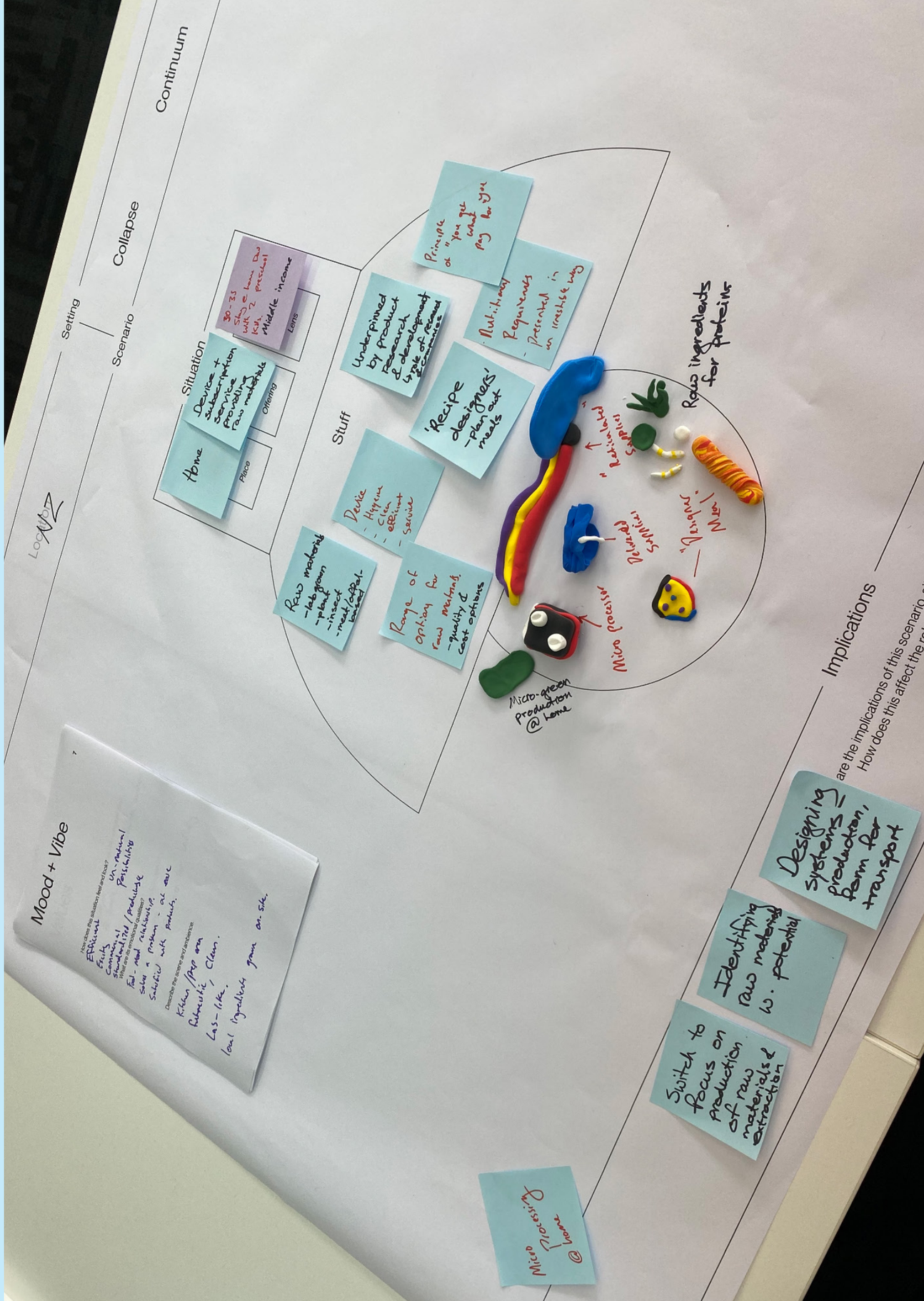
- What major trends, drivers and forces are shaping this world?
- What are the counter trends, reactions and responses to change?

Culture and values

- What are the cultural values and principles determining people’s behaviours and conducts?
- What does society value the most in this scenario?

The possibility

- Name the scenario and describe its potential.



8. Feedback form

I used a workshop feedback form to gauge the usefulness of the methods used, identify improvements, capture understandings of design from workshop participants. The feedback form was adapted and extended from a template provided by AgResearch. Most feedback was positive and suggest that the speculative design approach did help the participants think in a different way. However, some participants were unsure how design-led thinking differed from the research they usually do.

> Research suggests that design-led thinking uses inductive reasoning to draw conclusions from observation of the context or situation at hand and uses probability (Kolko). While science-led thinking uses deductive reasoning to draw conclusions from generally accepted facts, laws or 'evidence'. Both design and science are creative and experimental in nature, much research compares the two disciplines against each and overlooks the potential of design-science collaboration. Design doesn't seek to discredit or replace science, they are of mutual benefit to each other.

Workshop Feedback Form

This feedback form is designed to gauge the usefulness of the methods used in this workshop, and gain insight into the perception of design and designer within AgResearch more generally.

This workshop

1. *To what extent did the approaches used in this workshop help you to think in a different way?*

1	2	3	4	5	6	7
Not at all			To some extent			To a great extent

Comment:
I'm STILL NOT ENTIRELY CLEAR ON DESIGN-LED THINKING.

2. *If we were to use these methods again, how would we adapt them to be more useful?*
MAYBE MORE TIME ON THE SLIDES AT THE BEGINNING OF YOUR INTRODUCTION — TO UNDERSTAND ROLE OF DESIGN.

3. *What did you particularly enjoy?*
LAST STAGE = PROBLEM SOLVING, WHICH WE TEND TO BE GOOD AT.

4. *What did you find challenging?*
?

Role of Design and Designer

1. *Have you worked with designers before?*
Please circle one of the following: Yes / Indirectly / No

2. *Describe what 'design' means to you:*
IN MY EXPERIENCE, ITELP WITH ~~CCCC~~ VISUALISING / EXPRESSING ~~AT~~ A KNOWN IDEA.

3. *How might design fit within the broader science research area?*
? I REALLY DON'T GET IT YET.

4. *How might design support you in your role and work?*
?

5. *Additional comments:*
GOOD FUN, I SEE SOME SIGNIFICANT IDEAS WORTH PURSUING COMING FROM THIS

Workshop Feedback Form

This feedback form is designed to gauge the usefulness of the approach used in this workshop, and gain insight into the perception of design and designer within AgResearch more generally.

This workshop

1. *To what extent did the approaches used in this workshop help you to think in a different way?*

1	2	3	4	5	6	7
Not at all			To some extent			To a great extent

Comment:
We definitely generated some novel ideas, especially by the end

2. *If we were to use these methods again, how would we adapt them to be more useful?*
I think it was difficult at beginning to get out of our heads - maybe work on leading up to the crazy ideas rather than starting there (i.e. expecting them while doing the 'what are proteins' qu. to do this). Its a hard one.

3. *What did you particularly enjoy?*
The last activity!! Thinking through our scenario, and then using the clay to make thinking.

4. *What did you find challenging?*
Everyone getting caught up on the questions/scope - people don't move forward when they get like this and it is frustrating.

Role of Design and Designer

1. *Have you worked with designers before?*
Please circle one of the following: Yes / Indirectly / No

2. *Describe what 'design' means to you:*
Creating something thoughtfully so it is fit for purpose - considering the why.

3. *How might design fit within the broader science research area?*
To help us with new/different processes/ways of thinking. As Having designers as part of multi-disciplinary teams - like social scientists they help us to ask questions we wouldn't usually ask.

4. *How might design support you in your role and work?*
Certainly we could do with more graphic design support, but also on a deeper level with helping us think in a different way.

5. *Additional comments:*
Thanks very much it was very enjoyable and I especially loved the clay.

Workshop Feedback Form

This feedback form is designed to gauge the usefulness of the methods used in this workshop, and gain insight into the perception of design and designer within AgResearch more generally.

This workshop

1. *To what extent did the approaches used in this workshop help you to think in a different way?*

1	2	3	4	5	6	7
Not at all			To some extent			To a great extent

Comment:
most effective: ← different formats eg pictures, text, clay → stimulates creativity
← prompting Q's, cards etc, for considering different angles

2. *If we were to use these methods again, how would we adapt them to be more useful?*
ask people to give an example → helps others to understand

3. *What did you particularly enjoy?*
- range of media - clay!
- out of the box thinking encouraged - crazy ideas!

4. *What did you find challenging?*
getting my head out of current constraints and context eg food for our current

Role of Design and Designer

1. *Have you worked with designers before?*
Please circle one of the following: Yes / Indirectly / No

2. *Describe what you 'design' means to you:*
creating + visualising something different to share with others.

3. *How might design fit within the broader science research area?*
asking/allowing feedback in project meetings & be in other forms eg pictures, prompts, stickers, clay.

4. *How might design support you in your role and work?*
thinking outside the box.

5. *Additional comments:*
really like these sessions — really stimulating.

Considerations

Considerations for the workshops include providing a variety of expressive mediums for participants to use, the sequence of individual/pair/group activities workshop set-up and participant selection. Workshop participants were invited based off their interest in design approaches and receptiveness to novel ways of working. There was additional consideration given to ensure the workshop dynamic was a mixture of disciplines, organisational levels and personalities. Workshop notes and activities were digitised and relayed back to the participants via email

Pilot workshop

Pilot workshop

Who was there?

The pilot workshop had three participants with backgrounds ranging from science research to film.

What was created?

Idea	Potential	An implication
Lab food-court	Traditional notion of food has changed	Increased room for authority to influence food

Feedback:

The participants felt like they didn't know enough about protein to contribute and needed a lot of 'hand-holding'. Overall, they found it an enjoyable workshop and particularly liked the drawing and making part. As well as discussing their values with each other while filling in the 'future canvas'.

Additional notes:

The participants needed lots of prompts and examples throughout the workshop, which would have influenced their responses. The ratio of facilitator to participants was 1:3. In a larger workshop, the facilitator won't be able to play such an active role.

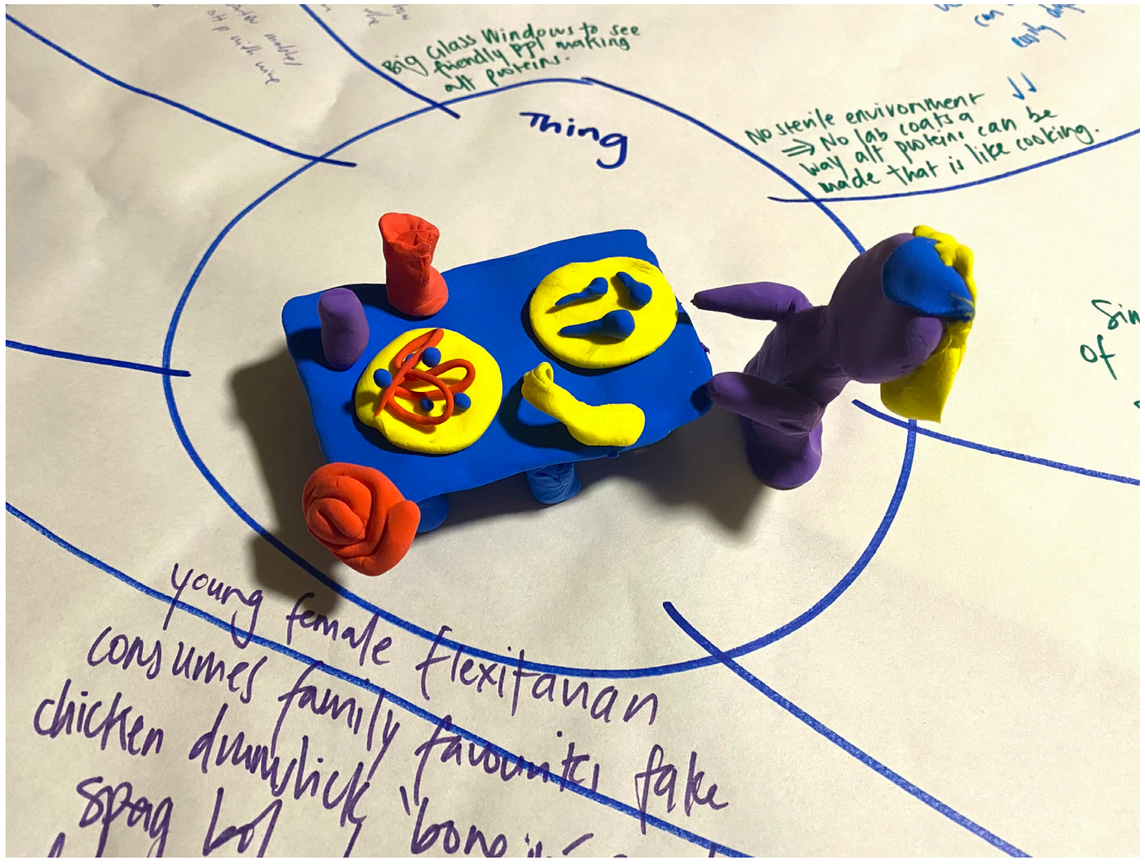


Fig. 25. *Lab food court prototype,* photo by author, 24 April 2021.

Workshop 1

Lincoln workshop

Who was there?

The first workshop had six participants with roles ranging from senior scientist to strategy lead.

What was created?

Idea	Potential	An implication for AgResearch
Customised nutrition at home	Tech-driven nutrition	Develop machine learning for monitoring
Micro-processing at home	Raw ingredients are produced in factories	Switch to focus on production of raw materials and extraction
Fantasy foods	Total biophysical food experience	Move away from traditional sectors

Feedback:

While the participants had fun and found it significantly helpful in enabling thinking outside the box, feedback suggests significant challenges were moving the focus away from food and “getting my head out of current constraints and context”, defining the scenario after prototyping and “rationalising the (matrix) axis of the spaces”.

Next steps?

Refinements for the next workshop include clustering the responses in real-time instead of after the workshop and providing fewer examples of responses from the previous workshop.

Additional notes:

It was beneficial to have someone from the ‘Alternative Proteins’ team as a participant and help to guide discussion and answer more specific scientific and organisational questions.

Fig. 27. *Customised nutrition at home prototype*, photo by author, 8 April 2021.

Fig. 28. *Micro-processing at home prototype*, photo by author, 8 April 2021.

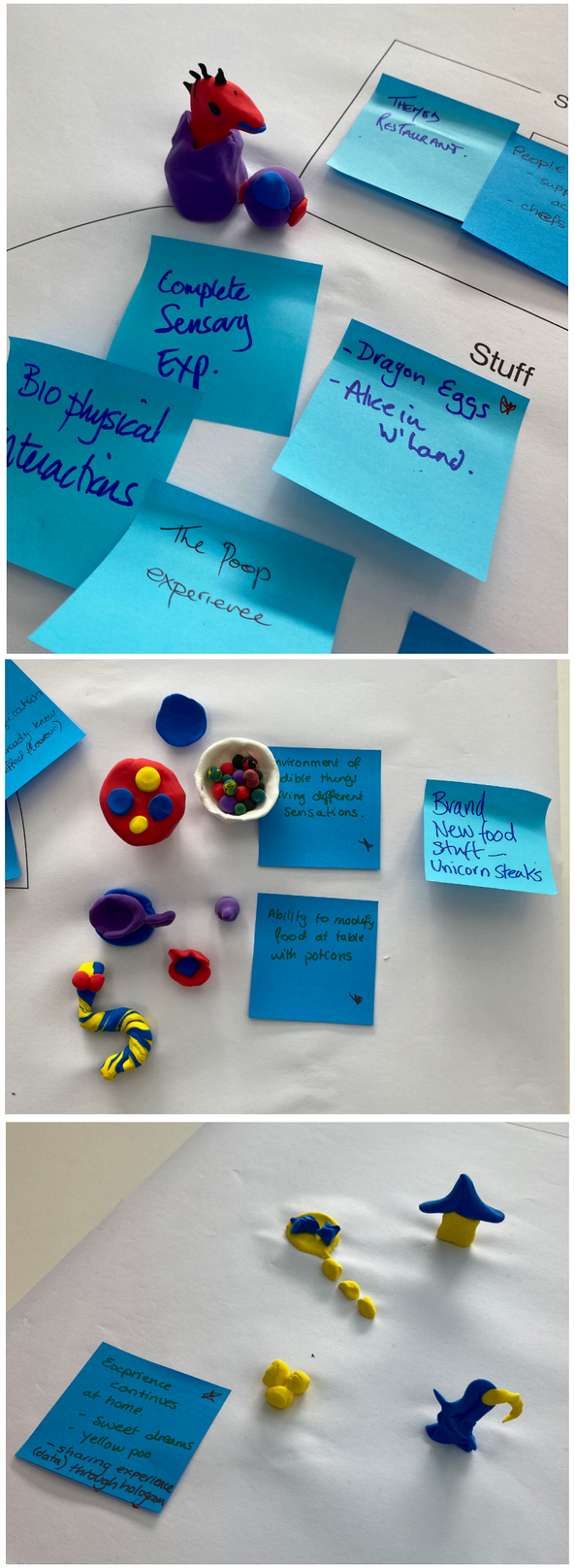


Fig. 29. *Fantasy foods prototype*, photo compilation by author, 8 April 2021.

Map

Multiply

Mediate

Mount

Map2

Workshop 2

Grasslands workshop

Who was there?

The second workshop had eleven participants with roles ranging from PhD students to leadership level.

What was created?

Idea	Potential	An implication for AgResearch
Clothing substrate	Use of inedible protein sources for clothes	Change in roles for agriculture and horticulture
Fungi	Fungus is a valuable source of sustenance	Consumption of alternative proteins is the norm
Farms in space	Biomass on the moon	Extend gut-brain axis research to zero gravity and sterile situation
Bio-digital interface	Creation of a virtual ‘happy place’	Land-use switched to producing other natural products
Sustainable shelters	Buildings that biodegrade	New materials needed
Protein cosmetics	Alternative protein for cosmetic/surgical industries	Expansion into other fields such as medical/cosmetic science

Feedback:

The workshop expanded participants thinking to some extent but not significantly. Challenges noted by the participants include “seeing the path from ideas to something concrete” and moving away from food as the primary application.

Next steps?

Refinements for the next iteration include giving more time for participants to work on the future canvas, introducing the process and purpose of the workshop in more detail and removing some constraints on the order of activity participants can proceed in.

Additional notes:

After the workshop, there were many questions raised about how design-led thinking differs from the thinking scientists typically do. I referred to abductive and deductive reasoning to explain.

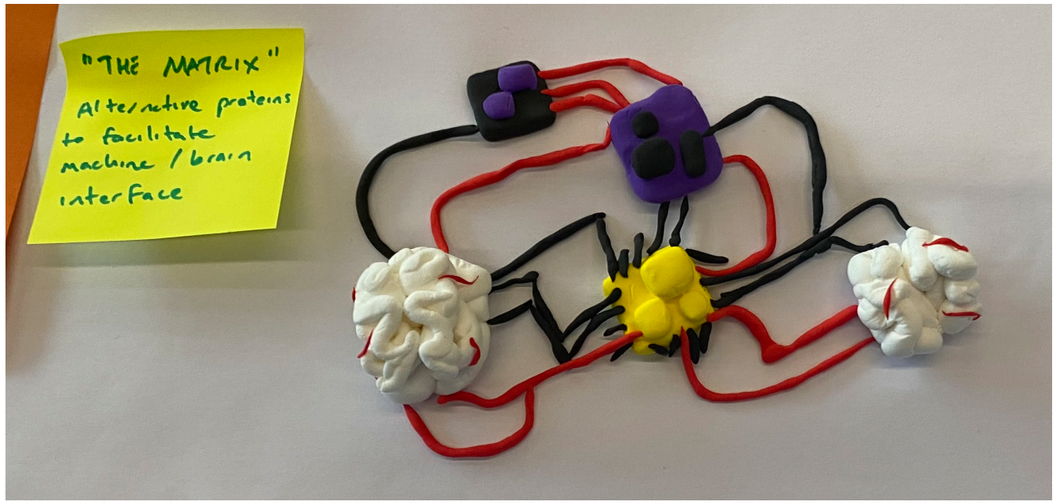


Fig. 30. *Bio-digital interface prototype,* photo by author, 14 April 2021.

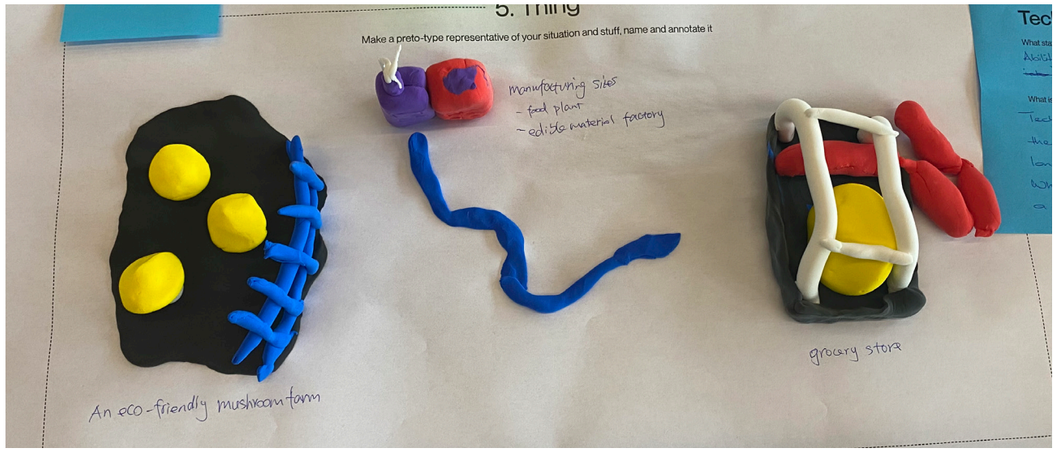


Fig. 31. *Fungi prototype,* photo by author, 14 April 2021.

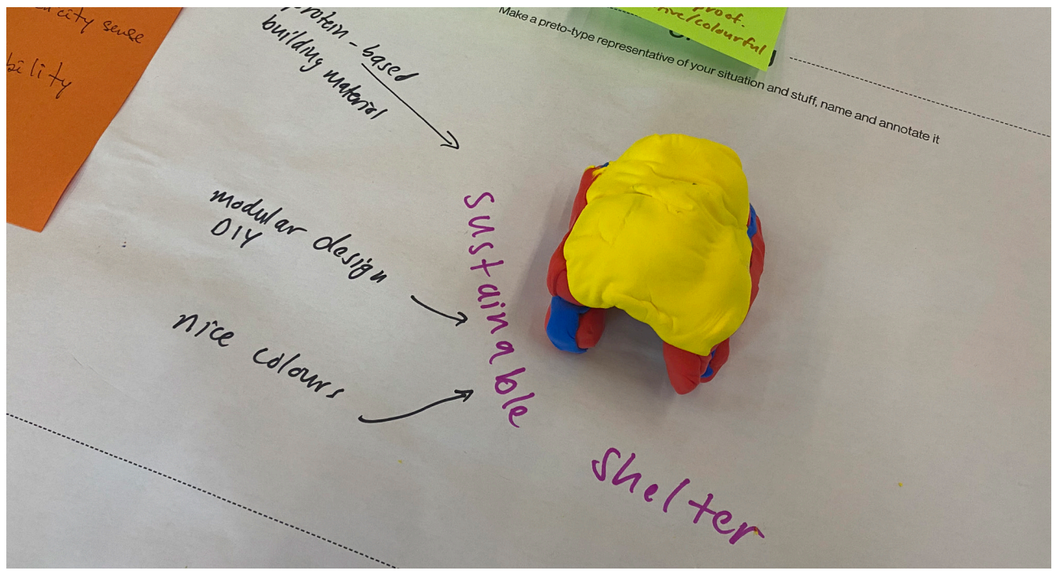


Fig. 32. *Sustainable shelter prototype,* photo by author, 14 April 2021.

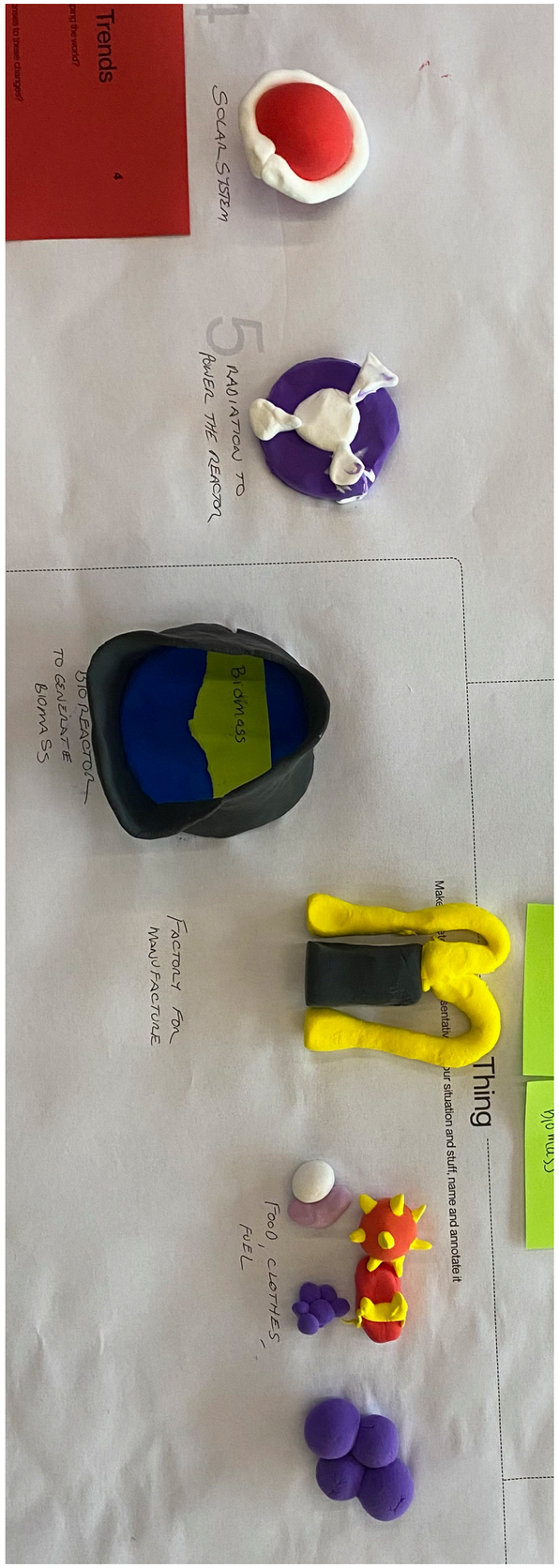


Fig. 33. *Farms in space,* photo by author, 14 April 2021.

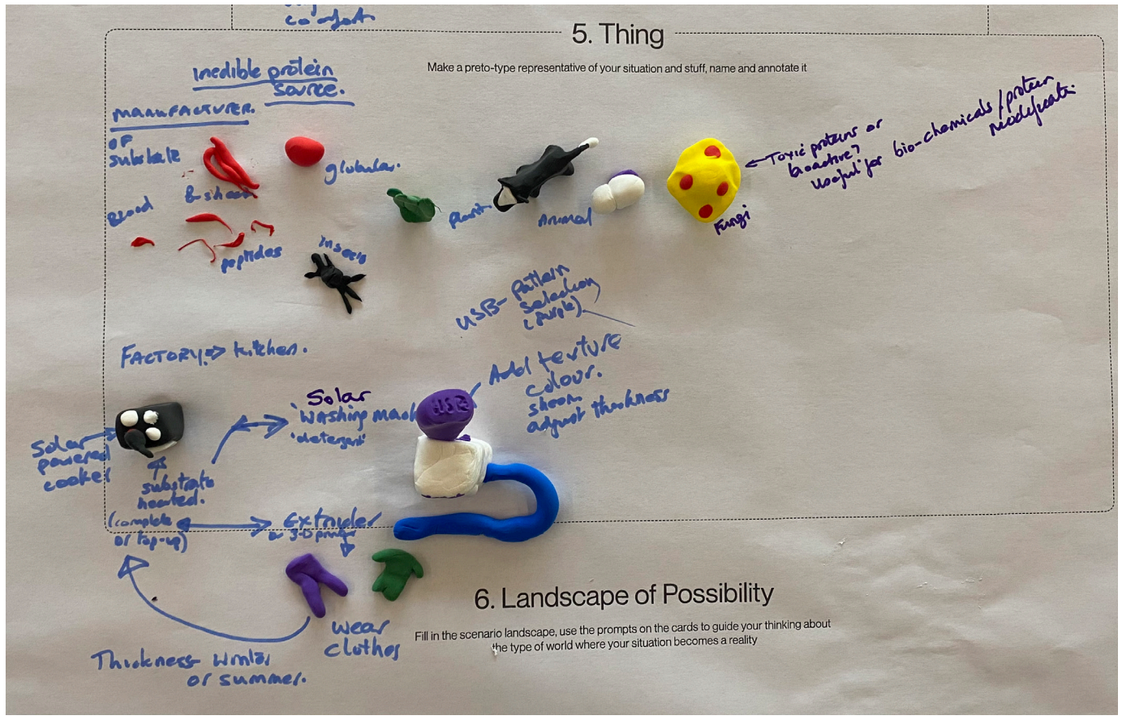


Fig. 34. *Clothing substrate prototype,* photo by author, 14 April 2021.

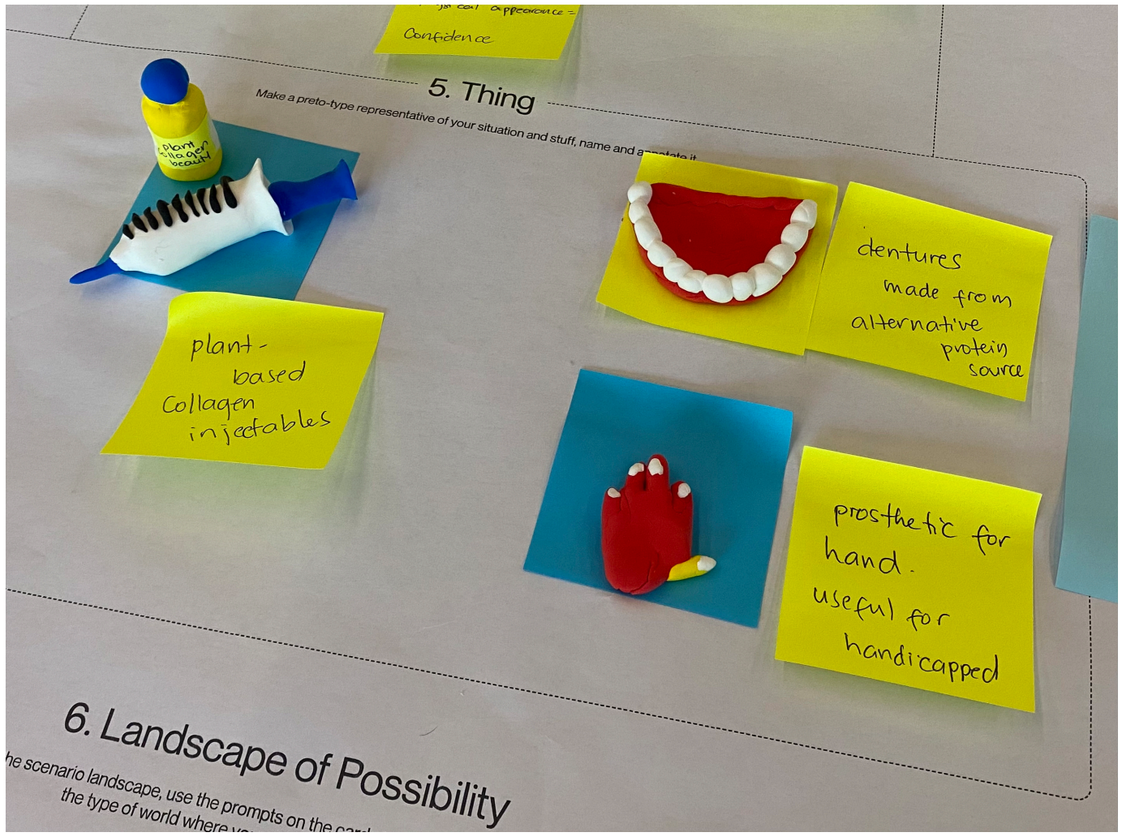


Fig. 35. *Protein cosmetics,* photo by author, 14 April 2021.

Map

Multiply

Mediate

Mount

Map2

Workshop 3

Ruakura workshop

Who was there?

The third workshop had seven participants with roles ranging from senior scientists to leadership level.

What was created?

Idea	Potential	An implication for AgResearch
Dissolvable packaging	Sustainable replacement for plastic	New research requirement of activeable protein that changes function
Mars cars	Full ecological restorations	Protein scientists need to create new materials
Smart muscle regeneration	Protein based clothing to help remedy the body	Develop new technology

Feedback:

Feedback suggests I used too many new terms, the workshop's output was unclear, and the questions poised needed more careful crafting. In addition, participants found changing their mindsets challenging and the workshop only helped participants think differently to some extent.

Next steps?

Refinements for the workshop process in the toolkit include using more accessible language and a framing document to ensure the purpose and expectations are explicit for participants.

Additional notes:

The crucial difference of this workshop from the previous ones was the lack of an internal champion for the design process from the 'Alternative Proteins' case study. As a result, participants found it difficult to progress past the initial discussion about what 'alternative proteins' meant and were unsure how the workshop contributed to the science research and AgReasearch.

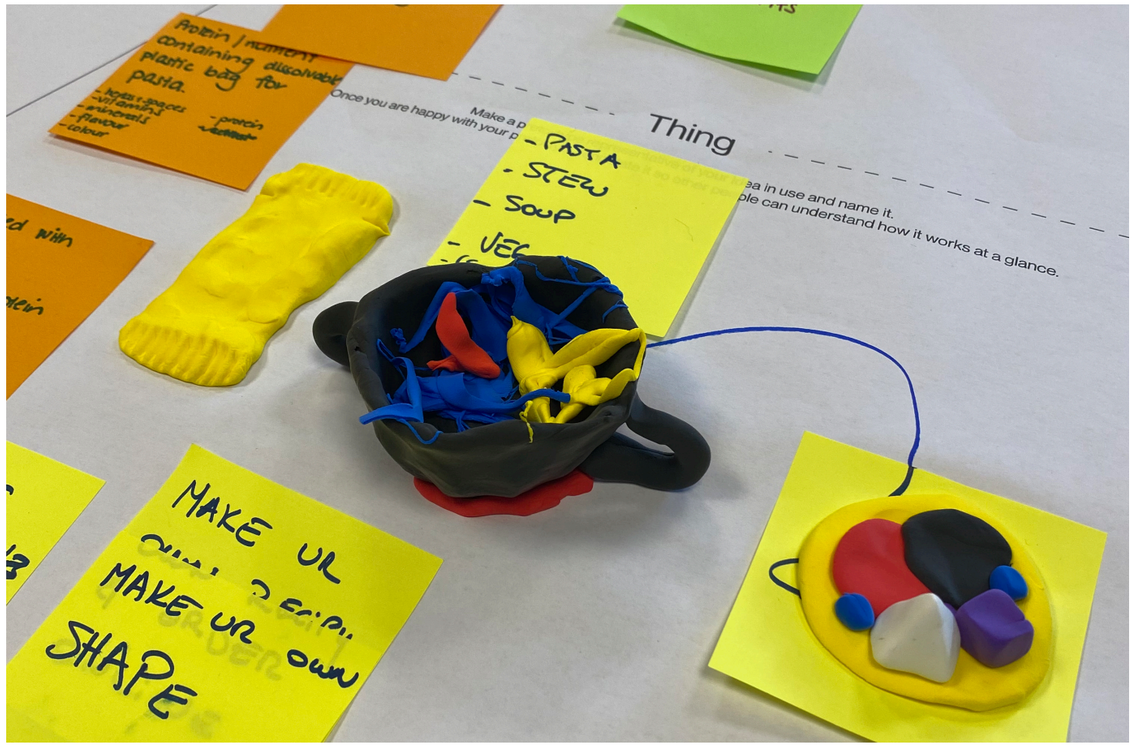


Fig. 36. *Dissolvable packaging prototype,* photo by author, 21 April 2021.

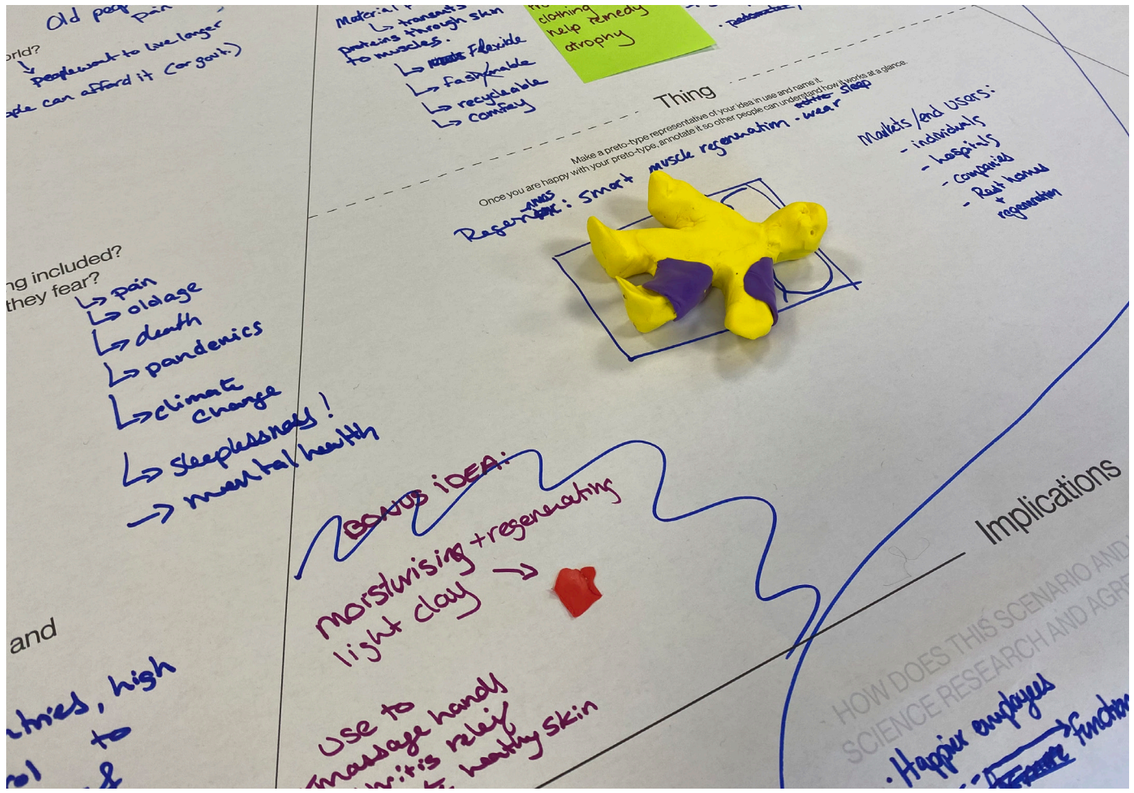


Fig. 37. *Smart muscle regeneration prototype,* photo by author, 21 April 2021.

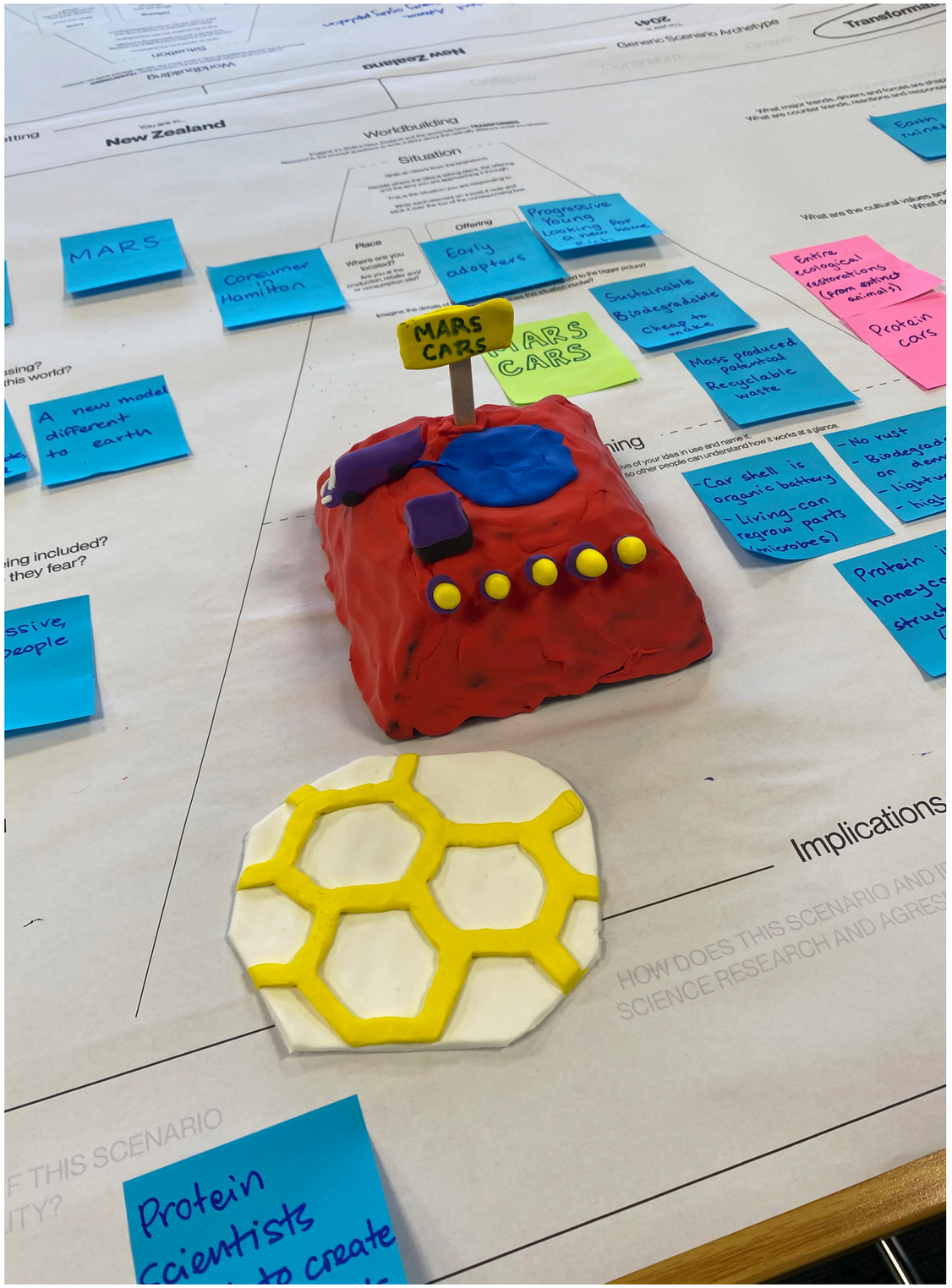


Fig. 38. *Mars cars prototype,* photo by author, 21 April 2021.

Retrospective

After the workshops, I carried out a retrospective on the speculative design process so far. I reflected on the things that went well, things that could have gone better, the surprises, the lessons, things to keep and things to change. The retrospective allowed me to refine the workshop design, workshop activities, methods and improve my facilitation for the next iteration.

Things that went well:

- Participants were open and receptive to utilising various expressive mediums.
- High levels of engagement during the futures ladder canvas.
- Participants enjoyed the mixture of working individually, as a group and the whole workshop.
- Discussing the different understandings of ‘alternative proteins’ helped participants to see beyond their perspective.
- By the end of the workshop, participants generated lots of innovative ideas.
- Discussion around values that drive the different futures the participants came up with.
- The feedback form provided vital insight into how to improve the process.

Things that could have gone better:

- Configuration of each workshop space to ensure all participants can work on the different canvases comfortably.
- Resetting the mindsets of participants as they enter the space away from their usual day-to-day setting.
- Utilising more accessible language and keeping design jargon to a minimum.
- Introduction of the design approaches and defining the workshop’s scope as it was a sticking point for discussions.
- Balancing the power dynamics within the workshop by pairing participants from different organisational levels (and disciplines) together.
- More engaging communication of findings to the participants, the follow-up emails received minimal response.

Surprises:

- Some participants were distracted by the novelty of the mediums.
- Participants found ideating about the future of protein challenging.
- Once the participants got stuck on discussing the term ‘alternative proteins’, they struggled to move forward onto the next activity.

Lessons:

- Clearly state the purpose and aims of the workshop.
- Spend more time introducing design approach and terminology used.
- Workshopping is a team sport; there should be at least three people (one person to be at the front facilitating and timekeeping, one person to work with the workshop groups closely and another person to scribe and take notes).

Things to keep:

- The use of the thinking-through-making method was enjoyable for the participants.
- Various expressive mediums, e.g. drawing, writing, dialogue and prototyping, for participants to capture their ideas.

Things to change:

- Introduce thought starters to help with creativity.
- Reduce the amount of ‘landscape of possibility’ questions
- Allow more time for participants to see what others had created and discussion time.
- Ask participants to prepare before the workshop through a primer activity or supply a pre-read document to clarify the purpose, aims and approaches that will be used.

Scenarios

Scenario development

After the all workshops, I reviewed the ideas generated and clustered the speculations to key themes to guide the development of future scenarios for the ‘Alternative Proteins’ team. Three key themes emerged 1) food, 2) post-food, and 3) new earth (see fig. 38). As the future of alternative proteins is most likely to remain food-focused, the sub-themes of ‘premiumise’ and ‘feed the masses’ were developed into their own separate scenarios.

In line with the Futures Cone concept by Voros utilised in the ‘99¢ futures’ workshop, I organised the four scenarios of premiumise, feed the masses, post-food and new earth on a scale of probable, preferable, plausible and possible and began sketching out what each world might look like (see fig. 39).

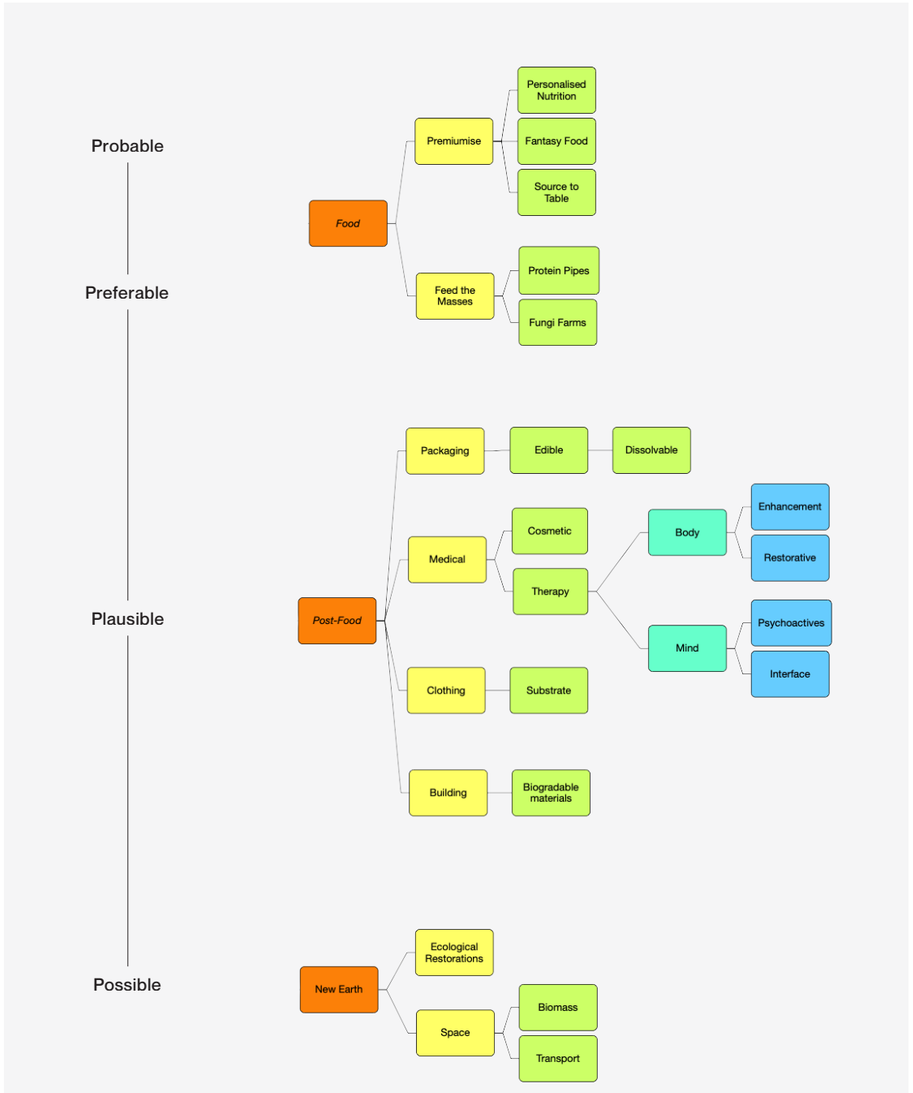


Fig. 38. *Speculative design workshop prototype themes,* image by author, 17 June 2021.

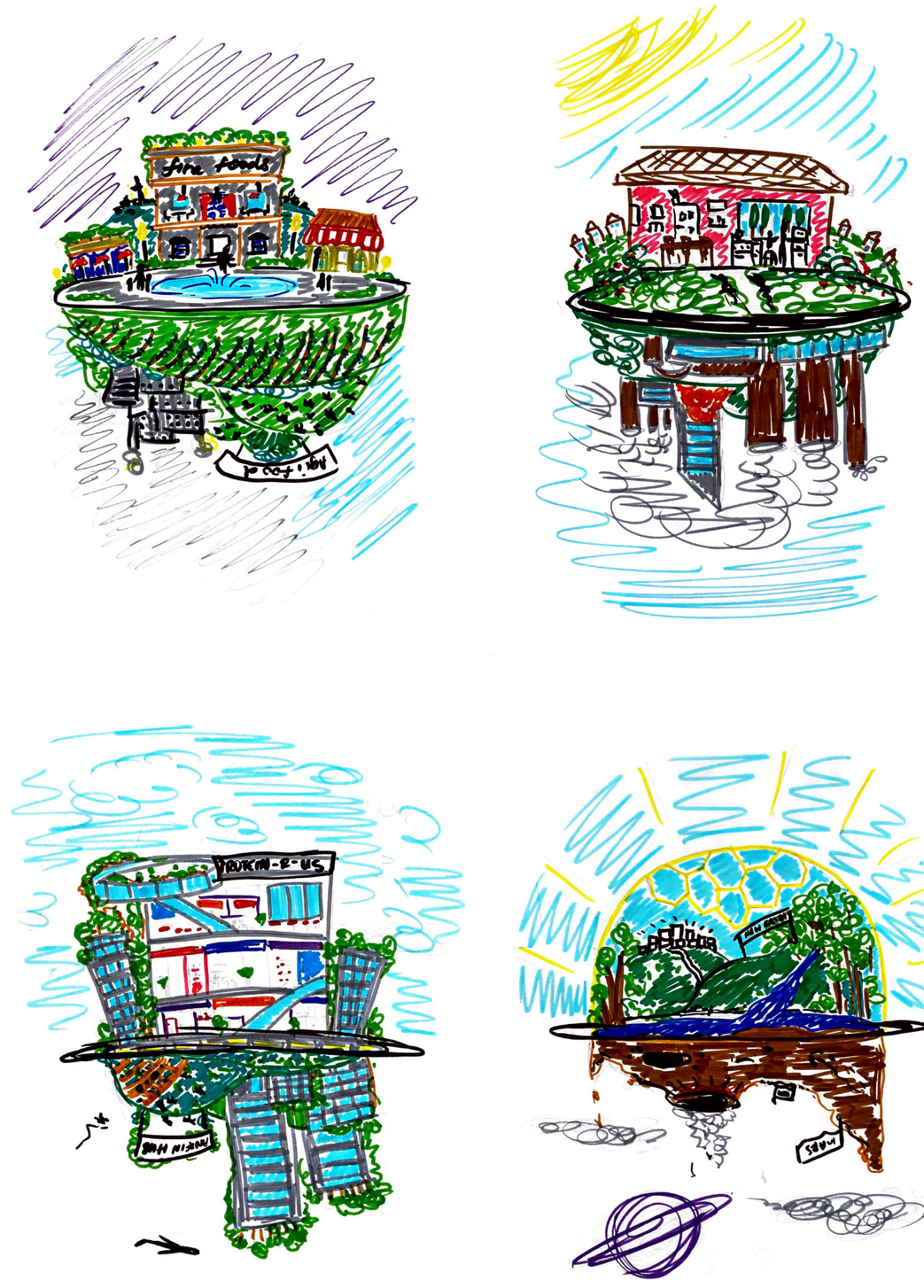


Fig. 39. *Scenario sketches,* digital collage by author, 20 July 2021.

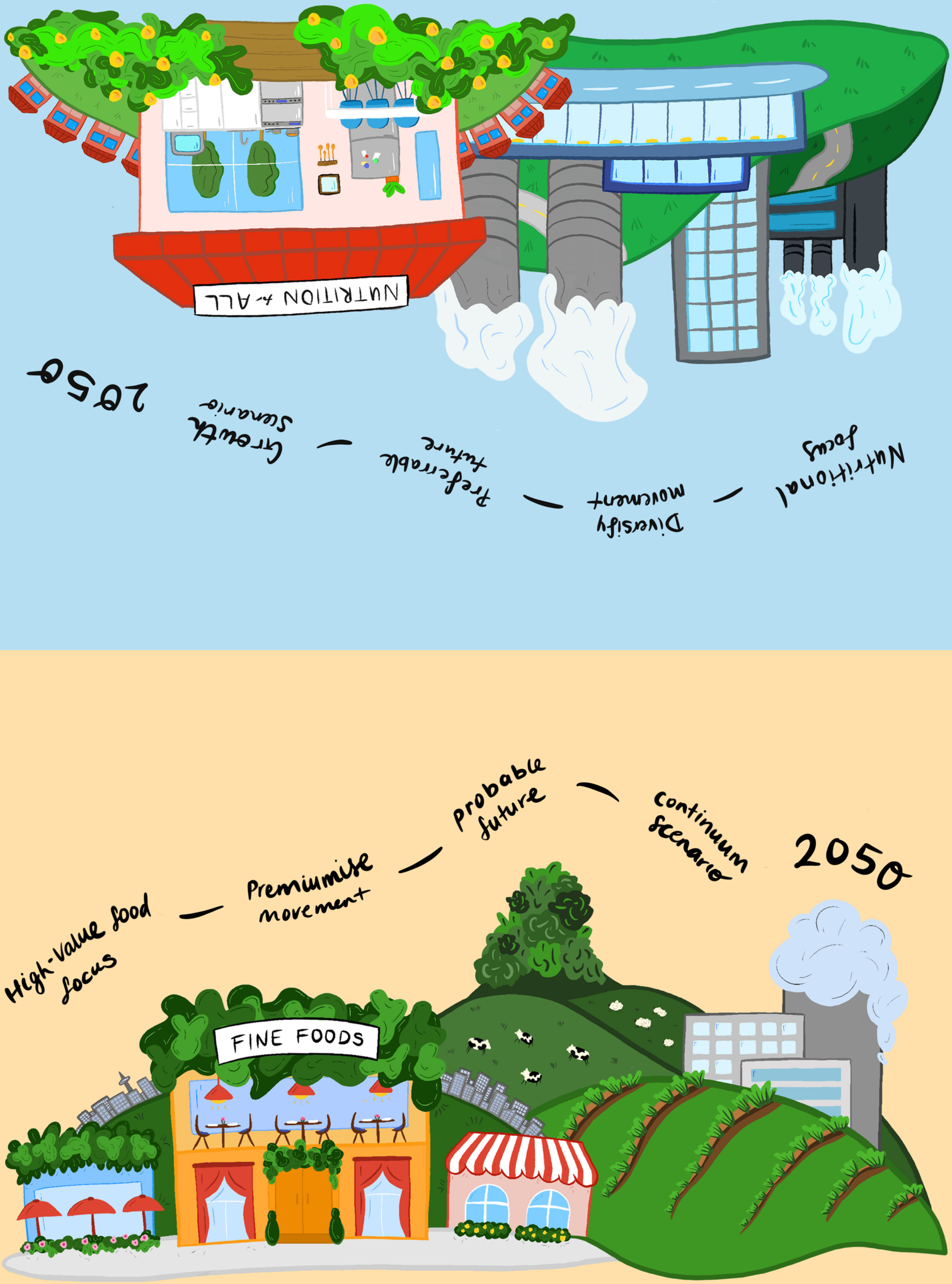
The following scenario visualisations are the culmination of the three speculative design workshops and twelve ideas generated by the participants (see fig. 40). I used the workshop participants' speculations and notes captured on the 'Future Canvas' to guide and populate the illustration and story for each of their respective scenarios. As I interpreted and translated the participants' ideas into a visual world and narrative, I drew inspiration from the 'Future of Meat' illustrations and used the 'supply' and 'demand' drivers to outline the cause and affect that resulted in each world.

Initially, the scenarios were designed to be like playing cards that could be flipped to show a consumer landscape (consumption domain) and an industry landscape (production domain) (see fig. 41). The last iteration of the scenarios are in a horizontal format to fit computer screens better. Iterations of the scenarios were presented back to the 'Alternative Proteins' team and refined based on feedback.

Idea	Potential	An implication for AgResearch
Customised nutrition at home	Tech-driven nutrition	Develop machine learning for monitoring
Micro-processing at home	Raw ingredients are produced in factories	Switch to focus on production of raw materials and extraction
Fantasy foods	Total biophysical food experience	Move away from traditional sectors
Clothing substrate	Use of inedible protein sources for clothes	Change in roles for agriculture and horticulture
Fungi	Fungus is a valuable source of sustenance	Consumption of alternative proteins is the norm
Farms in space	Biomass on the moon	Extend gut-brain axis research to zero gravity and sterile situation
Bio-digital interface	Creation of a virtual 'happy place'	Land-use switched to producing other natural products
Sustainable shelters	Buildings that biodegrade	New materials needed
Protein cosmetics	Alternative protein for cosmetic/ surgical industries	Expansion into other fields such as medical/cosmetic science
Dissolvable packaging	Sustainable replacement for plastic	New research requirement of activeable protein that changes function
Mars cars	Full ecological restorations	Protein scientists need to create new materials
Smart muscle regeneration	Protein based clothing to help remedy the body	Develop new technology

Fig. 40. *Speculative design workshop ideas,* digital image by author, 5 October 2021.

Fig. 41. *Scenario illustrations, image* compilation by author, 12 October 2021.



Demand for plant-based and cell-cultured protein continues to grow. Consumers value quality and experience above all else. This has resulted in the rise of premium offerings and upmarket establishments specialising in alternative protein products. The wealthy are the most influential consumer group in this world.

Artisan is trending and traditional forms of production is still being used to meet the bulk of the demand. However, as the demand for alternative protein continues to grow and consumer perceptions change, cell-cultured protein is becoming a more popular choice among the wealthy.

Cell-cultured protein is seen as a sustainable and affordable way to meet nutritional outcomes for the general population. Governments build infrastructure to ensure all households have a direct protein supply. Consumers can customise the alternative protein supply to their individual needs with the help of microprocessing technology.

The food production landscape is dominated by multinational corporations and has led to the creation of global alternative protein giants. There is a homogeneous way of production. However, small niches are encouraged to disrupt and innovate through government funding. Raw materials are sourced globally but processing remains local.

Post-food focus — Expand movement — plausiable future — Transformative scenario

Recent developments in science have resulted in cell-cultured protein becoming a versatile material. Consumers enjoy the practicality of the material and see it as a sustainable alternative to plastic. Material uses and applications range from medi-cosmeceuticals to furnishings and shelters. With a broader range of products, As the applications and uses of protein expand beyond food, startups and innovation hubs have popped up in response to the new technology and science. The majority of protein is produced using sophisticated technology and novel methods. There is more variety in value-aligned options for consumers due to intense market competition.

New Earth focus — Possible future — Collapse Scenario — 2050

Earth has become increasingly inhabitable for humans due to climate change. As a result, exploration beyond our planet has been a priority. A key focus for research is on understanding zero gravity and oxygen-free settings. Subsequent discoveries have unlocked cell-cultured protein as an energy source for space expeditions.

Cell-cultured protein is now a sustainable utility and primary energy source. With subsides and incentives from governments, everyone is a consumer of alternative protein power. Laws and regulations prioritise planet and human health. Research is now exploring alternative protein as a vehicle for enabling ecological restoration.

Map

Multiply

Mediate

Mount

Map2

Scenario test

Scenario activity

For the Mount and Map2 phase outlined by the EXF cycle, I framed the scenarios as another workshop activity for AgResearch. The scenarios were used for a scenario-planning activity in a virtual strategic development workshop for the ‘Integrated Foods Initiative’. There were thirteen participants from Lincoln, Grasslands and Ruakura campuses that attended. In addition, some participants from the speculative design workshops were present.

As the first activity on the workshop agenda, participants familiarised themselves with the different scenarios and chose one or two scenarios to answer a series of questions in two groups. The questions explored how AgResearch could respond if the scenario were to become a reality and the broader implications of the scenario for society. The two groups picked the food-focused scenarios.

The discussion started off slow as participants fixated on the headings and wording of the scenarios (instead of what each scenario enables and the opportunities that arise from it. In *Speculative Everything*, Dunne and Raby note, “in design, people often struggle to get beyond the concept to appreciate and engage with the (deeper) ideas” (15). However, as group discussions picked up pace, participants began to critique the direction of development embodied in the scenarios and discuss what a more desirable future includes.

A key insight from the discussions was that the scenarios are not mutually exclusive and feed into each other. Even though some of the scenarios could be deemed non-viable, they served as inspiration and thinking exercises for participants to generate their own ideas of a desirable future. By opening up participants’ thinking to the idea of multiple possible futures, they began to create shared understanding or start the dialogue to establish a common ground to orient research direction and organisational strategy towards sustainability transition pathways.

Toolkit

The speculative design process that was created throughout this project was refined and packaged into a toolkit for future use in design and science collaborations. Brandt et al. define a ‘toolkit’ as the collection of tools housed in one place and ‘tools’ as materials and resources used throughout a design process (146). As tools can be used in various ways (techniques), this toolkit outlines a method for each tool included to generate radical visions of sustainability to compel action and aid strategic thought.

The ‘Future Canvas’ tool can be used to challenge current mindsets and paradigms about what change and sustainability can look like by externalising tacit beliefs about the future and provoking critical reflection on the current path of development by asking what if this scenario or product was to become a reality.

Within the toolkit is a project framing tool for future design and science collaboration projects. The project framing tool can be used as a pre-read document for workshop participants to ensure they know how their time and effort will be targeted. A retrospective template is also included as reflection was crucial to the development and improvement of this speculative design process.

This toolkit and the tools included are by no means the final iteration. However, they do offer a starting point for further refinements and offer practical resources for future design and science collaboration. As Ian Gosher, an engineering professor at Brown University, states “design is never finished, never complete. Every design project is an iteration on a much greater process that has been unfolding since our ancestors first learned to use tools.”

(Angheloiu)

“These methods do not and should not offer definitive answers as to how the future will look — instead, they are useful devices in enabling people to better understand the challenges we are faced with and spark reflection about implications at a personal, collective and societal levels.”

Process framework

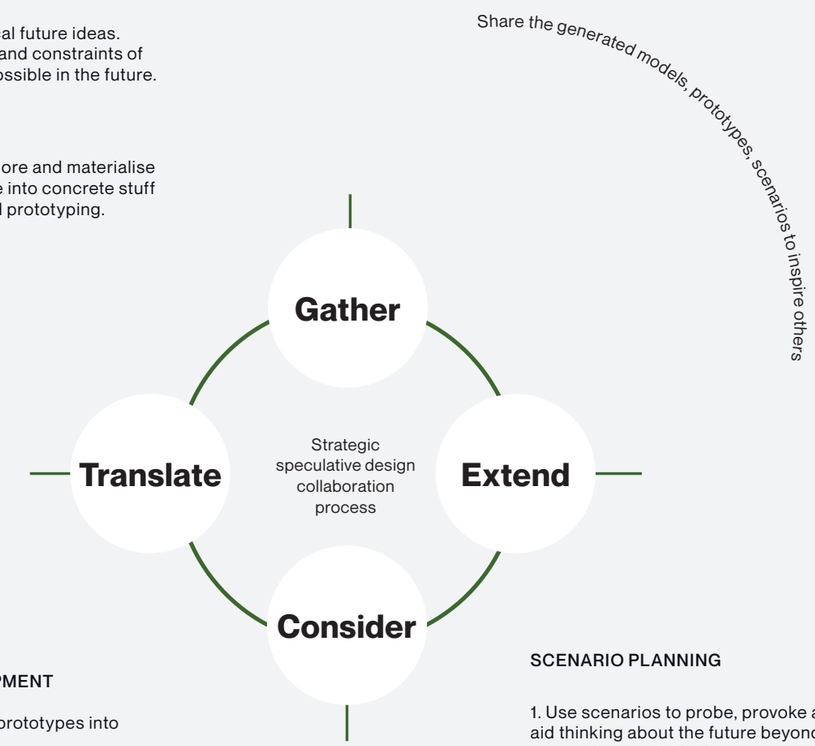
Use this strategic speculative design collaboration process with the tools included in this toolkit to envision compelling futures to guide sustainability transitions. Don’t forget to share what you’ve created with as many people as possible, speculations challenges thinking and provoke us to bridge what *could* and *should* be with action to get there. This process framework is a cumulation of this research projects process with the ‘Alternative Proteins’ team. A next step is included in the Consider-Extend domain and Scenario planning activity: #3.

IDEATION MATRIX

1. Rapidly ideate radical future ideas. Suspend all disbelief and constraints of reality - anything is possible in the future.

FUTURE CANVAS

1. Collaboratively explore and materialise ideas about the future into concrete stuff through modeling and prototyping.



SCENARIO DEVELOPMENT

1. Cluster models and prototypes into themes.

2. Use Dator’s future archetypes and Voros future cone to map out what category the scenario most resembles.

3. Refer to the scenario notes on the ‘Future Canvas’ for each model to illustrate, narrate and populate the scenario world.

4. Imagine supply and demand drivers to anchor the scenario world.

SCENARIO PLANNING

1. Use scenarios to probe, provoke and aid thinking about the future beyond the current frame of thinking.

2. Ask about what this specific future scenario enables and it’s implications. Consider how you would respond, stay relevant and actions required in the scenarios.

3. Use scenarios as long-term visions to practice creating tangible goals and objectives and identifying projects or programmes to link to explore sustainability transition pathways.

Fig. 42. *Strategic speculative design collaboration process*, digital image by author, 15 November 2021.

Thought-starter worksheets

Use at the start of a workshop to open conversation, set the tone and stimulate creative expression and thought. Quick and easy activity. It's important to allow participants to 'show and tell' before moving onto another activity. Workshops should be a mix of individual, pair and group work to facilitate time for personal reflection, collaboration and inspiration.

Fig. 43 inquires into what participants value outside of work to help expand their frame of thinking into everyday life and externalise the value system that drives action. Word association rapidly captures the breadth of participants understandings of a topic without causing a sticking point in conversation. By using scales to signify participants familiarity and feelings about a topic, the facilitator can attune themselves to the mood and vibe of the conversation on the day.

Fig. 44 captures the core of workshop participants understandings and ideas about a topic through visualisation. Make sure you provide markers of various colours, shapes and sizes so participants can express their ideas in detail. An important facilitation aspect is ensure you emphasis that this activity is about the ideas represented, not the actual picture itself.

Print out in black and white, A4, single-sided (markers tend to bleed through the page).

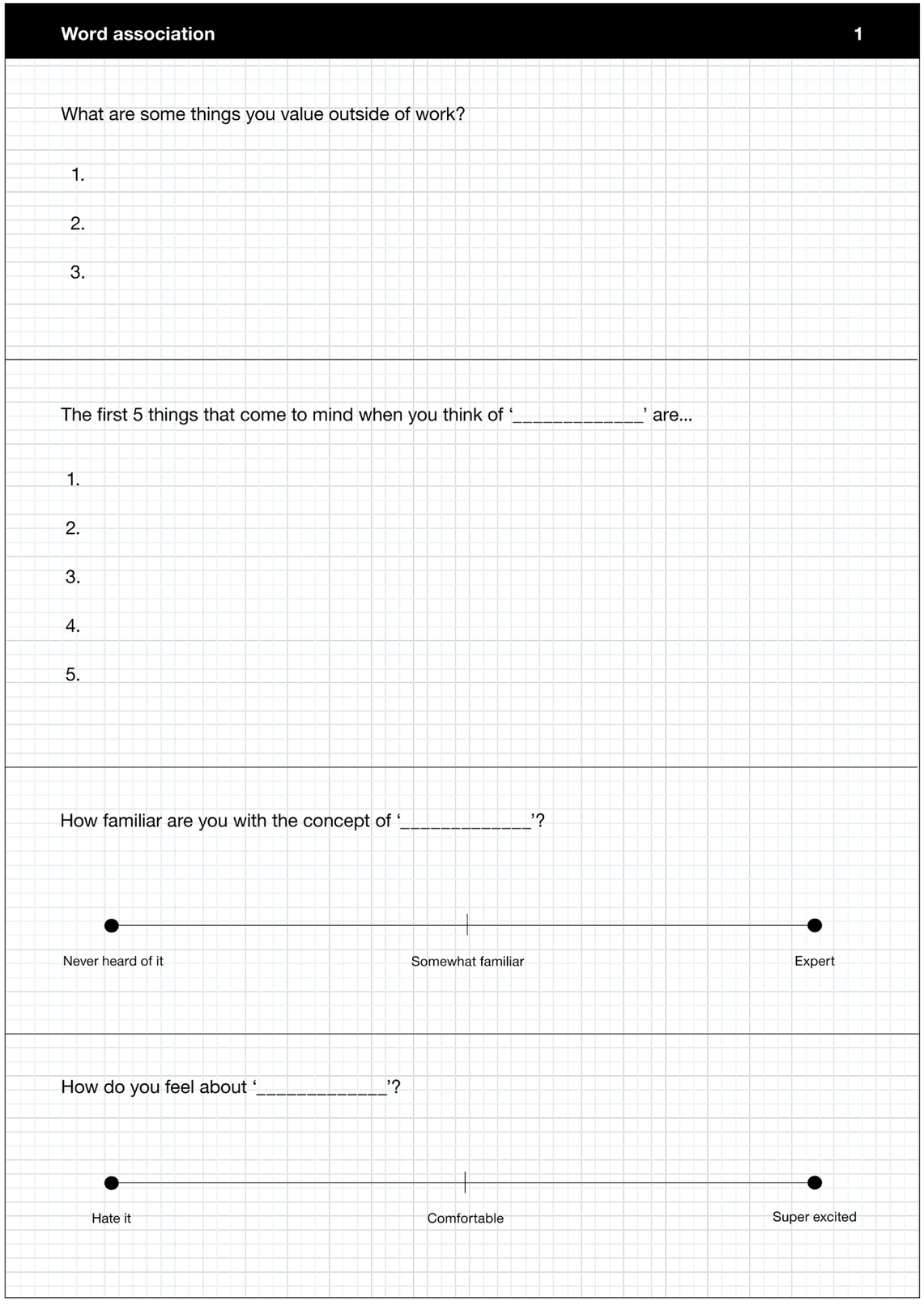


Fig. 43. *Word association activity,* digital image by author, 20 November 2021.

Visualisation 2

What does ‘_____’ mean to you?

Fig. 44. *Visualisation activity*, digital image by author, 20 November 2021.

Ideation tool

Use at the start of a workshop or project for future-oriented ideation about a topic. I used attitudes towards change and sustainability as axes to rationalise the space (Angheloiu). Works just like the ‘Opportunity Matrix’ activities used for the speculative workshops, instead of plotting the type of an idea, this ideation tool asks participants to consider possible implications and potential of an idea as they come up with it to prompt reflection. Best used in a large group. Facilitators need to emphasise this tool uses quantity over quality.

Fig. 43. *Ideation matrix*, digital image by author, 20 November 2021.

Future Canvas

Use in a speculative design workshop with pairs of participants. Assign a setting (place and year) and ask participants to choose and idea from the ideation matrix to build. Ask imagine a use situation with a persona. Finally, ask participants to fill in the scenario questions to detail their world. This ‘Future Canvas’ is based off iterations from my speculative design workshops.

Print the canvas as big as possible, preferably A2, so participants have space to draw, model and write.

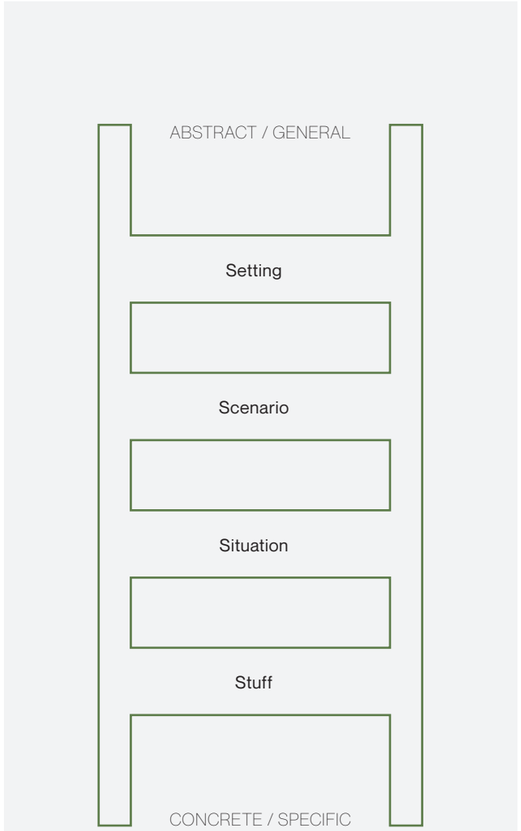


Fig. 44. *Future canvas outline,* digital image by author, 20 November 2021.

Players

- Who is involved in this scenario?
- What communities, organisations and institutions are included?
- What do they value and treasure the most?
- What do they fear?

Challenge

- What need, problem or pain is this scenario addressing?

Context

- Where is this scenario taking place?
- When in the future is this happening?
- What is the historical, socio-political and economic landscape like?

Mood and vibe

- How does this scenario feel and look?
- Describe the scene and ambiance?

Technology

- What technological advancements are impacting this scenario?
- What is the relationship between people and technology?

Trends and counter trends?

- What major trends, drivers and forces are shaping this world?
- What are the counter trends, reactions and responses to change?

Culture and values

- What are the cultural values and principles determining people’s behaviours?
- What does society value the most in this scenario?

The possibility

- Name the scenario and describe its potential.

Framing tool

Use at the start of a project and fill in together with everyone involved to establish the foundation of clear communication and refer back to it throughout the design process to ensure actions line up with the intent set out. Once completed, the “Framing tool’ can be used as a pre-read document for workshop participants. The tool is based off the extended brief document I created for the ‘Alternative Proteins’ case study.

Title	
Sponsor/s	
Description	
Point of difference or value	
Why are we doing this?	
Desired outcomes	
How can we accelerate towards our outcomes?	
Expected outputs	
Action or steps needed	
What does success look like?	
What does failure look like?	
Linkages or contributions to other projects	
Logistics	
Timeframe	
Key dates	
Who do we *need* to talk to?	
Who *should* we include?	
What is this project not?	
Expected risks and challenges	
Actions to minimise risks and challenges	

Fig. 45. *Framing tool,* digital image by author, 20 November 2021.

Retrospective template

Use at the end of workshop or task with your core team to reflect on things that went well, things that could have gone better, surprises, lessons to identify things to keep or change for future iterations. This Retrospective template is based of the questions i asked myself after every design task i carried out as part of this project. These questions can also be used to recap an important meeting and note key points with your team.

Things that went well	
Things that could have gone better	
Surprises	
Lessons	
Things to keep	
Things to change	
Additional notes	

Fig. 46. *Retrospective template,* digital image by author, 20 November 2021.

Conclusion

Conclusion

The ambition for agri-food system transformation and sustainability transitions from AgResearch can be supported through the use of design approaches like speculative design. Hopeful visions can compel strategic action towards sustainability transitions.

Supporting Change: Exploring the Potential of Speculative Design for Science Research worked within AgResearch to investigate the role of design in science research. The roles the designer played in this project range from facilitator, translator, a public and critical friend to science research. There is great potential for design and science collaboration to generate transformative science and science leading to transformation. However, there is still a lack of exploration into the area. This responded to the gap by testing a speculative design approach within AgResearch.

Further directions

A salient next step is to repeat the application of this process with the same group and topic to investigate if their idea of the future has changed due to the speculative design process they were involved in. It would also be valuable to include non-science research participants, as there is great value in including external perspectives to challenge current thinking.

Further exploration is also needed to understand better how design and designers can contribute throughout the whole duration of a science research programme or project in practice. In addition, an adjacent avenue to consider is how might diffuse design be promoted (design capability of all stakeholders and non-designers involved in the process) within design and science collaboration.

Recommendations for AgResearch

- Continued experimentation with design approaches throughout the full duration of programmes and projects to identify which design approaches are most suited to different phases and purposes.
- Embedding designers within the organisation to increase design literacy (especially navigating design jargon and ambiguity in the design process).
- Including designers in research teams to challenge thinking and provide alternative ways of doing research, similarly to how social scientists are embedded within AgResearch.
- Internal champions or advocates for design at a leadership level to increase participant trust and buy-in into the design process.
- Building in design principles to the current way of work, particularly engagement with the end-user to ensure the research meets the needs of those most affected.
- Increasing the internal design capability of AgResearch by establishing a ‘design space’ and multi-disciplinary design team.
- Offering design support for those interested in utilising design approaches as initial engagement with design can be overwhelming given the sprawling landscape of voices and fuzziness in methods.
- Creation of a standard design language and common terms, e.g. co-design means different things to different people at the moment.

(Tham and Jones 1)

“Although it is gratifying that the sustainability discourse has finally reached the public domain and corporate agendas, the journey towards transcending our current collective conditioning to short-termism, immediate revenues, and a narrow context of decision-making, still lies ahead. The scope of the challenge facing humanity demands imaginative and systemic action and a creative and auspicious organisation of human potentials and natural resources. It necessitates change that not only engages with the substitution of materials and processes, but that addresses the speed and scale of a producer and consumer culture.

The sustainability imperative thus invites the designer into more strategic and systemic territories, and into a more complex set of collaborations; working with other disciplines, with users, and with representatives of wider human and environmental concerns, than what ‘design as usual’ implies. It suggests the need for a design that invites its participants to operate with fluidity at a wide range of cognitive levels, and to cross-fertilise ideas of different levels of complexity.”

Massey University Ethics

This project has been evaluated by peer review and judged to be low risk. Massey University's College of Creative Arts has a blanket low-risk approval from the ethics committee. Consequently it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Professor Craig Johnson, Director (Research Ethics), email humanethics@massey.ac.nz.

Appendix A

AgResearch Ethics

Appendix B

agresearch
āta mātai, mātai whetū

Social Research Ethics Application

Applicant: Annie Wu

Application: #14.21

Approved: 22/04/21

Table of Contents

About ethical research and ethics approval

Please read the following before you complete the form

Research that involves human subjects or participants raises unique and complex ethical, legal, social and political issues. Research ethics is specifically interested in the analysis of ethical issues that are raised when people are involved as participants in research. There are three objectives in research ethics.

- protecting human participants;
- ensuring that research is conducted in a way that serves interests of individuals, groups and/or society as a whole;
- examining specific research activities and projects for their ethical soundness.

Knowing what constitutes ethical research is important for all people who conduct research projects or use and apply the results from research findings. All researchers should be familiar with the basic ethical principles and have up-to-date knowledge about policies and procedures designed to ensure the safety of research subjects and to prevent sloppy or irresponsible research, because ignorance of policies designed to protect research subjects is not considered a viable excuse for ethically questionable projects. Therefore, the duty lies with the researcher to seek out and fully understand the policies and theories designed to guarantee upstanding research practices.

Researchers and research project leaders should consider ethics issues throughout the lifecycle of a research project and promote a culture of ethical reflection, debate and mutual learning. The lifecycle of research includes the planning and research design stage, the period of funding for the project, and all activities that relate to the project up to – and including – the time when funding has ended. This includes knowledge exchange and impact activities, the dissemination process – including reporting and publication – and the archiving, future use, sharing and linking of data.

The social research ethical review process of AgResearch Limited is within the guidelines of the Code of Ethics developed by the New Zealand Association of Social Science Researchers. This Code of Ethics emphasises informed consent; freedom from coercion to participate; individual privacy; confidentiality; and sensitivity to participants' circumstances.

This social research ethics approval application is not a peer-review process to ensure quality research.

1. Application Form

Date: 1/04/2021

Project Manager: Helen Percy

Contact details of Project Manager: Helen.Percy@agresearch.co.nz

Study/research/project Title: Supporting Change: Design at the Intersection of Science, Technology and Innovation, a Master of Design project within Agri-STAR (Sustainability Transitions Action Research).

2. Abstract

Provide a brief summative outline of the proposed study.

There is a need for science organisations to change the way they are working. That is, greater levels of integration are required between different disciplines and stakeholders, and big system transformations are needed rather than incremental change. This is a fundamental change to the science model and comes with a large amount of jargon and new ways of working.

As part of the AgResearch Agri-STAR programme, this Master of Design project is about understanding the role of design and designer within AgResearch. This study will explore how design-led approaches to working can support transformational research change and research leading to transformation. It proposes to test a solution space where participants become designers themselves to co-explore desirable futures through a speculative design process. Alternative Proteins will be used as a case study for this, as AgResearch is currently is developing strategy for this space, envisaging future scenarios beyond the current frame of thinking can be used as a starting point.

A series of three half-day workshops will be run to develop experimental research methods for collaboratively prototyping, experiencing and impacting future scenarios with staff at AgResearch. Workshop outputs include a summary of notes and scenarios generated from the workshop for the Alternative Proteins project. Following on from the workshops, 5-10 semi-structured interviews will be conducted internally to gain insight to how design and designer is perceived within science research organisations such as AgResearch. Interview outputs include transcripts and a report for the Agri-STAR programme. All workshop outputs from this study, including the developed methods and processes, will be packaged into a toolkit and guide for AgResearch and published as part of a Master of Design exegesis by the researcher. The study being undertaken may also be drawn upon for academic and scientific publications, as well as presentations.

3. About the study

- *Outline the purpose of the study*

The purpose of this study is to explore the role of design and designer within the context of science research. The primary objective is to test a novel design-led approach to working through workshops. A secondary objective is to gain insight into how design is perceived within the organisation through interviews. This will contribute to a broader Master of Design project objective of providing a situated example of design within an alternative design space, such as a science research organisation.

- *Briefly describe the methodology*

We will use qualitive research methods with a mix of face to face and virtual interaction (workshops and interviews).

A series of three workshops will be run internally with the Alternative Proteins project to envisage future scenarios through a speculative design process. The scenarios generated will be used to support the development of strategy for Alternative Proteins.

A workshop method is appropriate for this context as it allows the participants to work collaboratively. The workshop run-sheets will be peer reviewed by the project manager (Helen Percy). A summary of notes and scenarios generated from the workshop will be circulated to the participants following the workshop. Participants will be given the opportunity to review the notes via email within 14 days of receiving the notes.

Following on from the workshops, approximately 5-10 interviews will be conducted with AgResearch employees to gain insight into how design is perceived within a science research organisations and sustainability transitions research. The interviews will be semi-structured with a duration of 30 minutes to 1 hour. Interviews will be recorded and transcribed. Participants will be given the opportunity to review their transcript via email within 14 days of receiving the transcript.

- *State whether questionnaires, workshop designs etc. will be peer-reviewed internally*

All questions and approaches used in either workshops or interviews will be reviewed by the project manager (Helen Percy) and a member of the Consumer Food Systems team (Penny Payne).

- *Name key individuals/staff involved*

Helen Percy (Project Manager) will provide support and supervision internally, alongside Anna Brown and Jo Bailey (Master of Design supervisors from Massey University).

Annie Wu (Master of Design student) will design and conduct the workshops, analyse transcripts for themes and write-up results.

- *Provide details of how research participants (farmers usually) will be selected and involved*

Participants will be AgResearch science staff, who are spread across three campuses. Individuals will first be selected by the team developing strategy on Alternative Plant Proteins (Cameron Craigie, Helen Percy, Emma Birmingham and Scott Hutchings) and asked if they would like to participate. Participants chosen are from diverse disciplines, different levels of the science structure and based off their interest in Alternative Proteins and/or ability to contribute at a strategic level to future visioning workshops. Potential participants will be invited through email to a workshop or interview either in a face-to-face setting or via Microsoft Teams, depending on location. Participation is voluntary.

- *Detail any specific instructions or preparation that the participants may be required to perform prior to participation*

No prior preparation is required for participants in any stage of the research.

4. Describe how informed consent will be handled

Potential participants will be informed about the research project as a whole, and the element they are being asked to participate in particular, and of their rights regarding refusal to participate or refusal to answer any individual question. For the workshops, informed consent will be sought with written consent at the start of workshops. For the interviews, informed consent will be sought prior to the interviews via email.

Note: Informed consent must contain the following information:

- Information about the nature and purpose of the research;
- A statement that participation is voluntary, including the choice to opt out of the research at any time;
- Information about the data collection method and the option to agree/refuse to being recorded (if applicable);
- A description of the extent to which confidentiality will be maintained and an option to choose anonymity;
- A description of any possible risks or discomforts to the participant;
- A description of any possible benefits to participant or others;
- Contact details for any questions about the research;
- An option to agree or refuse to participate (signature of participant, date, signature of witness/researcher);
- A description of the intended uses, and disposal/storage/access and documentation procedures for data including an option to agree/disagree with these procedures.

5. Benefits, risks and safety

- Describe any benefits that the researcher expects.

This research should aid in identifying future roles of design and designer within the organisation. Benefits to the researcher include collecting data that will inform a Master of Design exegesis.

- Identify any possible discomforts that may be part of the study e.g. there may be difficult or personal questions that cause fear or stress.

There is a very low risk of discomfort being caused from this study.

- If discomforts have been identified, indicate how the situation will be handled (for example an offer of assistance will be made).

Participants will be informed they don't need to answer any questions or participate in any activity they do not wish to. They can choose to answer in less detail if they are concerned that their anonymity may be compromised. Participants are being facilitated and interviewed by a student who understands the context, to ensure that the information is handled appropriately.

6. Cultural issues

- State whether Maori and/or other cultural groups will be involved (name those groups).

We will not be involving any Maori or cultural groups as part of this study.

- Indicate how potential cultural issues will be prevented and if they should occur, how they will be addressed.

It is unlikely that any cultural issues will be encountered in this study. All potential participants will be treated with respect and differences in viewpoints will be welcomed. Representatives of the AgResearch's Māori research team (including Tamara Mutu, as Pou Rangahau) and the Mātai Ahuwhenua tema will be invited to the workshops. If any cultural issues arise the Pou Rangahau will be consulted on the most appropriate action to take moving forward.

7. Compensation

- Disclose all financial implications for participants including payment of expenses or fees, and explain any compensation or indemnity arrangements as arranged through the National Manager - Campus Services.

There are no financial implications for any participants.

8. Research participation

- Describe how research participation will be managed. In the box directly below is an example of how participation could be managed.

Participation will be entirely voluntary (participants' choice). If individuals choose not to take part this will have no effect on them in any way. They are free to withdraw from dedicated research activities (e.g., workshops or interviews) at any time, without giving a reason and this too will not disadvantage them; however, they will be informed that once they have completed the activities and their responses have been included in the project outputs, we will not have the ability to change the results or outputs.

9. Confidentiality

- Outline how data of the participants will be handled, stored and disposed of. Briefly describe how confidentiality will be managed. (The following bullet points are examples of how confidentiality could be managed)

  - ✓ No material which could personally identify participants will be used in any reports on this study.
  - ✓ Only the investigators involved in this project will be able to access the information.
  - ✓ At the end of the project computer data files will be kept in secure storage for a minimum of 7 years, as required by Archives NZ, and may be destroyed thereafter.
  - ✓ Any database records will be retained with restricted access.

Participants will be anonymous in all project outputs. Workshop outputs include a summary of notes and scenarios generated from the workshop for the Alternative Proteins project. Interview outputs include transcripts and a report for the Agri-STAR programme. All workshop outputs from this study, including the developed methods and processes, will be packaged into a toolkit and guide for AgResearch and published as part of a Master of Design exegesis by the researcher.

No identifying information will be included, but due to the small number of participants at each campus, it is possible that some individuals may be identified by those familiar with the project. Quotes and themes will not be specifically associated with participating individuals. All internally and externally shared information will be anonymous. Only the investigators involved in this project will be able to access the information. At the end of the project computer data files will be kept in secure storage for a minimum of 7 years, as required by Archives NZ, and may be destroyed thereafter. Any database records will be retained with restricted access.

10. Results

Describe if and how results may be provided to participants and if feedback will be sought from them.

Workshop participants will be given the option of receiving a summary of notes and the scenarios generated from the workshops. Interview participants will be given the option of receiving their transcript and the report from the interviews. Feedback will be sought through email upon sharing the outputs with both workshop and interview participants. Participants have 14 days to review and provide feedback.

All outputs from this study, including the developed methods and processes, will be published as part of a Master of Design exegesis. Draft versions of the exegesis will be shared with the project manager (Helen Percy) and academic supervisors (Anna Brown and Jo Bailey) for feedback before being submitted to Massey University.

The study being undertaken may also be drawn upon for academic and scientific publications, as well as presentations.

11. Statement of approval

This study/project has been approved by: _Margaret Brown_____

Social Research Team Leader / Delegate

Date: 22/04/21

Appendix 1: Participant Information Sheet for Workshops

Participant Information Sheet for Workshops
Supporting Change: Design at the Intersection of Science, Technology and Innovation

What is this research about?

There is a need for science organisations to change the way they are working. That is, greater levels of integration are required between different disciplines and stakeholders, and big system transformations are needed rather than incremental change. This is a fundamental change to the science model and comes with a large amount of jargon and new ways of working.

As part of the AgResearch Agri-STAR programme, this Master of Design project is about understanding the role of design and designer within AgResearch. This study will explore how design-led approaches to working can support transformational research change and research leading to transformation. It proposes to test a solution space where participants become designers themselves to co-explore desirable futures through a speculative design process. The Alternative Proteins project will be used as a case study for this, as AgResearch is currently is developing strategy for this space, envisaging future scenarios beyond the current frame of thinking can be used as a starting point.

A series of three half-day workshops will be run to develop experimental research methods for collaboratively prototyping, experiencing and impacting future scenarios with staff at AgResearch. Workshop outputs, including notes and scenarios generated, will be shared with the Alternative Proteins project. Following on from the workshops, 5-10 semi-structured interviews will be conducted internally to gain insight into how design and designer are perceived within science research organisations such as AgResearch. Interview outputs, including transcripts and a report, will be shared with the Agri-STAR programme. All workshop outputs from this study, including the developed methods and processes, and final report from the interviews, will be fully anonymised and packaged into a toolkit and guide for AgResearch and published as part of a Master of Design exegesis by the researcher. The study being undertaken may also be drawn upon for academic and scientific publications, as well as presentations.

What does the research involve?

- This will involve answering questions and participating in activities, however your participation is entirely voluntary and you can decline to answer any questions or participate in any activity. You may also leave at any time. If you change your mind about taking part, you may contact us within 14 days of the workshop to request that your responses be removed from the research.
- Data from the workshops will be collected in the form of activity responses. These responses will remain anonymous in the final report we produce. You have the option of requesting a copy of the anonymised responses from the workshop and commenting within 14 days of receiving the responses via email. Please email Annie at Annie.wu@agresearch.co.nz if you wish to obtain a copy of the responses for comment.
- Only the investigators involved in this project will be able to access the information. At the end of the project, computer data files will be kept in secure storage for a minimum of 7 years, as required by Archives NZ, and may be destroyed thereafter. Hard copies of information will be kept secure during the project and the either archived or destroyed.

If you have any questions or comments about this workshop or the research, please do not hesitate to contact us.

Annie	Annie.wu@agresearch.co.nz	+64210697010
Helen	Helen.percy@agresearch.co.nz	+6478385107

Human Research and Ethical Conduct

Appendix 2: Participant Information Sheet for Interviews

Participant Information Sheet for Interviews
Supporting Change: Design at the Intersection of Science, Technology and Innovation

What is this research about?

There is a need for science organisations to change the way they are working. That is, greater levels of integration are required between different disciplines and stakeholders, and big system transformations are needed rather than incremental change. This is a fundamental change to the science model and comes with a large amount of jargon and new ways of working.

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What does the research involve?

- This will involve answering questions, however your participation is entirely voluntary and you can decline to answer any questions. You may also leave at any time. If you change your mind about taking part, you may contact us within 14 days of the interview to request that your responses be removed from the research.
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- Only the investigators involved in this project will be able to access the information. At the end of the project, computer data files will be kept in secure storage for a minimum of 7 years, as required by Archives NZ, and may be destroyed thereafter. Hard copies of information will be kept secure during the project and the either archived or destroyed.

If you have any questions or comments about this interview or the research, please do not hesitate to contact us.

Annie	Annie.wu@agresearch.co.nz	+64210697010
Helen	Helen.percy@agresearch.co.nz	+6478385107

Appendix 3: Informed Consent Form for Workshops

Informed Consent for Workshop

Design Workshop

Supporting Change: Design at the Intersection of Science, Technology and Innovation

by Annie Wu

This form is to confirm with you that:

- You have received a copy of the Participant Information Sheet with researcher contact details.
- The research has been fully explained to you and you have had the opportunity to ask any questions you might have.
- You understand that the research is entirely voluntary, you can cease participation at any time, and you may withdraw your responses up to 14 days after this workshop. Please email Annie at Annie.wu@agresearch.co.nz if you wish to withdraw.
- You acknowledge that this workshop will not be recorded.
- You may request a copy of the anonymised responses from the workshop to comment on if you wish to do so. Please email Annie at Annie.wu@agresearch.co.nz if you wish to obtain a copy of the anonymised responses for comment. You will have up to 14 days upon receiving anonymised responses for comment.

If you understand and accept these conditions for participating in this workshop, please sign here:

Full name: _____

Email: _____

Signature: _____

Date: ___ /___ /___

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Appendix 4: Informed Consent Form for Interviews

Informed Consent for Interview

Role of Design and Designer

Supporting Change: Design at the Intersection of Science, Technology and Innovation

by Annie Wu

This form is to confirm with you that:

- You have received a copy of the Participant Information Sheet with researcher contact details.
- The research has been fully explained to you and you have had the opportunity to ask any questions you might have.

  You understand that the research is entirely voluntary, you can cease participation at any time, and you may withdraw your responses up to 14 days after this interview. Please email Annie at Annie.wu@agresearch.co.nz if you wish to withdraw.
- You are happy to be recorded, acknowledging that these recordings will be transcribed and will remain with the researcher
- You may request a copy of the transcript from your interview to revise and amend if you wish to do so. Please email Annie at Annie.wu@agresearch.co.nz if you wish to obtain a copy of your transcript for review. You will have up to 14 days upon receiving transcript for review.

If you understand and accept these conditions for participating in this interview, please sign here:

Full name: _____

Email: _____

Signature: _____

Date: ___ /___ /___

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Visualisation Activity Test
Documentation

Appendix C

Alternative Proteins

The first 3 things that come to mind are...

Mushrooms

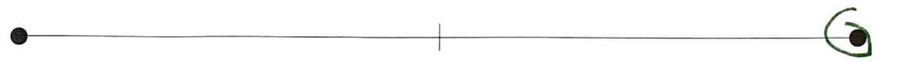
Lab grown

Umami

I am a fungi box and to me, it looks like...

How familar am i with this concept?

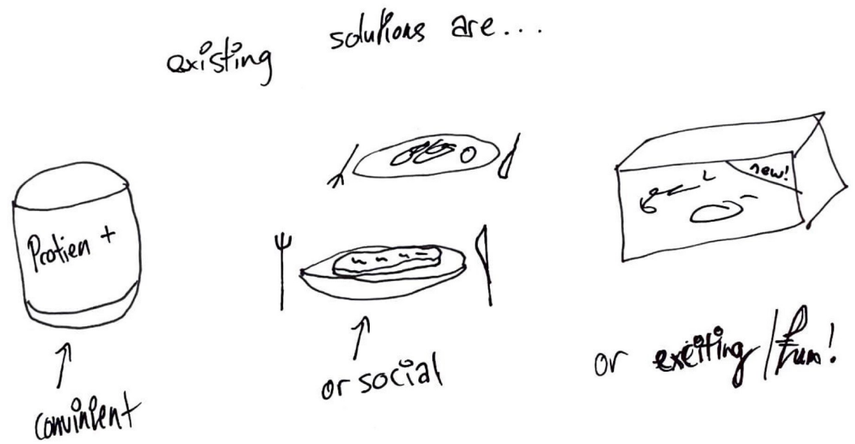
How do i feel about this concept?



Alternative Proteins

The first 3 things that come to mind are...

I am a vegan ♡ and to me, it looks like...



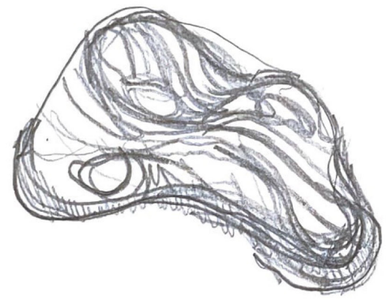
How familar am i with this concept?

How do i feel about this concept?

Alternative Proteins

The first 3 things that come to mind are...

I am a _____ and to me, it looks like...



How familar am i with this concept?

How do i feel about this concept?

The first 3 things that come to mind are... tofu, tempeh, pea protein

I am a woman and to me, it looks like...

the soy proteins = tempeh, tofu } take on flavours earthiness

How familar am i with this concept?

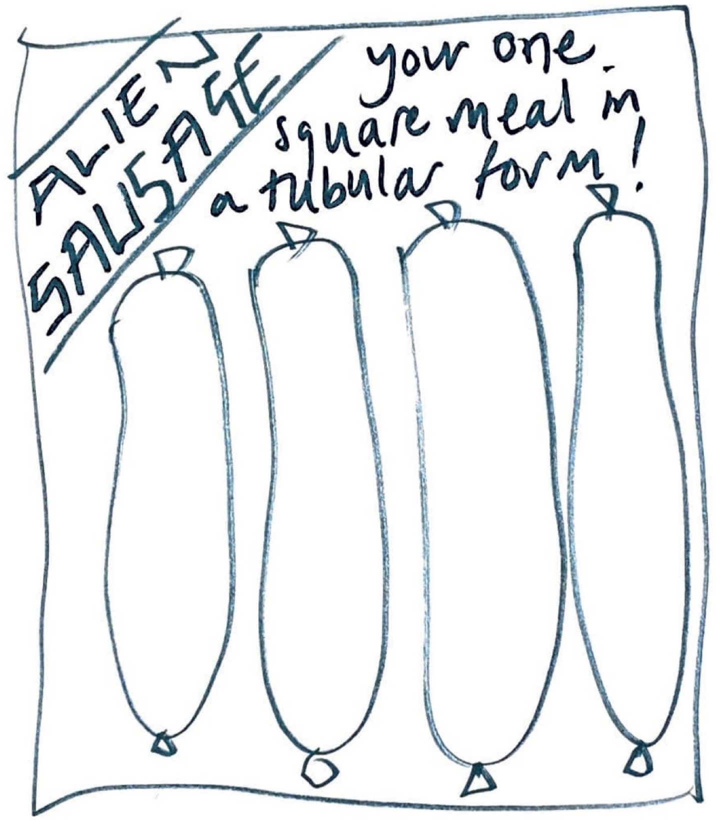
Never heard of it — I talk about this all the time

How do i feel about this concept?

Hate it — Super excited

The first 3 things that come to mind are... space food in a silver wrapper, lumps of tofu, 3D printed sausages

I am a designer and to me, it looks like...



How familar am i with this concept?

Never heard of it — I talk about this all the time

How do i feel about this concept?

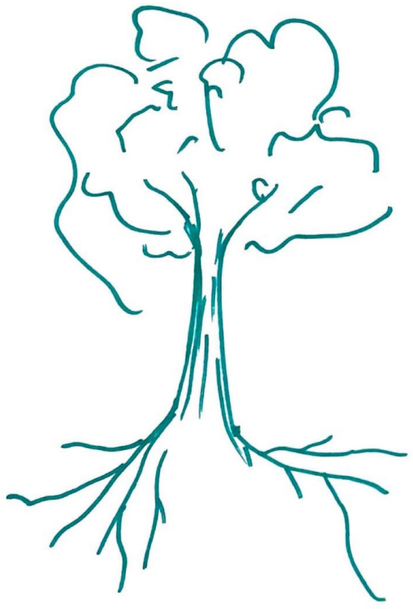
Hate it — Super excited

Alternative Proteins

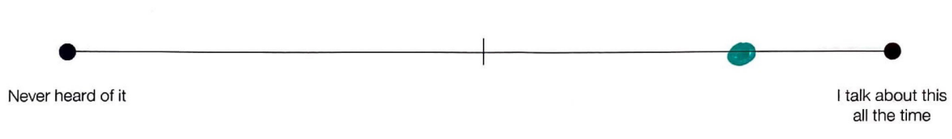
The first 3 things that come to mind are...

Sustainability. Animal welfare. CHANGE

I am a Creative dreamer / spatial designer and to me, it looks like...



How familar am i with this concept?



How do i feel about this concept?

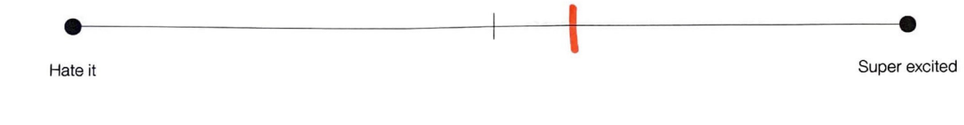
Alternative Proteins

The first 3 things that come to mind are... NOT MEAT FOR HEALTHY DIET SUPS!

I am a DESIGN STUDENT and to me, it looks like...

How familar am i with this concept?

How do i feel about this concept?

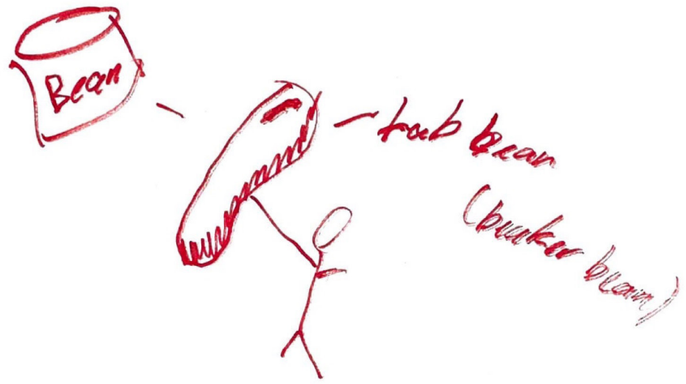


The first 3 things that come to mind are...

Lentils

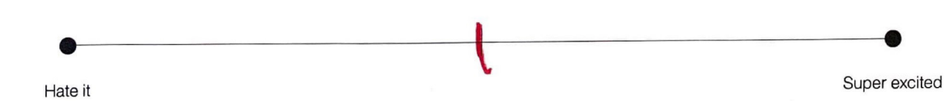
Protein Powder

I am a _____ and to me, it looks like...



How familar am i with this concept?

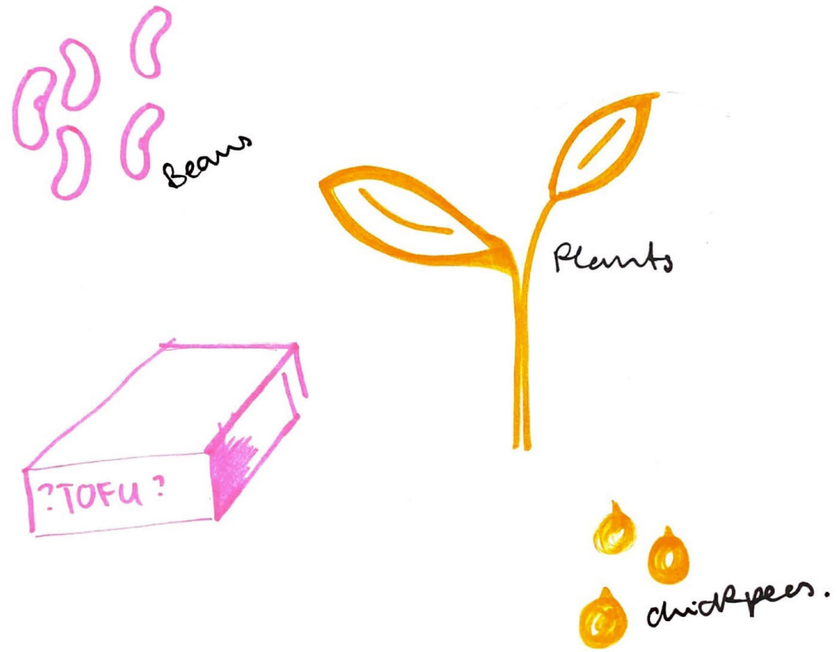
How do i feel about this concept?



The first 3 things that come to mind are...

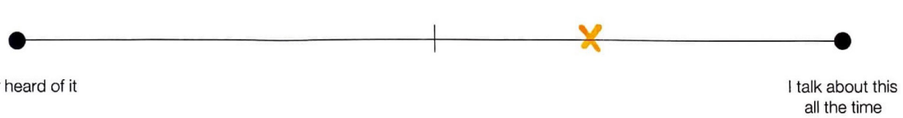
Plants , natural , non-chemically

I am a _____ and to me, it looks like...



↳ new proteins built from combining natural things.

How familar am i with this concept?



How do i feel about this concept?

Pilot Workshop Documentation

Phase	Activity	Description	Materials	Duration
Introduction	Introduction	Introduction	Powerpoint	10 mins
	Worksheet	1. Think of some roles you play in everyday life 2. Word association 3. Mark an X with the sliders 4. Share your last 3 words around the table	Worksheet	5 mins
Map	Doodle	Doodle what does 'alternative proteins' means to you, try use words and pictures	Worksheet	15 mins
	Wall gallery + Definition	Look at what each other's worksheets - What are some commonalities we are seeing? - What is particularly interesting? Define what do we mean by alterative proteins? - What are the values that underpin it?	Blutac, paper on table, pens	30 mins
	Ocean of opportunity 1	1. Matrix: Current Alternative Protein space 2. Identify opportunity areas and stakeholders		20 mins
Multiply	Vision Ladder	Vision Ladder (individual) Discuss and create a broad guiding vision: no nitty gritty		30 mins
Break				20 mins
Multiply	Futures Ladder Canvas	1. Introduce Futures Ladder: setting and scenario (with vision ladder) 2. Ocean of Opportunity 2: Matrix: Future of Alternative Proteins situations 3. Spilt into pairs and choose an idea off the matrix 4. Identify the location and commodity	Futures Ladder Canvas, light clay	30 mins
		Brainstorm people in the situation: create write down a persona		5 mins
		Rapid ideation in response to the situation		5 mins
Mediate		1. Pretotype an idea: keep in mind, there are no constraints 2. Annotate it: think about the size, shape, colour, texture, taste, storage, cooking, cultural connotations, production... 3. Describe how you experience it or how you use it 4. Landscape of possibility cards (situation)		30 mins
Mount	Exhibition	Walk around		10 mins
Reflection	Discussion	Discuss the scenarios, how might this affect the role of science?		25 mins
	Survey		Feedback survey	5 mins

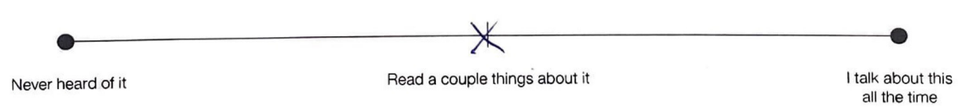
Appendix D

I am a .... Neuroanatomy Masters Student
Flatmate
`Flexitarian'
Person who likes being outside
Person who enjoys 'natural living'
Consumer. (hopefully conscious)

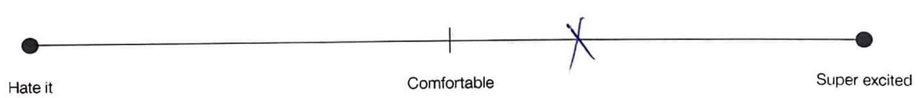
The first 10 things that come to mind when i think of 'Alternative Proteins' are...

1. Beans
2. Fake mince
3. Vege sausages
4. Tofu based products (LOTS of soy)
5. Powders? eg. nutritional protein powders (plant based)
6. Chickpeas.
7. Lord of the Fries
8. Vegan/Vegetarian, ~~diet~~
10. Are alternative proteins lower in carbon emissions? Eg. production + shipping? ~~Are~~

How familar am i with the concept of 'Alternative Proteins'?



How do i feel about 'Alternative Proteins'?

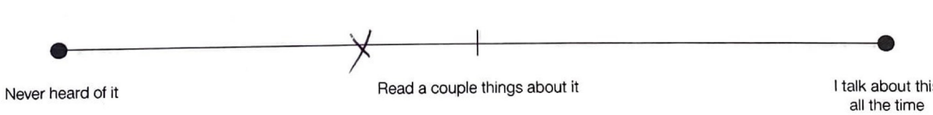


I am a .... person who has studied communication but beyond that I am a socialiser! I enjoy spending time with friends - Being around more vegetarians recently has opened up my mind to be more of a conscious eater. I am a consumer and I am sometimes hyper aware about my consumption.

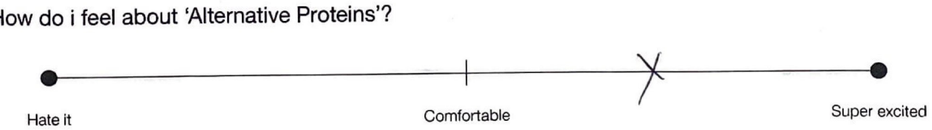
The first 10 things that come to mind when i think of 'Alternative Proteins' are...

1. Soy
2. Copying
3. interesting textures
4. an unknowing of what I'm actually eating (sometimes)
5. unawareness in general
6. Quorn
7. Aunty Menas
8. Beetroot patties
10. Something I wish I knew more about tbh!

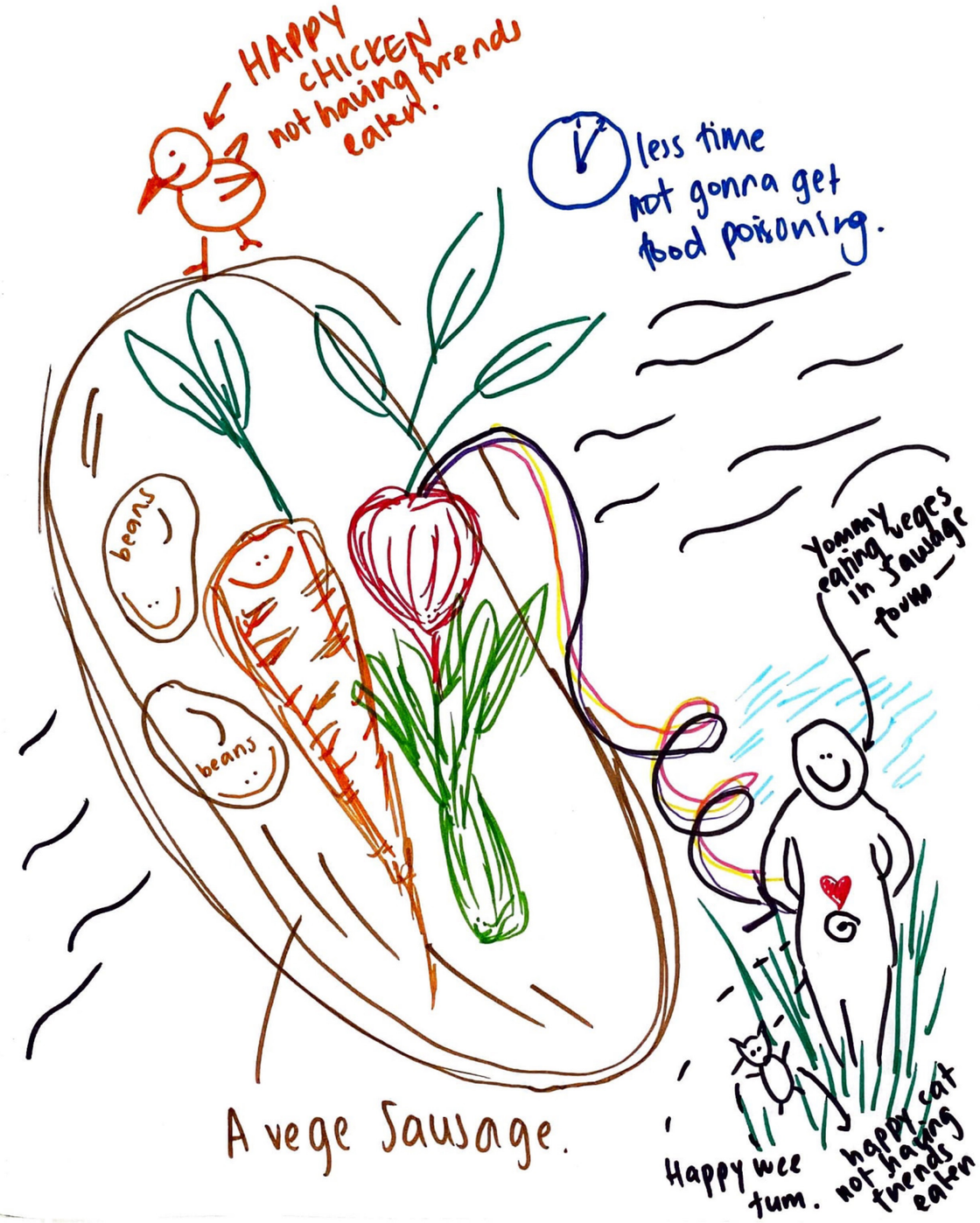
How familar am i with the concept of 'Alternative Proteins'?



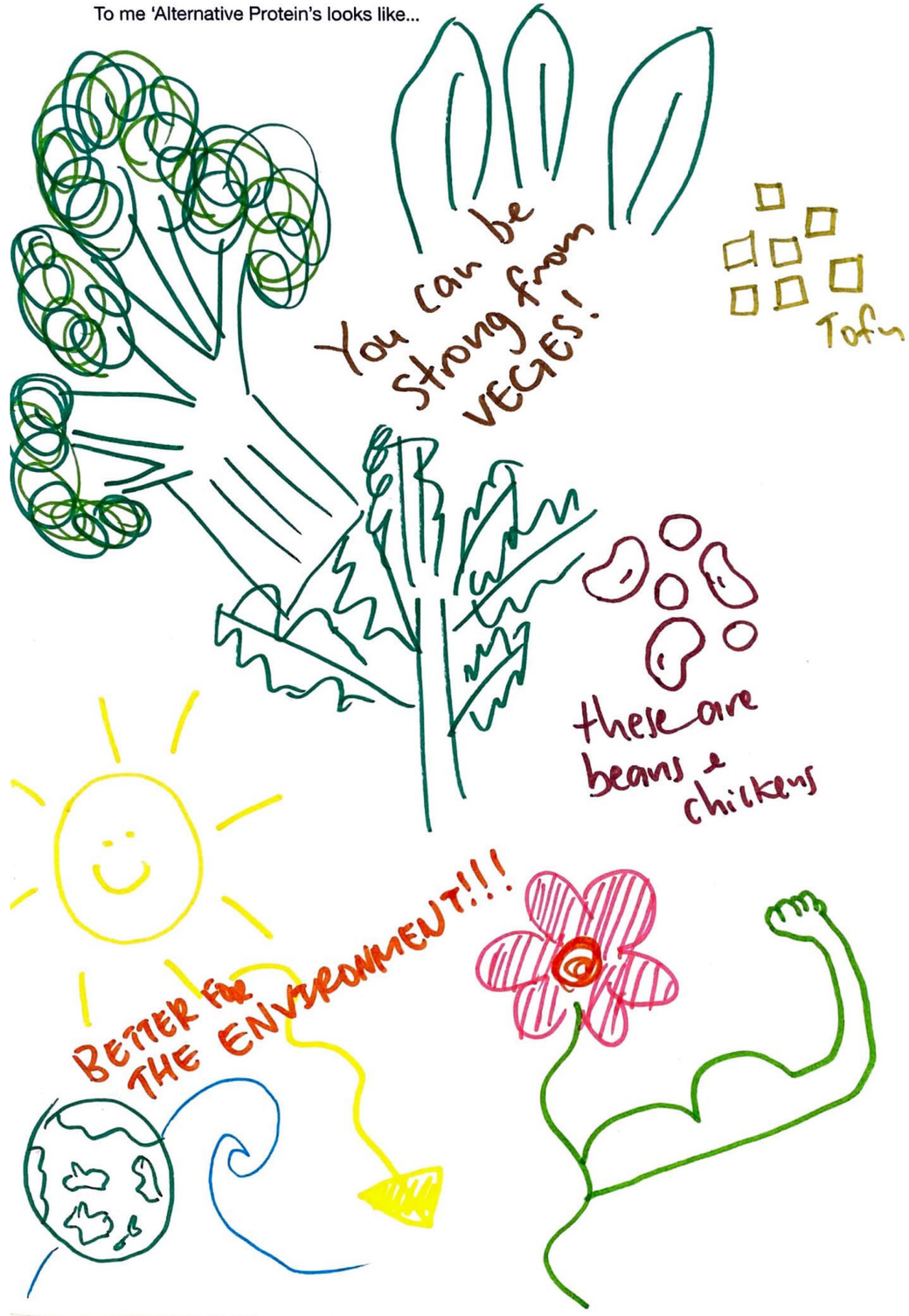
How do i feel about 'Alternative Proteins'?



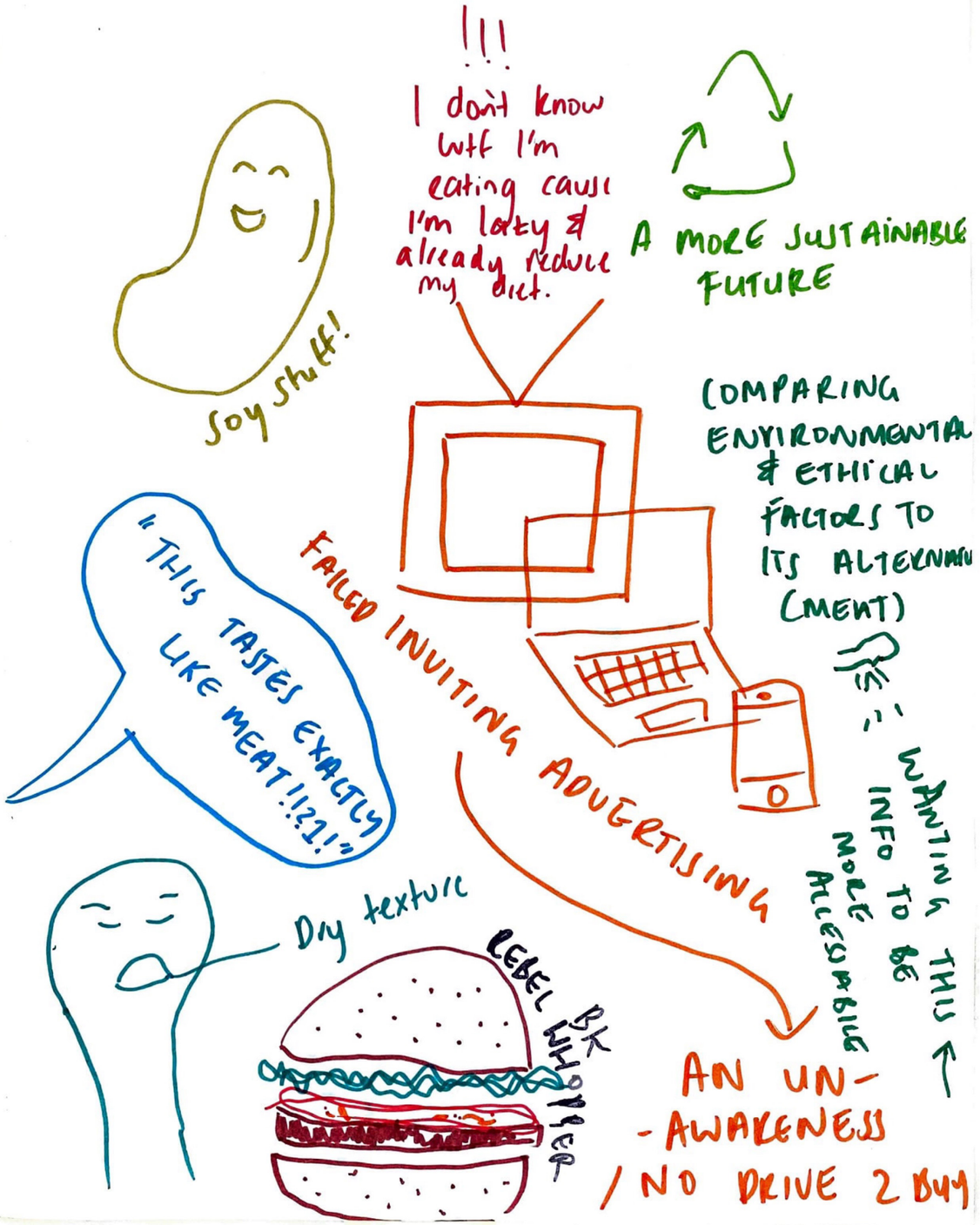
To me 'Alternative Protein's looks like...



To me 'Alternative Protein's looks like...



To me 'Alternative Protein's looks like...



What do we mean by Alternative Proteins?

Replacement for meat

A more sustainable option than meat

Another way to get protein

Alternative way of production or alternative product?

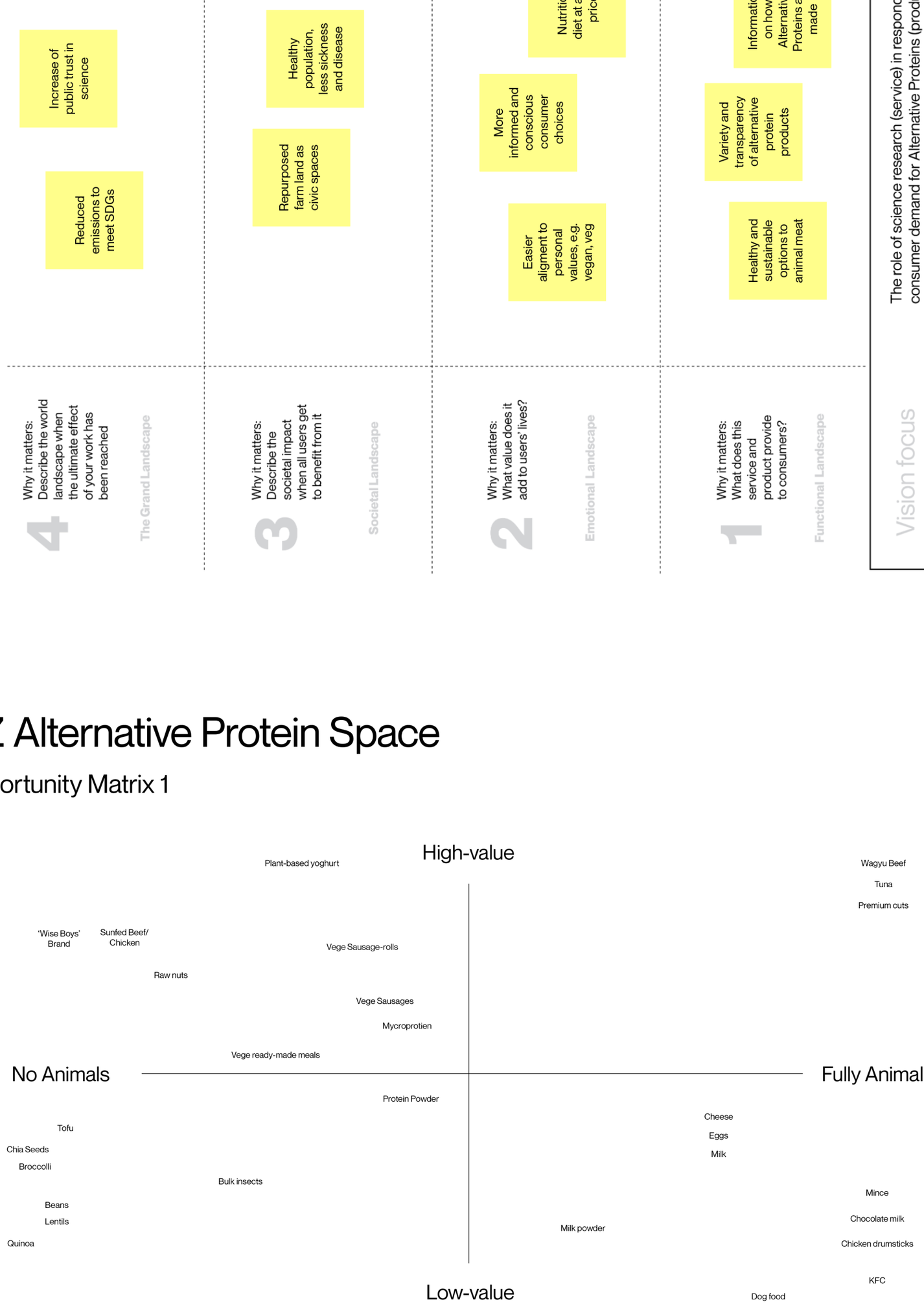
It's not inviting enough to make the switch

The thought/ fear of it being unnatural

Unethical? e.g. lab stuff

NZ Alternative Protein Space

Opportunity Matrix 1



4 Why it matters: Describe the world landscape when the ultimate effect of your work has been reached

The Grand Landscape

Reduced emissions to meet SDGs

Increase of public trust in science

3 Why it matters: Describe the societal impact when all users get to benefit from it

Societal Landscape

Repurposed farm land as civic spaces

Healthy population, less sickness and disease

2 Why it matters: What value does it add to users' lives?

Emotional Landscape

Easier aligment to personal values, e.g. vegan, veg

More informed and conscious consumer choices

Nutritious diet at a fair price

1 Why it matters: What does this service and product provide to consumers?

Functional Landscape

Healthy and sustainable options to animal meat

Variety and transparency of alternative protein products

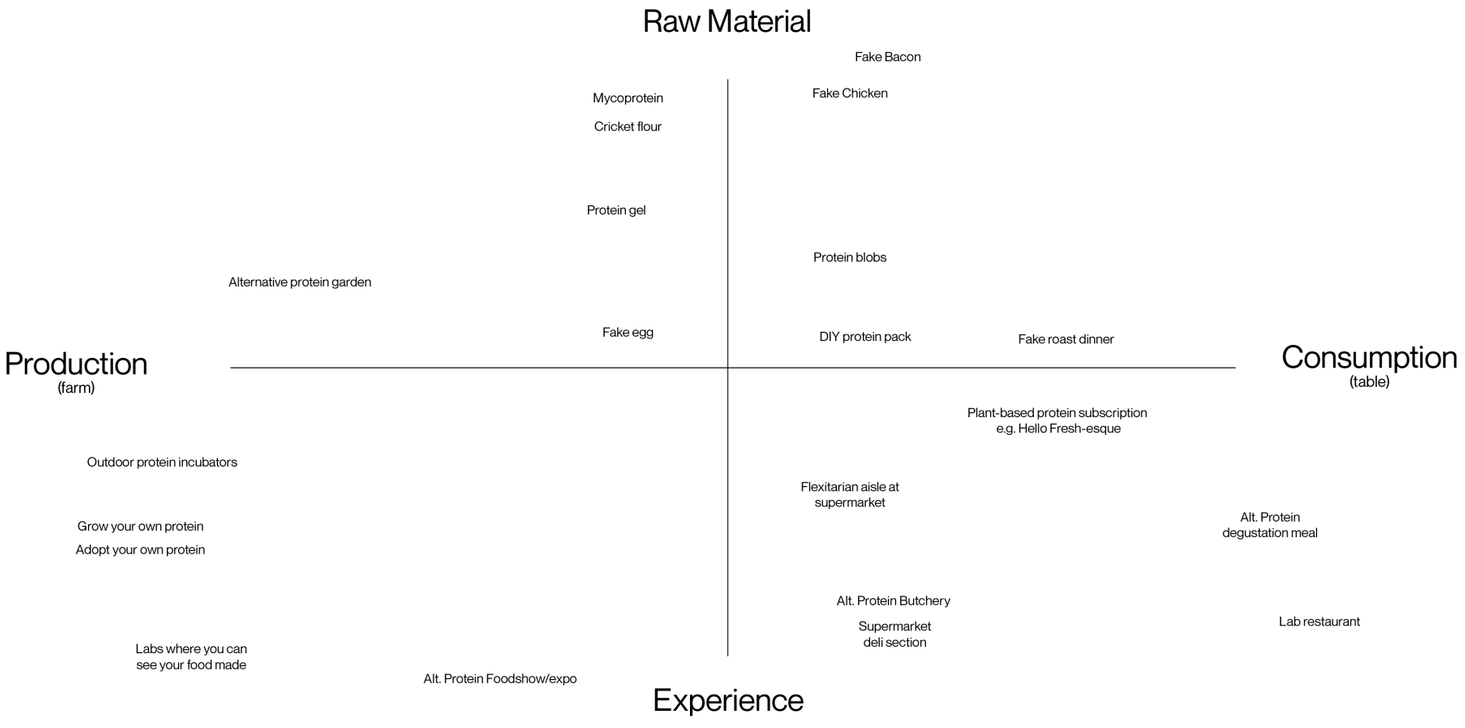
Information on how Alternative Proteins are made

Vision focus

The role of science research (service) in responding to consumer demand for Alternative Proteins (product)

Global Futures of Alternative Proteins

Opportunity Matrix 2



Setting

2041 in NZ | Collapse | Continuum | Growth | **Transformative**

Scenario

Situation

Lab, restaurant,

Service to/and experience

Consumer: 20-25 year old female flexiterian

Big push to be conscious consumers—a way to connect us to where our food is from

Stuff

A way alt. proteins can be made that is like cooking

History of lab food

Fancy waitress with chefs hat serves you a 10-course meal that explains how it's made and where ingredients come from

No sterile enviroment—no lab coats

Friendly and patient wait staff

Loyalty card

Deserts that are light and easily digested

Yummy menu

Big glass windows to see friendly people making alt. proteins

Similar to style to Best Ugly Bagels where you can see what's in it

Free cold water

Thing

Serving edible protein blobs, food is in what ever shape, size and colour you want. Everything is customisable, including the flavour.

People from all walks of life eat here, it is not exclusive.

This is a lab foodcourt. You can order anything and they will make it in front of you!

Chefs with the big white hats make the food behind glass screens. The stoves and ovens either super small or mega sized

Culture + Values

5

What are the cultural values and principles determining people's behaviours and conducts?

Empathy/kindness/understanding, oneness with enviro, shift in eurocentrism, break down of cultural barriers

What does society value the most in this situation?

Enviroment > money

Context

2

Where is this situation taking place?

In a lab restaurant in NZ

When in the future is this happening?

20 years in the future

What is the historical, sociopolitical and economical landscape like?

Melting pot of people, skews left politically, boosted economy, lots of refugees, social reckoning with enviromental crisis which brought the left and right together

Mood + Vibe

7

How does this situation feel and look?

Comfortable, accessible, normalised

What are its emotional qualities?

Sense of belonging, comfort and connection

Describe the scene and ambience.

Players

1

Who is involved in this situation?

People who love food!

What communities, organisations and institutions are being included?

Diverse communities

What do they value and treasure the most?

What do they fear?

The Possibility

0

Name the situation and describe it's potential

- Push towards enviromentalism
- Gen Z have kids—raising more conscious consumers
- More connected world, more possibilities to collaborate with food people, new gens more experimental with food trying new flavour combos
- Room for authority to influence food
- Traditional notion of food changed
- People more concerned with food being healthy, more health research shoes how diet influences us
- Mindful eating, discussing food choices

Trends + Counter Trends

4

What major trends, drivers and forces are shaping the world?

Mindful eating, push for connection to food, organic, globalisation, empathy, gender equality, climate refugees

What are counter trends, reactions and responses to these changes?

- Increase of people seeking natural alternatives
- scrutiny about the food chain
- hunter gatherer diet
- farmers and agriculture uprising
- intensified population and cities

Challenge

3

What need, problem or pain is this situation addressing?

Climate crisis, climate health, classism and poverty

What are some assumptions and beliefs that underpin this situation?

- Still some animals
- Still social classes, even though the poverty gap is smaller
- Change of meal time
- Unification against climate change
- People are open to new protein sources
- New generation want change

Technology

6

What state-of-the-art technological advancements are impacting this situation?

Lab food and processing

What is the relationship between people and technology?

Symbiotic relationship

Implications

What are the implications of this scenario, situation, stuff, thing?
How does this affect the role of AgReseach?

Lincoln Workshop Documentation

Appendix E

Time	Activity	Materials	Duration (mins)
9:00	Intro	Info sheet, consent form, Power point	10
9:10	Word Association	Worksheet, pens	5
9:15	Visualisation	Worksheet, felts	15
9:30	Definition	Blutac/tape, paper, pens	15
9:45	Opportunity 1	Canvas, post-it notes	15
10:00	Vision	Worksheet	30
10:30	Break	Biscuits	15
10:45	Opportunity 2	Canvas, post-it notes	20
11:05	Futures Ladder Canvas	Canvas, light clay	60
12:05	Discussion		15
12:20	Reflection	Survey	5
12:30	End		

Phase	Time	Activity	Description	Talking Points + Prompts	Duration
Introduction	9:00	Introduction	Introduce everyone, powerpoint	Introductions, go around the table and get everyone to introduce themselves Provide background info and go over the workshop aims and structure	10 mins
Map	9:10	Word Association	Worksheet 1	Checkpoint 1 [Hand out worksheets: show example slide] Think of some roles you play in everyday life, list the first 10 things that come to mind, and then mark where you sit in the sliders. We will then go round the table and share the first and last words from the word association.	5 mins
	9:15	Visualisation	Worksheet 2	Visualise what does 'alternative proteins' means to you, try using words and pictures. We will then put the visualisations on the wall to create a gallery to look at while discussing a working definition for 'Alternative Proteins'. [show wall gallery example slide] This is a thought exercise to capture the core of your understanding as well as tangents. You will not be judged on your drawing ability and you most certainly do not have to be Picasso.	15 mins
	9:30	Definition	Wall gallery and creation of working definition	Put the worksheets on the wall, look at the worksheets: - What are some commonalities we are seeing? - What is particularly interesting? Let's discuss what do we mean by alterative proteins [Show definition example slides] There are multiple understandings of 'alternative proteins.	15 mins
				Let's document our understandings about it to create a working definition. It does not have to be in detail or resolved. The response can be intuitive.	
	9:45	Opportunity	Matrix: Global Alternative Protein space	[show matrix 1 example slide] Let's map out what's currently going on in the protein space globally and locally. The vertical axis runs from high to low value and the horizontal axis focuses on the shift from fully animal to no animal. By value I mean cost, as in money. This is activity is about quantity not quality. Don't think too much about where they belong on the axis', trust your gut instinct. Where are the opportunity areas?	15 mins
Map	10:00	Vision	Vision Ladder Canvas	Now that we have an idea of what's going on in the space, let's create a broad guiding vision. [show vision example slide] Have a think about each landscape level and try contributing at least one thing to each level. If you can add more than one, that's brilliant. You have about 15 minutes for this, we will then spend the remaining 15 minutes of this activity going through it and creating a shared vision.	30 mins
	10:30	Break			15 mins

Multiply	10:45	Opportunity	Matrix: NZ Future of Alternative Proteins	Checkpoint 2 [show matrix 2 example slide] This is a rapid ideation activity. The vertical axis locates raw material and experience on either end, and the horizontal axis focuses on the places ranging from production to consumption. Like the previous matrix is activity is about quantity not quality. Every idea is useful and the wilder the better. This is about radical ideas that have the potential to be transformational. Take cues or norms of proteins or food from your everyday life and flip Where are the opportunity areas? Who are stakeholders?	20 mins
Mediate	11:05	Futures	Futures Canvas	Checkpoint 3 We are going to take all those good ideas, or at least some of them, forward now. Let's make some stuff. You will now be asked to design and pretotype an Alternative Protein idea, we will then have a walk around and discussion about what has been created. There is an hour for the next activity and there are fair few steps, so I'll guide you through it one step at a time. [show futures ladder slide] Introduce the Futures Ladder Canvas: This futures canvas was created based off the experiential futures ladder. The point of this activity is to materialise an something from the future and use that as tangible reference for discussion. It also proposes possible situations which can be useful in exploring how we might respond and what are the implications if the situation becomes reality. [show futures canvas example slide] Run through example	5 mins
				Spilt into pairs. In the setting row, write 2041 NZ and circle transformative. Choose an idea of the future matrix. Take note of the position of it on the axis when you grab it. If you want, grab two post-its and merge the ideas to create an even more radical idea. Identify the place and opportunity. Grab a fresh post-it and put them in the boxes in the situation space. [refer to situation box on futures canvas example slide] Next, have a think of the type of people in this situation. Create a high-level persona. [refer to situation box on futures canvas example slide]	2 5
				Build on this future situation. Once again, rapidly ideate stuff in response to this situation.	10
				Choose an idea and pretotype it. A pretotype comes before a prototype, it is extremely lo-fi and is used to materialise an idea quick and easily. It does not have to be perfect or resolved. Keep in mind, there are no constraints. While you do this think about how you use it, the *size, shape, colour, texture, taste, storage, cooking, cultural connotations, production…*	15
				Annotate it: what is it? Describe how you experience it or how you use it *Think about the size, shape, colour, texture, taste, storage, cooking, cultural connotations, production…*	5
				Lastly, fill out the Landscape of Possibility cards. Use your situation, stuff, and think to guide your thinking to construct a scenario of NZ in 2041. This is about describing a possible future scenario, it is not about predicting or analysing the particulars but more so about what might be seen at a glance. [refer back to example]	20
Mount	12:05	Discussion	Tabletop gallery	Walk around and have a think about what the implications of these situations are if these became reality, how does the scenario, situation, stuff and thing affect AgResearch's role? Jot down some thoughts and add them to each canvas.	15 mins
Reflection	12:20	Survey	Feedback form		5 mins

Lincoln Workshop Responses

Worksheets

Think of some roles you play in everyday life:

- Project manager, dog walker, home cook, gardener, networker, golfer, fisherman, scientist, technologist
- Scientist, husband, mentor, colleague, son, manager
- Father, husband, son, mate
- Wife, colleague, cook, cleaner, driver, researcher, analyst, coordinator, thinker, reader
- Scientist, friend, pet carer
- Listener, friend, coordinator, sibling, daughter, contributor, scientist, team leader, thinker, artist, helper

'Alternative proteins' word association

1. Plant based milk, insects, insects, crickets, having beneficial functionalities (e.g., kids will eat, health benefits etc.), unusual to eat.
2. Sustainably produced, Quorn, larvae, tofu, bobby calves (dead), making something out of proteins that's made with metal/plastics/etc.
3. Additive/multiplicative benefits to traditional protein, Sunfed (brand), soy, cell-culture milk, petri dishes, from unique organism.
4. Complement existing, strange taste, synthetic meat, cell-culture meat, vertical shelving – "labs", large scale nanotechnology - molecular protein look.
5. Novel/exciting forms and presentation options, odd texture, cells, extracted proteins (From somewhere), hemp crops (fields of), clean image to help climate change.
6. Controversial, growing market, petri dish, vegan 'ice-cream', double helix + AA's (DNA/RNA) – building blocks of protein, GE of a protein.
7. Un-defined aspects, required to feed populations, mush, vegan 'insect', mRNA vaccine.
8. Un-intended consequences, too expensive, tech start-up – Silicon Valley, proteins extracted from plants, looking to the past/other cultures.
9. The future, trendy and fashionable, Impossible Burgers.

How familiar am I with the concept of 'Alternative Proteins'?

1= Never heard of it | 3= Read a couple things | 6= Discuss this all the time

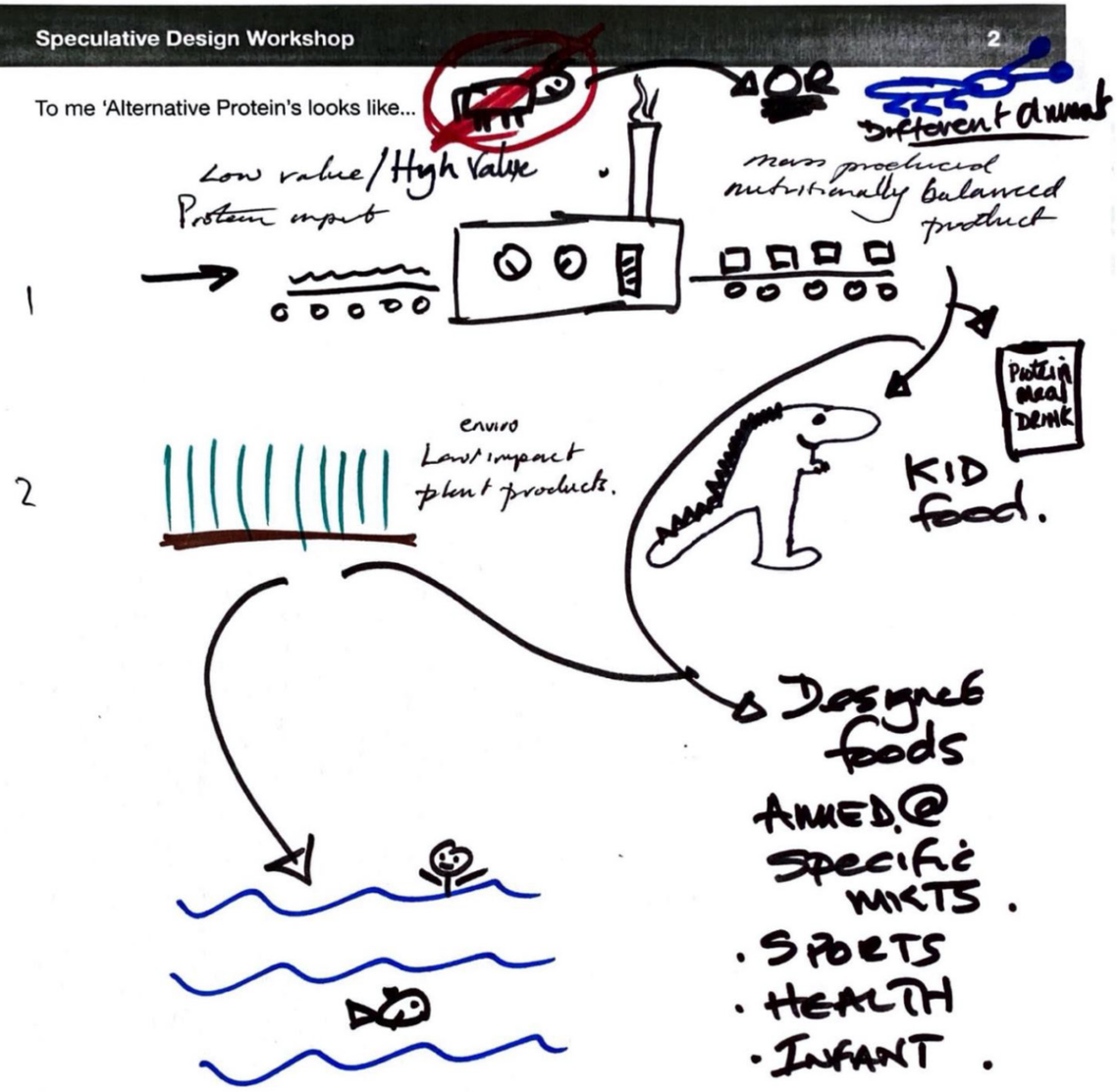
3.5, 3.5, 3.5, 3, 3, 4 = 3.4 average

How do I feel about 'Alternative Proteins'?

1= Hate it | 3= Comfortable | 6= Super excited

4, 4, 4, 3.5, 3, 2.5 = 3.5 average

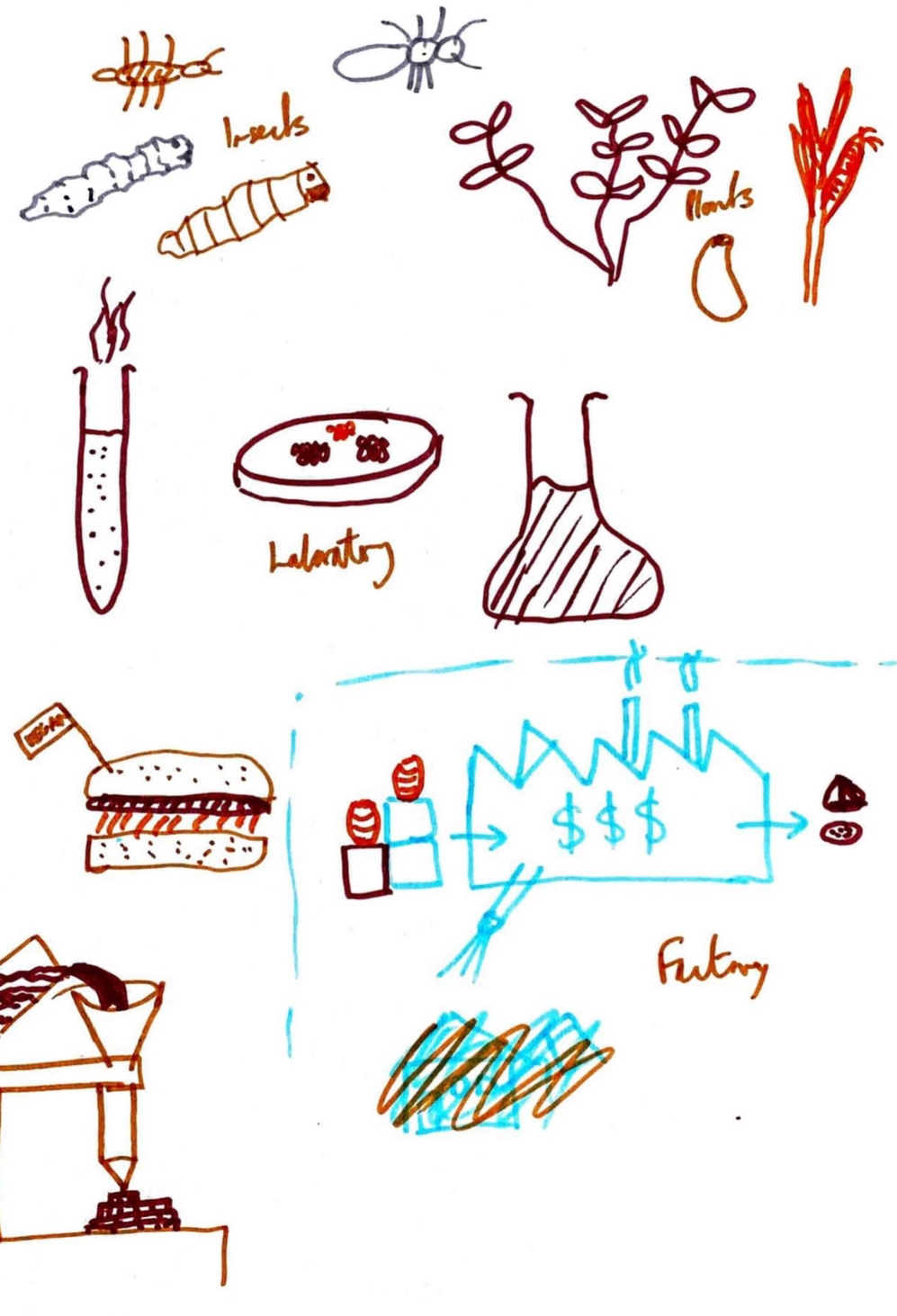
To me 'Alternative Protein's looks like...



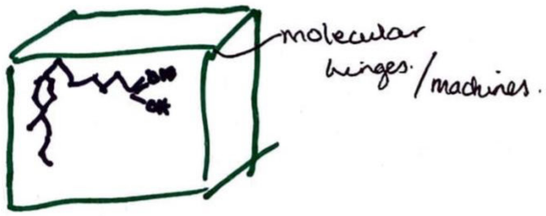
- New Uses for Proteins - NON food.
  - fibres — Circular
  - PLASTIC ALTS → Circular
  - functional proteins — Medical

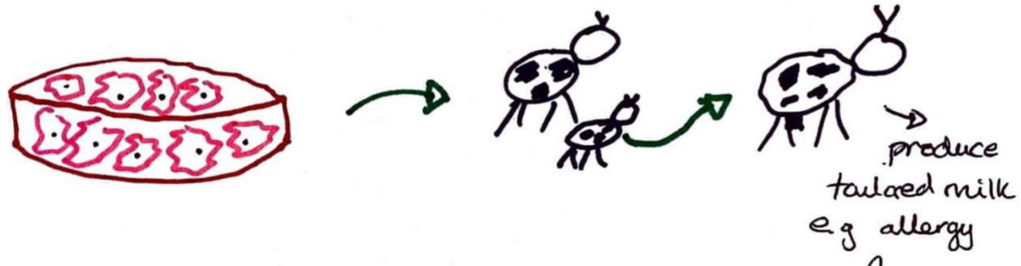
Speculative Design Workshop 2

To me 'Alternative Protein's looks like...



To me 'Alternative Protein's looks like...

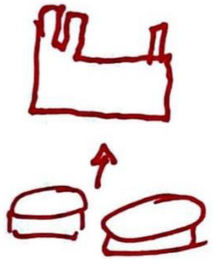




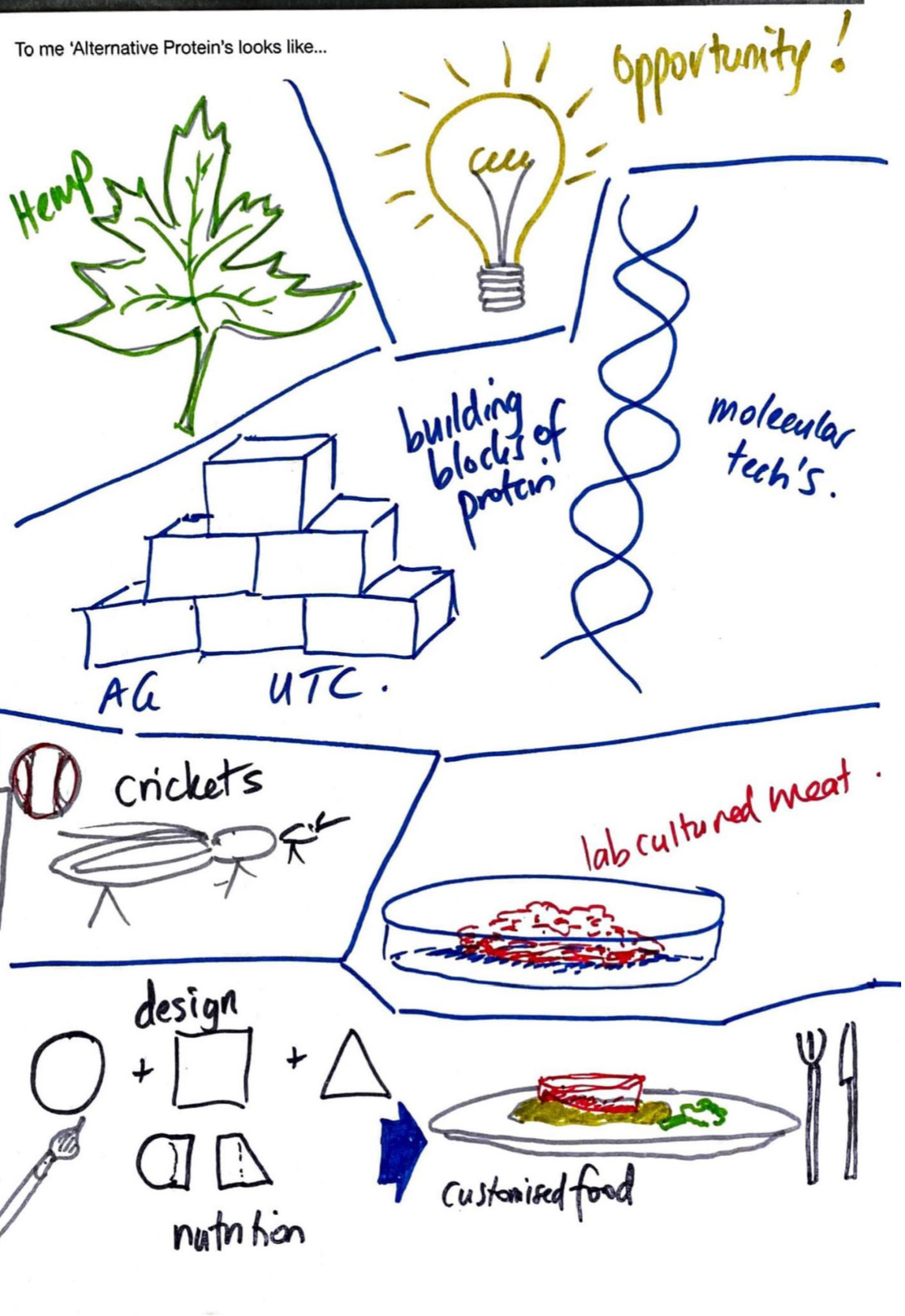
Conducting Protein polymers

protein devices to encapsulate drugs/nutrients

Modification of isolated proteins.
for a purpose
→ industrial not lab.



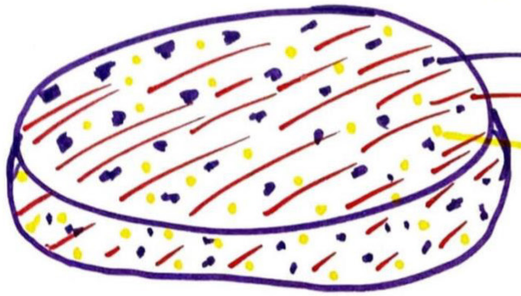
To me 'Alternative Protein's looks like...



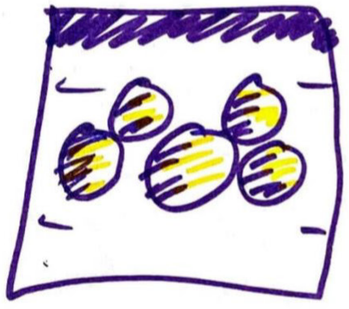
To me 'Alternative Protein's looks like...

Enriched biscuits, with additional plant protein + chocolate & insect flour drops

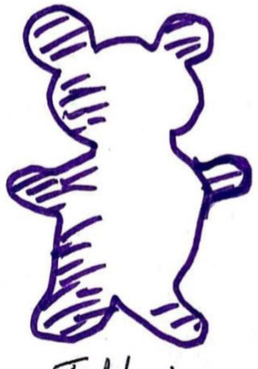
'Alternative protein patty'



Wasabi flavoured fried crickets

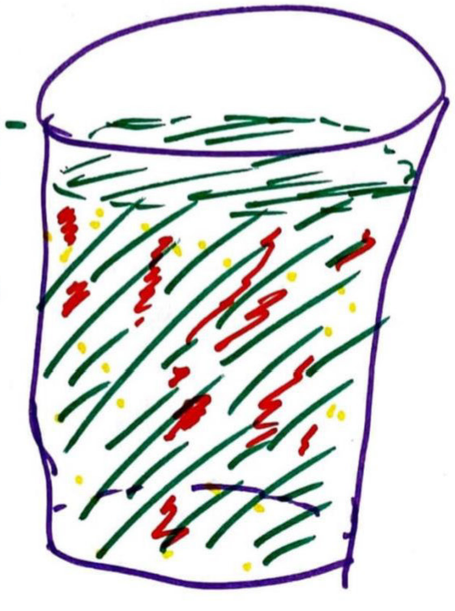


Insect flour, & fruit, & nut protein balls



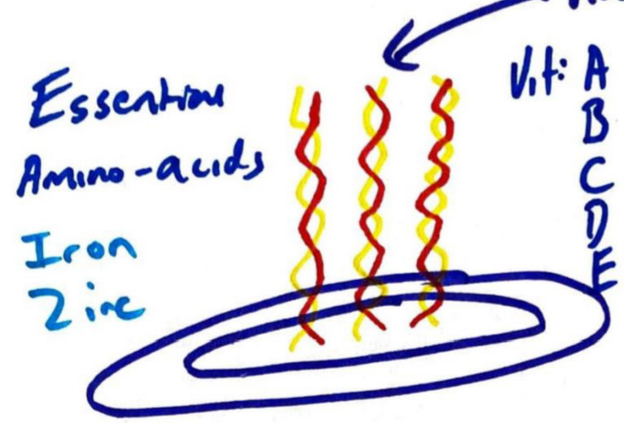
Teddy bear-shaped steaks, grown in the lab

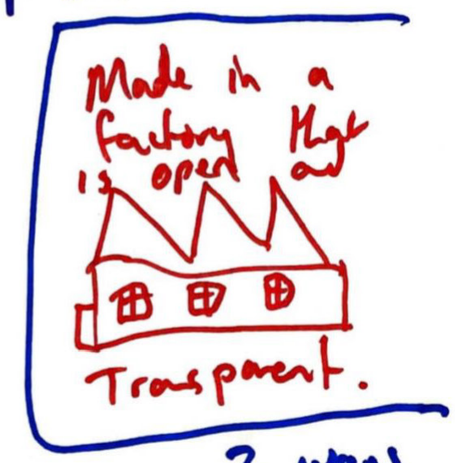
Protein shake- with greens + insect & plant protein powder



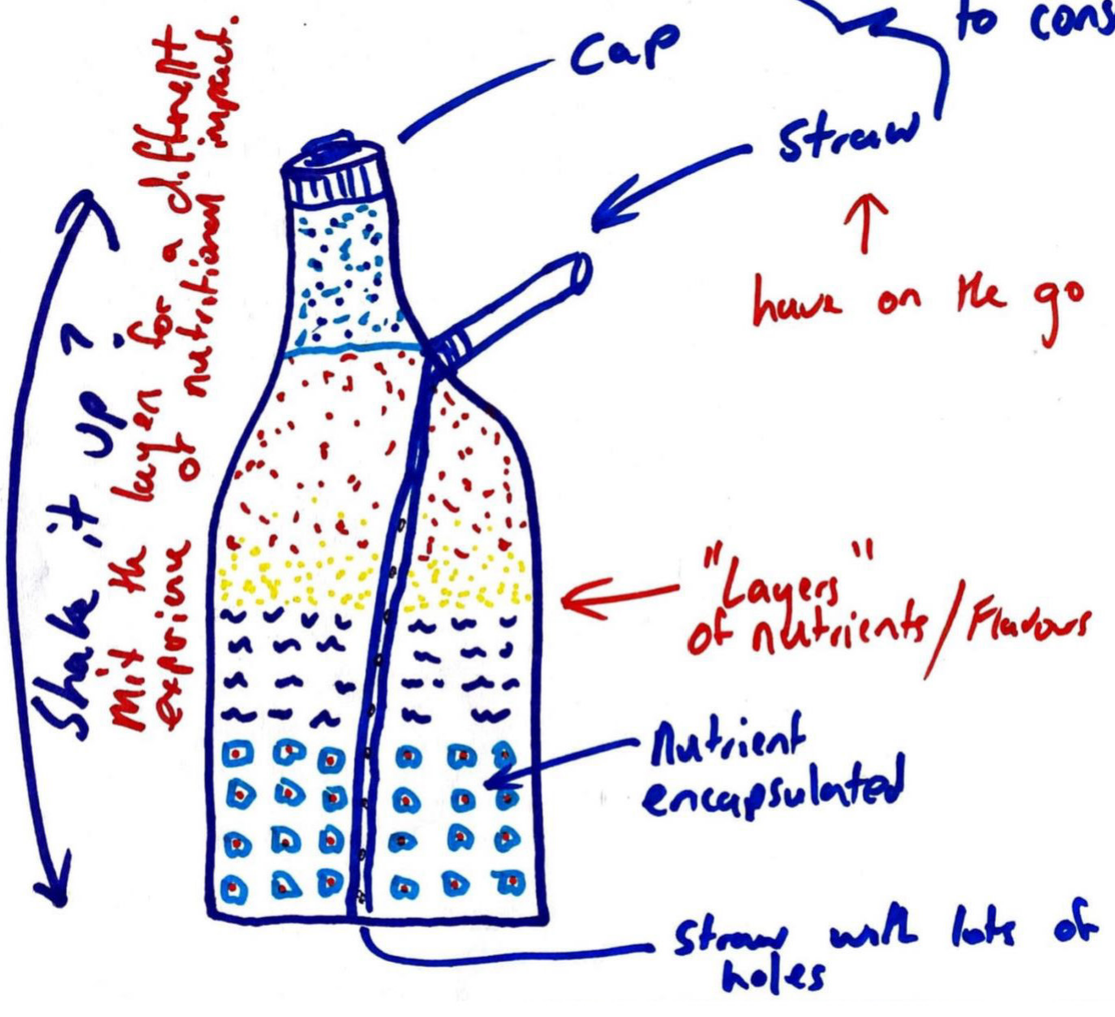
To me 'Alternative Protein's looks like...

novel presentation

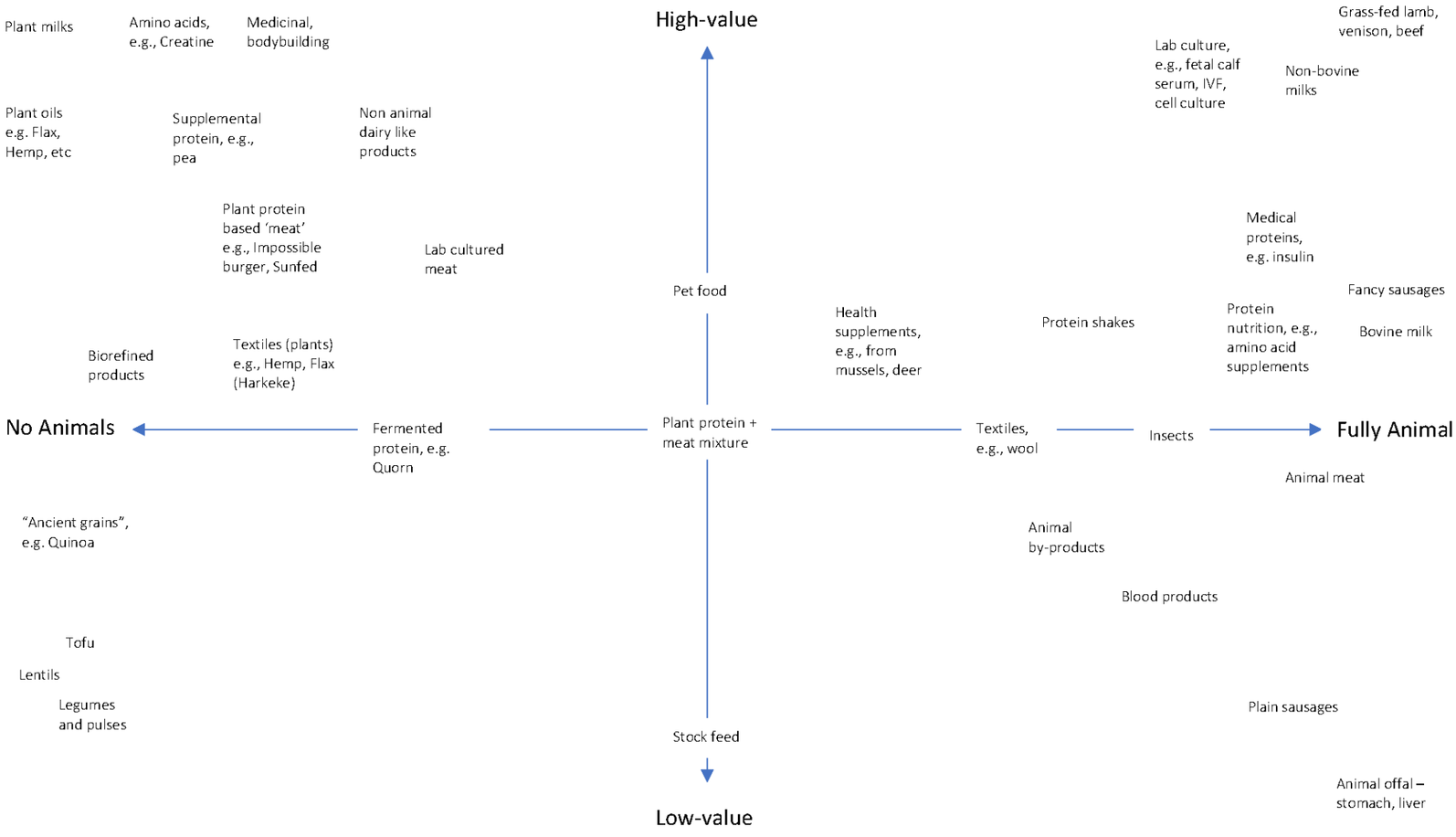




2 ways to consume



Matrix 1 – Global Alternative Protein Space



Definition

What do we mean by ~~alternative~~ future proteins?

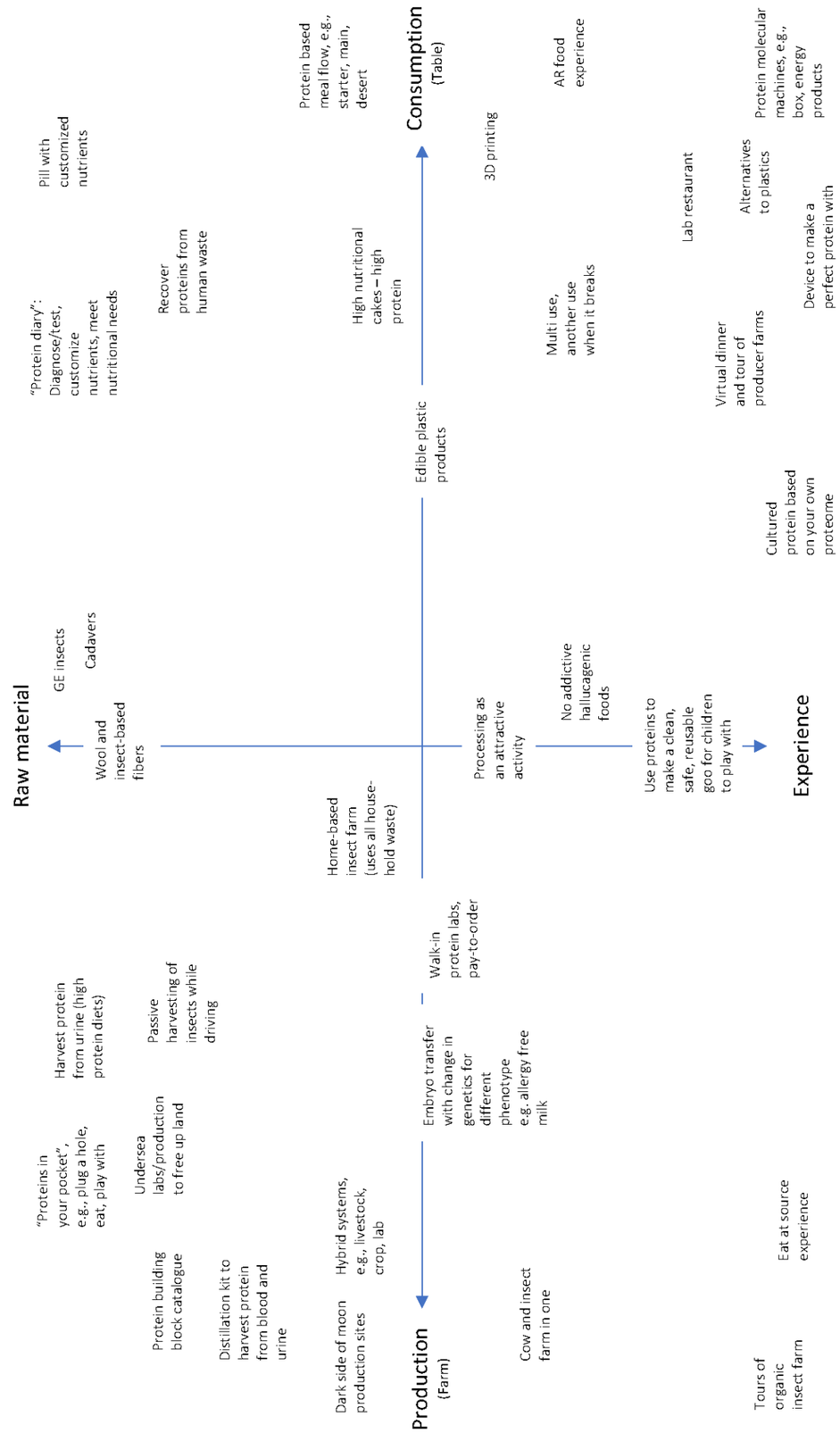
Theme	Responses
Culture, context, perception	Ick factor, acceptable foods
	Nutritional value of protein, who are consumers?
	Culture and 'the craft' – how it is made
	Transparency of process and methods
	Synthetic v. natural protein
	Alternative – what is 'normal'?
	Things outside of the 'comfort zone'
	Not a replacement, new ways of doing things
	Fermentation – something that could make 'alternatives' more acceptable
Not just food	Molecular machines
	Fibers, plastics, other materials
	'Alternative proteins' – implies difference to existing options
	Proteins as raw materials
Process, method, design	Into the lab: feasibility, viability
	Health properties
	Building blocks of protein
	New protein sequences
	Designer protein
	'new foods'
	Personalized food
	How things are made: methods, processes
Opportunities and drivers	Clean, better for the environment
	Feeding people
	Not just efficiency driven… value
	Opportunity to meet multiple outcomes
	Consumer demands

Vision

Vision focus: the role of science research (service) in responding to consumer demand for Alternative Proteins (product)

Level	Theme	Responses
The Grand Landscape	Environmental sustainability	Society values wellbeing and long-term thinking about sustainable living
		Reduce global emissions from animals
	Nutritional outcomes	Prioritized nutrition – resources allocated fairly
		Widespread understanding and ownership of nutrition
	Impact on markets and producers	Good income for farmers across the world
		-VE value to farmers, +VE for food giants
		Negative if less milk protein involved for developing countries - EAA
		Negative for small nations as developed countries (USA, Canada) move subsidy to farmers
	Connection to natural world	'Big brother' over natural disorder
		Fewer cute animals: aesthetic value of animals
	Education outcomes	Developing countries can educate women
		Increased science literacy and awareness
Societal Landscape	Resilience	Less dependence on one resource, e.g., cows
	Consumer choice	Access
		Choice
		Informed decisions
	Improved health and nutrition – developing and developed countries	Healthier communities
		Improved nutrition for poorer communities and developing countries, lacking dietary protein
		'Know how' of meeting their nutritional requirements
		To improve the quality of life through nutrition and experiences (happy people)
	Producer systems	Enviro +
		Removal of animal welfare concerns
		Lower emissions and continued income for farmers
Emotional Landscape	Education for consumers	Busting myths (about protein sources)
		Personalized choice of food/materials
	Meeting consumer needs	Control and confidence over nutrition: "my choice"
		Affordable access to needed nutrition
	Options for using proteins	Future options, alternative ways to use proteins from different products
		Recycling by-products → less waste
	Value and options for farmers	Future value for landowners + managers
		New production options for farmers
Function Landscape	Background information to support	Provide clarity around +VE and -VE aspects: the facts
		Underpinning science data to marketing
		Credentials for claims of benefits
		New Knowledge of alternative proteins, pros and cons
		AgR provides understanding of how proteins are composed and their nutritional value
		Clarity and transparency of composition and manufacture
	Product value	Lower cost but equally healthy proteins for consumers
		New product technologies
		Edible product: taste and texture
		Maintain characteristics of protein
		Create products across product sectors
	Technologies and products	AgR provides potential users of proteins to create new materials
		Novel medicinal tools, solutions, services
	Production systems	Cost-effective product system for food
		Low footprint of grown raw ingredients

Matrix 2 – NZ Futures of Alternative Protein



Futures Canvas

2041 in NZ, transformative scenario

G = group

G1. Fantasy Food

G1. Scenario

0. The Possibility:

Name the scenario and describe its potential

- Foods from fantastical origins
- Functionalized proteins to create:
  - Novel taste
  - Smell
  - Total biophysical experience
  - Visions – what you think you are seeing

1. Players

Who is involved in this scenario?

- Science to develop the functionalized proteins

What communities, organizations and institutions are being included?

- It's for high end $$$

What do they value and treasure the most?

- Experience

Who do they fear?

- The unknown

2. Context

What is the historical, sociopolitical and economical landscape like?

- Acceptable Hedonism
- Escape current reality

3. Challenge

What need, problem or pain is this scenario addressing?

- Bringing fun into a challenging world
- Adding value from new?

What are some assumptions and beliefs that underpin this scenario?

- People need new means of escape and finding experience
- The world is a challenging place to live

4. Trends + Counter Trends

What major trends, drivers and forces are shaping the world?

- Safety
- Close to home

- Need for new experiences

What are the counter trends, reactions and responses to these changes?

- Growing wealth divide
- Only the top % can afford to enjoy what future proteins offer, the majority see it as a utility product

5. Culture + Values

What are the cultural values and principles determining people's behaviors and conducts?

- Don't mind about extravagance
- Haves and have nots (have nots get the spill overs)

What does society value the most in this scenario?

- Experiencing something society as a whole cannot
- Development of grey goo food

6. Technology

Who state-of-the-art technological advancements are impacting this scenario?

- Functionalism/bioengineering of proteins

What is the relationship between people and technology?

- Tech solves world food and nutrition problems while achieving a new high value experience such as food from fantastical origins

7. Mood + Vibe

How does this situation feel and look?

- Full of possibilities
- Creative

What are its emotional qualities?

Describe the scene and ambience?

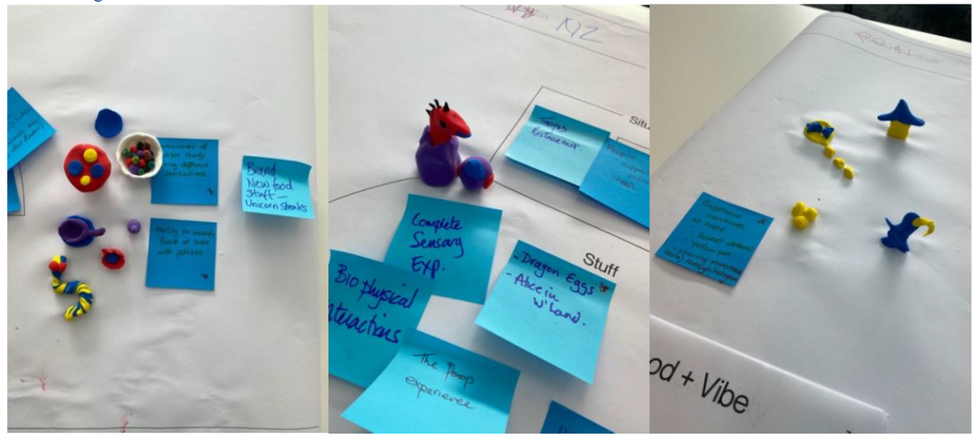
G1. Situation

Place: Themed restaurant
Offering: New flavor and sensory profile
Persona: consumer; supporting actors, chefs

G1. Stuff

- Alter food for sensations
- Functional; protein modification (we already know it affects flavour)
- Mushrooms, teacup, flowers, Willy Wonka
- Dreamland
- High-end value
- Dragon eggs, Alice in Wonderland
- The poop experience
- Complete sensory experience
- Bio physical interactions

G1. Thing



G1. Implications

- Understanding different consumers
- Away from traditional sectors; why have "AgR"?
- Functionalizing, bioengineering of proteins
- AgR—now: understanding how protein molecular structure affects food sensations

---

G2. Micro-processing at home

G2. Scenario

0. *The Possibility:*

Name the scenario and describe its potential

- Micro-processing at home is the norm
- Raw ingredients are produced in factories that are socially accepted by the majority of people
- Microprocessors provide consumers with many options to cater for dietary needs and preferences
- Microprocessors can extract nutrients/building blocks from waste products
- Sensory experiences are novel, exciting and can be enhanced with devices

1. Players

Who is involved in this scenario?

- Consumer, e.g., our stay-at-home dad
- Food designers
- Companies that produce nutrients
- Utilities companies that supply nutrients to homes

What communities, organizations and institutions are being included?

- NZ society
- Production and supply companies
- Research and design companies

What do they value and treasure the most?

- Health and well-being
- Profit, supplying a good safe product, reputation
- Producing inspiring and appealing meals
- Minimizing waste

Who do they fear?

- Compromise of food safety
- Lack of resources
- Affordability
- Uninteresting food

2. Context

What is the historical, sociopolitical and economical landscape like?

- Investment into technology and infrastructure
- Crises that changed the game
- Political imperative for change; support, awareness (en masse), community benefit outweighs personal gains
- Market economies driven by quadruple outcomes
- Commodities/resources socialized?

3. Challenge

What need, problem or pain is this scenario addressing?

- Need for efficient resource and to be less reliant on inputs
- Desire to be still be able to export

What are some assumptions and beliefs that underpin this scenario?

- Possible to put together proteins in this way
- This system is sustainable (quadruple bottom line)
- Production of raw materials is possible; land is repurposed
- Rest of the world is also moving in this direction

4. Trends + Counter Trends

What major trends, drivers and forces are shaping the world?

- Trends towards personalized production of meals from building blocks

What are the counter trends, reactions and responses to these changes?

- Natural foods movement—maintaining and promoting traditions; 'remembering roots'
- Spectrum of responses—super enthusiastic to strongly opposed

5. Culture + Values

What are the cultural values and principles determining people's behaviors and conducts?

- Majority of people adopt a collective mindset to life
- Technology is trusted

What does society value the most in this scenario?

- Collective behaviors
- Raw materials/resources for wellbeing

6. Technology

Who state-of-the-art technological advancements are impacting this scenario?

- Scaling of protein production and extraction
- Software to support home processors

What is the relationship between people and technology?

- Trusted
- Intertwined with daily life—need it to live a 'normal life'

7. Mood + Vibe

How does this situation feel and look?

- Efficient
- Exciting
- Commercial
- Standardized
- Un-natural
- Possibilities

What are its emotional qualities?

- Food—mood relationship
- Solves a problem—at ease
- Satisfied with products

Describe the scene and ambience?

- Kitchen/prep area
- Futuristic, clean
- Lab-like
- Local ingredients grown on-site

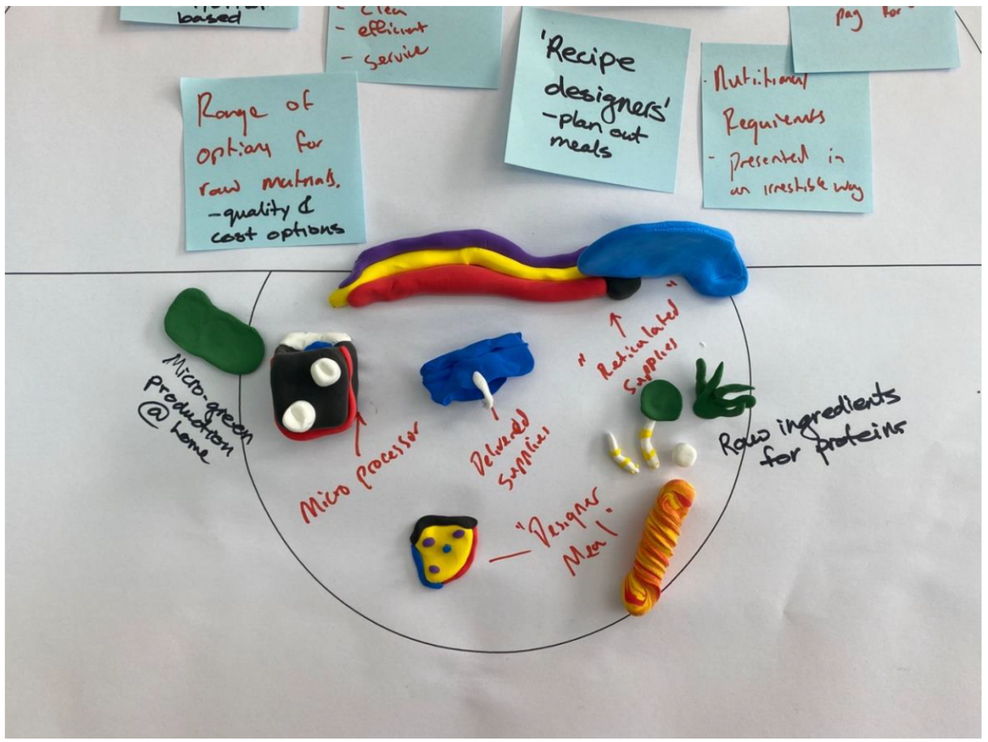
G2. Situation

Place: home
Offering: device and subscription service providing raw materials
Person: 30–35-year-old stay-at-home dad with two preschool kids, middle income

G2. Stuff

- Raw materials: lab grown, plant, insect, meat/offal based
- Device: hygiene, clean, efficient, service
- Range of options for raw materials: quality and cost of options
- 'Recipe designers': plan out meals
- Underpinned by product research and development, e.g., role of research and companies
- Principle of "you get what you pay for"
- Nutritional requirements, presented in an irresistible way

G2. Thing



G2. Implications

- Switch to focus on production of raw materials and extraction
- Identifying raw materials with potential
- Designing systems—production, form for transport

G3. Customised nutrition—from home

G3. Scenario

0. The Possibility:

Name the scenario and describe its potential

- System at home that:
  - Detects individual nutritional needs and planned activities
  - Creates either recipe (based on contents of pantry) or something ready-made (e.g., a pill that does everything).

1. Players

Who is involved in this scenario?

- Busy working professional
- Service provider

What communities, organizations and institutions are being included?

- Health professionals
- Ingredient providers
- Tech provider (app)

What do they value and treasure the most?

- Convenience and health
- Consistency and reliability
- Data security

Who do they fear?

- Loss of personal data
- Poor health

2. Context

What is the historical, sociopolitical and economical landscape like?

- Increased concern of food provenance
- Less time for food prep
- Affluent enough to not need to prioritize low cost
- Better food transparency and traceability
- Better science/nutrition knowledge fundamentals

3. Challenge

What need, problem or pain is this scenario addressing?

- Optimized nutrition, more convenient, waste reduction

What are some assumptions and beliefs that underpin this scenario?

- Nutrition is important
- Tech exists, e.g., health monitoring, scanning, production
- Components are accessible at home
- Trust in technology and science behind it

4. Trends + Counter Trends

What major trends, drivers and forces are shaping the world?

- Technology-driven nutrition
- More home-based living
- Environmental footprint is important
- Urban living and land use change

What are the counter trends, reactions and responses to these changes?

- Back to natural
- Reaction to data harvesting (concern regarding data security)
- Desire for handcrafted artisan products (the idea requires homogenization)

5. Culture + Values

What are the cultural values and principles determining people's behaviors and conducts?

- Cultural preference for different ingredients
- Heightened awareness and control of diet

What does society value the most in this scenario?

- Health and good nutrition

- Waste reduction
- Convenience

6. Technology

Who state-of-the-art technological advancements are impacting this scenario?

- Smart sensors and integrated systems
- Home-scale processing tech

What is the relationship between people and technology?

- Reliance on devices for nutrition
- Trust in tech; security of it, reliability
- User friendly interface

7. Mood + Vibe

How does this situation feel and look?

- Discreet technology embedded into everyday ideas and life

What are its emotional qualities?

- Controlled and structured

Describe the scene and ambience?

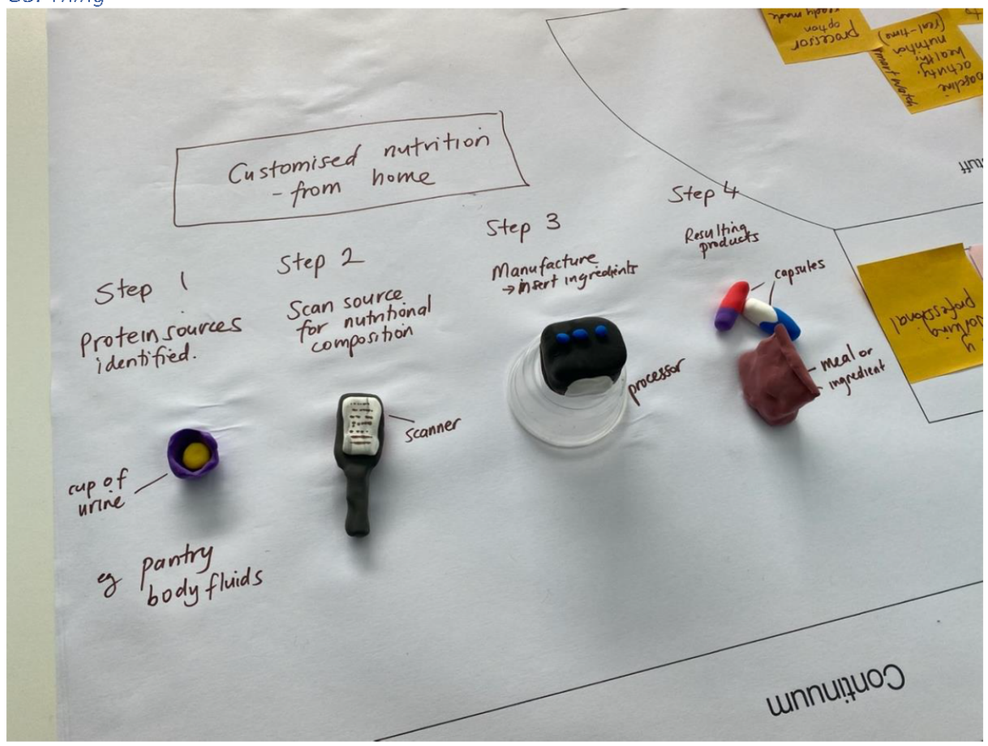
G3. Situation

Place: the home
Offering: personalized nutrition (from a local source)
Persona: 30-year-old working professional

G3. Stuff

- Combine different sources of protein…? How?
- Optimized daily 'diagnosis' and 'supplementation'
- Smart chef "interface"
- Smart pantry; knows what's available and nutritional components
- Smart recipe creator
- Sensor to detect composition
- Baseline activity; health, nutrition in real time (e.g., smart watch)
- Processor option; readymade, DIY

G3. Thing



G3. Implications

- How to determine nutritional needs from urine/other sample
- Develop machine learning for monitoring
- Managing security of the system

Feedback form responses

To what extend did the approaches used in this workshop help you to think in a different way?

1	2	3	4	5	6	7
Not at all			To some extent			To a great extent

7, 7, 7, 6, 5, 5 = 6.2 average

Comments

- Got me to think about more different futures then I would usually consider or be comfortable with
- Most effective: different formats, using pictures, text, clay to stimulate creativity and prompting questions, cards, etc., for considering different angles
- Novel approaches unlock creativity
- Hard to break out of the preconceived ideas that I came to the workshop with

If we were to use these methods again, how would we adapt them to be more useful?

- The brainstorming at the beginning was useful but also a place where people got a bit distracted/spent extra time. Possibility of cutting down the number of initial brainstorming exercises.
- Ask people to give an example as it helps others to understand.
- Think of a way to develop knowledge now to help the idea to come to fruition.
- Provide less in terms of examples of how others have responded (this was a little constraining, although only temporarily)
- Undertake with a broader range of participants
- Have a preconceived/known already sheet and then a separate "anything / unknown" sheet

What did you particularly enjoy?

- Liked getting into the final scenario development exercise—gave me more time to think
- Range of media, e.g., clay, and out-of-the-box thinking encouraged, e.g., crazy ideas.
- Being able to think outside the box
- Group discussions
- Modelling—time to think about the system
- Being able to create models of ideas

What did you find challenging?

- Trying to think of new things that don't currently exist—kept going back to current uses and variations of these
- Getting my head out of current constraints and context, e.g., current food focus
- Defining the situation in the last exercise
- Rationalising the axis of the spaces
- Breaking out from the norm

Have you worked with designers before?

No = 3
Yes = 3

Describe what 'design' means to you:

- Developing new ideas into something structured and useful but novel
- Creating and visualizing something different to share with others
- Thinking of a new way to do things
- A process of creation of a product or system that has been done with the requirements of the end user at its center
- Creating a future that will enable success

How might design fit within the broader science research area?

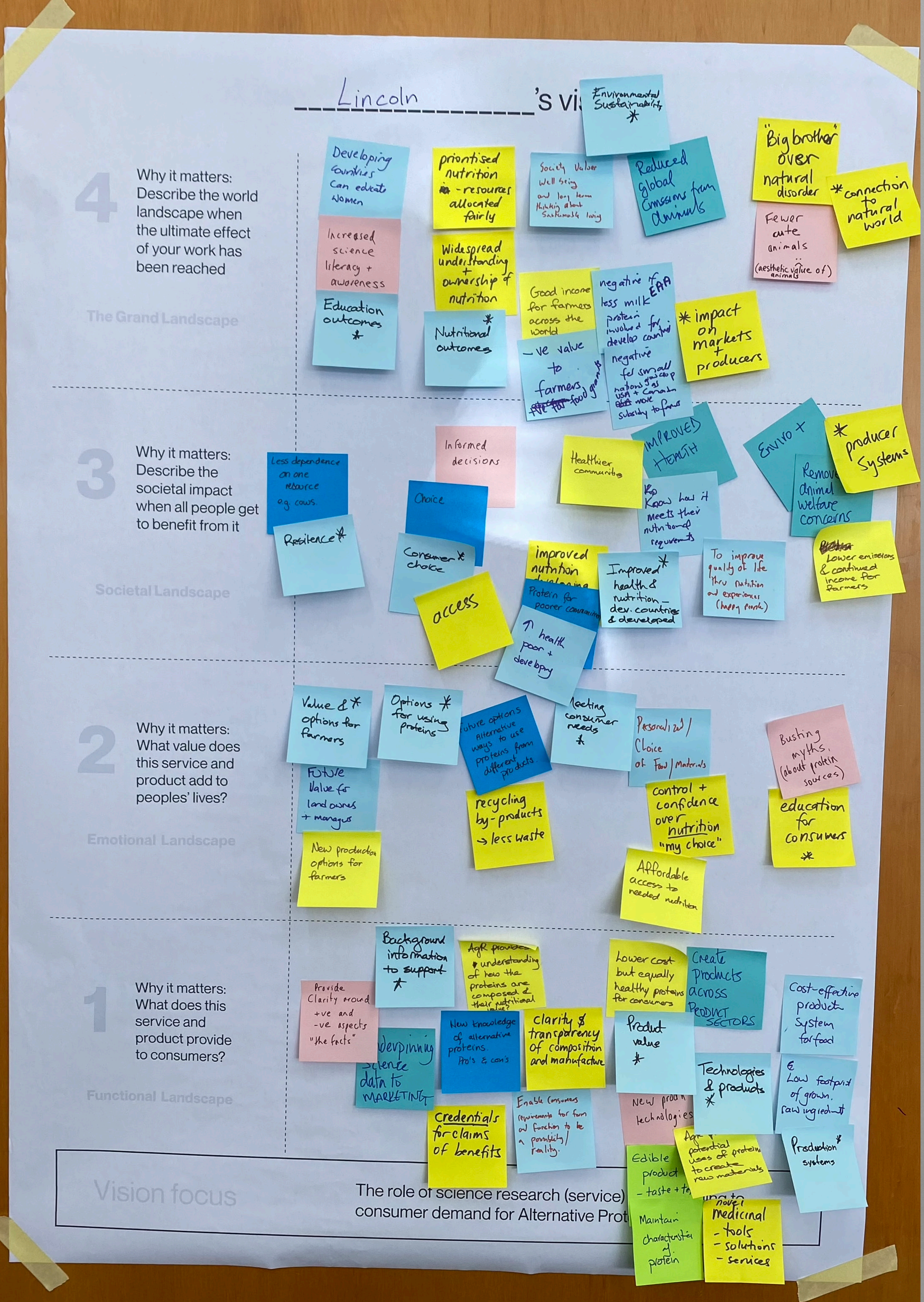
- Good for designing projects
- Asking and allowing feedback in project meetings to be in other forms, e.g., pictures, prompts, clay
- Helping to plan projects
- Design processes can be used throughout research to maintain an end user focus
- It helps to identify the science priorities

How might design support you in your role and work?

- Help me to think about potential new research areas and projects
- Thinking outside the box
- Future project planning
- Help keep an end user focus, especially in close to market research
- It will help build our strategy and how we choose to use the resources at our disposal

Additional comments:

- Good workshop but quite busy.
- Really like these sessions—really stimulating.
- I enjoyed the workshop
- Great fun, up-beat, enabling tone set by the facilitator. Well done!


Lincoln 's vi
4 Why it matters: Describe the world landscape when the ultimate effect of your work has been reached
The Grand Landscape
3 Why it matters: Describe the societal impact when all people get to benefit from it
Societal Landscape
2 Why it matters: What value does this service and product add to peoples' lives?
Emotional Landscape
1 Why it matters: What does this service and product provide to consumers?
Functional Landscape
Vision focus
The role of science research (service)
consumer demand for Alternative Prot
Environmental Sustainability
Developing countries can educate women
prioritised nutrition - resources allocated fairly
Reduced global emissions from animals
"Big brother" over natural disorder
connection to natural world
Fewer cute animals (aesthetic value of animals)
Increased science literacy + awareness
Education outcomes
Widespread understanding + ownership of nutrition
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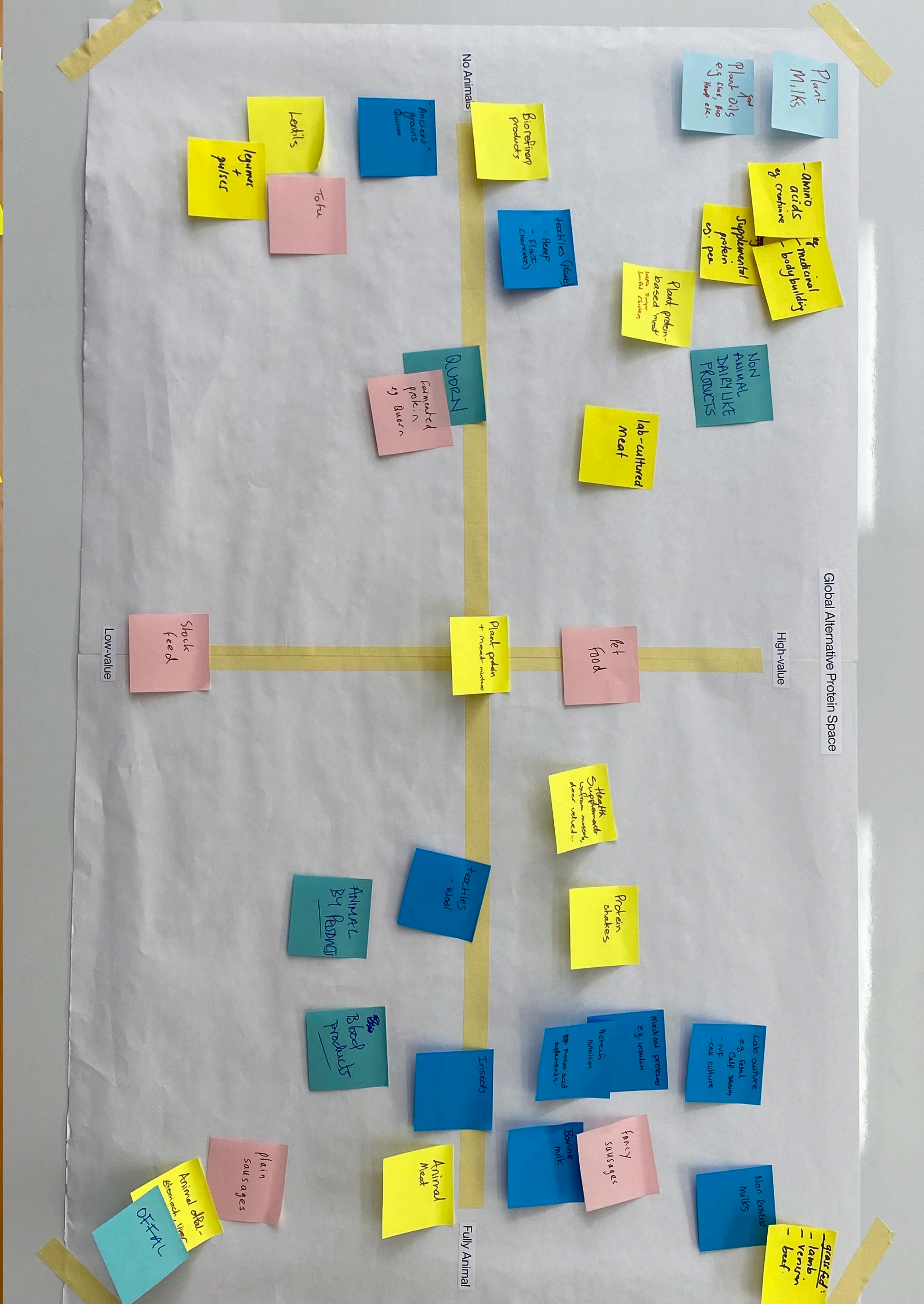
Good income for farmers across the world
-ve value to farmers
impact on markets + producers
Informed decisions
Healthier community
IMPROVED HEALTH
Enviro +
producer Systems
Remove animal welfare concerns
Less dependence on one resource e.g. cows
Choice
Resilience
Consumer choice
access
improved nutrition
Protein for poorer communities
health poor + develop
Improved health & nutrition - dev. countries & developed
To improve quality of life thru nutrition and experiences (happy food)
Lower emissions & continued income for farmers
Value & options for farmers
Options for using proteins
Future options alternative ways to use proteins from different products
Meeting consumer needs
Personalised / Choice of Food / Materials
Busting myths (about protein sources)
Future value for land owners + managers
recycling by-products → less waste
control + confidence over nutrition "my choice"
education for consumers
New production options for farmers
Affordable access to needed nutrition
Background information to support
Lower cost but equally healthy proteins for consumers
Create products across PRODUCT SECTORS
Cost-effective product system for food
Provide clarity around +ve and -ve aspects "the facts"
New knowledge of alternative proteins
clarity & transparency of composition and manufacture
Product value
Technologies & products
Low footprint of grown raw ingredient
credentials for claims of benefits
New prod. technologies
Production systems
Edible product - taste + te
Maintain characteristics of protein
novel medicinal - tools - solutions - services

No Animals
Fully Animal
Low-value
High-value
Global Alternative Protein Space
Lentils
legumes + pulses
Tofu
Biorefinery products
Plant Milks
amino acids
Supplemental protein
Plant protein-based meat
QUORN
lab-cultured meat
NON ANIMAL DAIRY LIKE PRODUCTS
Stock feed
Pet food
Plant protein + meat
Protein shakes
ANIMAL BY PRODUCTS
Blood Products
Insects
plain sausages
fancy sausages
Animal Meat
Bovine milk
Non bovine milks
OFFAL

NZ Futures of Alternative Proteins
Production (Farm)
Raw Material
Experience
Consumption (Table)
Eat at Source → experience
Tours of organic insect ~~protein~~ farm with a big insect for ~~[illegible]~~
Cow & insect farm in one.
DARK SIDE OF MOON PRODUCTION SITES… so not to spoil view of moon
hybrid systems - livestock - crop - lab
distillation kit to harvest protein from blood and urine
Protein Building Block Catalogue
"protein in your pocket" eg plug a hole & eat play with
Undersea Labs / in to Production to free up Land
Embryo transfer with change in genetics for different ~~[illegible]~~ eg allergy free milk
harvest protein from urine (high protein diet)
Passive harvesting of insects while driving.
Walk-in protein labs - pay to order
Home-based insect farm (uses all household waste)
Use proteins to make a clean, ~~[illegible]~~ reusable [illegible] for children to [illegible]
No addictive Hallucagenic foods
Processing is an attractive activity
Wool & insect-based fibres
GE INSECTS
CADAVERS
Cultured protein based on your own proteome
Virtual ~~[illegible]~~ dinner + tour of producer farms
multi use - another use when it breaks
Edible plastic products
~~[illegible]~~ Recover Proteins from human WASTE
"protein diary" - diagnostic test - customise nutrients. → meet nutritional needs
Device to make a perfect protein with perfect bioactives
lab restaurant (copied)
pill with customised nutrients
High nutritional cakes - high protein
"Alternatives to plastics"
3D Printing
Protein molecular machines eg. bees, energy producers
AR food experience
Protein-based Meal flow eg. starter-main-dessert A B C D

What do we mean by ~~Alternative~~ FUTURE Proteins?
"efficiency" (perception of)
transparency of process + methods
culture & "the craft" - how it's made, served
alternative - what is "normal"?
SYNTHETIC V NATURAL PROTEIN
Process, method, design *
Culture * & context, ~~perception~~
"perception" - "ick" factor - acceptable foods
nutrition - protein Who consumes?
Fermentation - something that could make 'alternatives' more acceptable?
Fibres, plastics, other materials
material
HOW things are made - methods - processes
Personalised food
new
Things that outside of the 'comfort zone'
not a replacement, new ways of doing things
not just food ~~textiles~~ *
Molecular machines
designer protein
Health properties
New protein sequences.
Alternative proteins - implies different to ~~[illegible]~~ existing options
Clean, for better environment
not just efficiency driven… value
Feeding people
into the lab - feasibility - viability
building blocks of protein
Opportunities & drivers *
opportunity to meet multiple outcomes
Consumer demands

Grasslands Workshop Documentation

Appendix F

Time (PM)	Activity	Materials	Duration (mins)
12:30	Intro	Info sheet, consent form, Power point	10
12:40	Word Association	Worksheet, pens	10
12:50	Visualisation	Worksheet, felts	15
1:05	Definition Discussion	Post-it notes, paper, felts	20
1:25	Vision	Canvas, post-it notes	35
2:00	Break	Biscuits	20
2:20	Rapid Ideation	Canvas, post-it notes	15
2:35	Futures Ladder Canvas	Canvas, light clay, felts	60
3:35	Implications Discussion		25
3:55	Reflection	Survey	5
4:00	End		

Phase	Time	Activity	Description	Talking Points + Prompts	Duration
Introduction	12:30	Introduction	Introduce everyone, powerpoint	- Introductions, go around the table and get everyone to introduce themselves - 5-minute spiel to provide some background info on the lead-up to my project, the broader project and then I'll go over the workshop aims and structure.	10 mins
Map	12:40	Word Association	Worksheet 1	Checkpoint 1 [Hand out worksheets] 1. Think of some roles you play in everyday life. 2. List the first 10 things that come to mind 3. Mark where you sit in the sliders. 4. We will then go round the table and share the first and last words from the word association.	5 mins
	12:50	Visualisation	Worksheet 2	1. Visualise what does 'alternative proteins' means to you - try using words and pictures. 2. We will then have a look at each other's drawings and discuss what the future of protein might refer to. - This is a thought exercise to capture the core of your understanding as well as tangents. - You will not be judged on your drawing ability and you most certainly do not have to be Picasso. [show example slide if needed]	15 mins
	1:05	Definition	Wall gallery and creation of working definition	1. Have a walk around and look at everyone's drawings 2. Share what alternative proteins means to you in a couple words, write your thoughts on a post-it 3. Move to the working definition sheet 4. Let's create a working definition and document our understandings - Write on post-it notes what you think it is - It does not have to be in detail or resolved. The response can be intuitive. - What do we know about proteins? - What do we not know proteins? - What are some commonalities we are seeing? - What is particularly interesting? - What might future proteins enable? - Shift away from food focus 5. Cluster and name themes [show example slide if needed]	15 mins
Map	1:25	Vision	Vision Ladder Canvas	1. Now that we have an idea of what we mean by 'Alternative Proteins', let's create a broad guiding vision. 2. Move over to the canvas [show vision example slide] 3. Have a think about each landscape level and try contributing at least one thing to each level. - If you can add more than one, that's brilliant.	30 mins
	2:00	Break			15 mins

Multiply	2:20	Opportunity	Matrix: NZ Future of Alternative Proteins	Checkpoint 2 1. Move to matrix 2. Brainstorming ideas about the future of proteins 3. This is a rapid ideation activity. 4. The vertical axis locates raw material and experience on either end, ans the horizontal axis focuses on the places ranging from production to consumption. - This about quantity not quality. Every idea is useful and the wilder the better. - It's about radical ideas that have the potential to be transformational. - Take cues or norms of proteins or food from your everyday life and flip it on its heads. - If you get really stuck, build on top of the examples and evolve or combine them to form a new idea. - I'm asking you essentially to be a designer and come up with new ideas.	20 mins
Mediate	2:35	Futures	Futures Canvas	Checkpoint 3 [Show futures ladder slide] 1. Introduce the Futures Ladder Canvas - This futures canvas was created based off the experiential futures ladder. - The point of this activity is to materialise an aspect, object, thing from the future and use that as tangible reference for discussion. - It also proposes possible situations which can be useful in exploring how we might respond and what are the implications if the situation becomes reality. [Show futures canvas slide] - Design and pretotype a Future Protein idea - Quick presentation and discussion on what has been created. - There is an hour for the next activity. 2. Spilt into pairs 3. Choose an idea from the matrix: Take note of the position of it on the axis when you grab it - If you want, grab two post-its and merge the ideas to create an even more radical idea. 4. In the setting row, write 2041 NZ and circle transformative. 5. Identify the place and opportunity. Grab a fresh post-it and put them in the boxes in the situation space. 6. Next, have a think of the type of people in this situation. Create a high-level persona. 7. Build on this future situation. Once again, rapidly ideate stuff in response to this situation. 8. Choose an idea and pretotype it. A pretotype comes before a prototype, it is extremely lo-fi and is used to materialise an idea quick and easily. It does not have to be perfect or resolved. Keep in mind, there are no constraints. - While you do this think about how you use it, the *size, shape, colour, texture, taste, storage, cooking, cultural connotations, production...* 9. Annotate it: what is it? Describe how you experience it or how you use it 10. Fill out the Landscape of Possibility cards - Use your situation, stuff, and think to guide your thinking to construct a scenario of NZ in 2041. This is about describing a possible future scenario, it is not about predicting or analysing the particulars but more so about what might be seen at a glance.	5 mins
Mount	3:35	Discussion	Tabletop gallery	1. Present, go around the table, elevator pitch, describe how this works 2. Discuss the implications of these situations become a reality - How does the scenario, situation, stuff and thing affect AgResearch's role? Jot down some thoughts and add them to each canvas.	25 mins
Reflection	3:55	Survey	Feedback form	1. Form	5 mins

Grasslands Workshop Responses

Worksheets

Think of some roles you play in everyday life:

- Scientist, parent, pet owner
- Ordered thinking, big-picture thinker
- Scientist
- Husband, cat fancier, potterer, grateful new kiwi
- Pseudo-philosopher, foodie
- Husband, uncle, musician, conscious consumer, Christian
- Yoga enthusiast, restless online shopper, artist wannabe
- Actionist
- Scientist, husband, father, coach
- Daydreamer, gardener
- Partner, strategic thinker
- Mum (kids + animals), chef, exercise trainer

'Alternative proteins' word association

1. Unnatural/processed, novel, new opportunities for science, farmers
2. Plants, hamburgers, nutrition, thin people, malnourished amnio acid limitations, tasteless seaweed, mono-agriculture, fake meat
3. What is the definition of alternative proteins, nutrition aspect or processing quality aspect, plant-based proteins, insect-based protein, opportunity?
4. Substitute, poor quality, expensive, alternative to what, processing, food technology, unnatural
5. Biotransformation, Snowpiercer, flexitarianism, black soldier flies, cultured meat, autophagy (i.e., your own cultured cells)
6. Plant burgers, cultured meat, fungi protein, food from waste, bug protein, jelly fish, chickens without brains, bioactive peptides GM, de novo tailored proteins
7. Tofu, plant-based milk, Quorn, plant-based workout drinks, plant-based butter
8. Plant-based protein, meat analogue, vegan/vegetarian, microprotein, beyond meat, cricket, Quorn, pea protein, vegan sausage, vegetarian chicken
9. Plant, not cow, not sheep, insect fungus, healthy, environment, sustainability, different, technology
10. Lab grown meat, unusual foods, comedians, soy, Impossible Burger, flowers, colors, soup
11. Insects, meat substitutes, lab-made meat, quinoa, legumes, healthy
12. Plants, insects, diversification, accessing protein, hydrols, fungus, taste issues, ultra-processed, sustainability, opportunities

How familiar am I with the concept of 'Alternative Proteins'?

1= Never heard of it 3= Read a couple things 6= Discuss this all the time

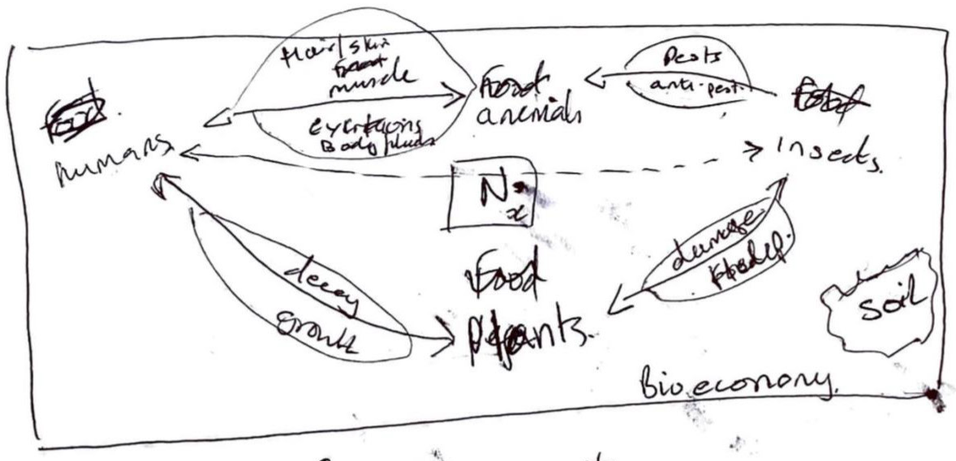
2, 3, 3, 4, 5, 5, 5.5, 5.5, 6 = average 4.3

How do I feel about 'Alternative Proteins'?

1= Hate it 3= Comfortable 6= Super excited

2, 2.5, 2.5, 4, 4.5, 5, 5, 6, 6 = average 4.2

To me the future of proteins looks like...



Box of smarties

N => Protein 'x' amount available.

Can't 'add' to number => smarties.

Can't make matter but can re-distribute forms.

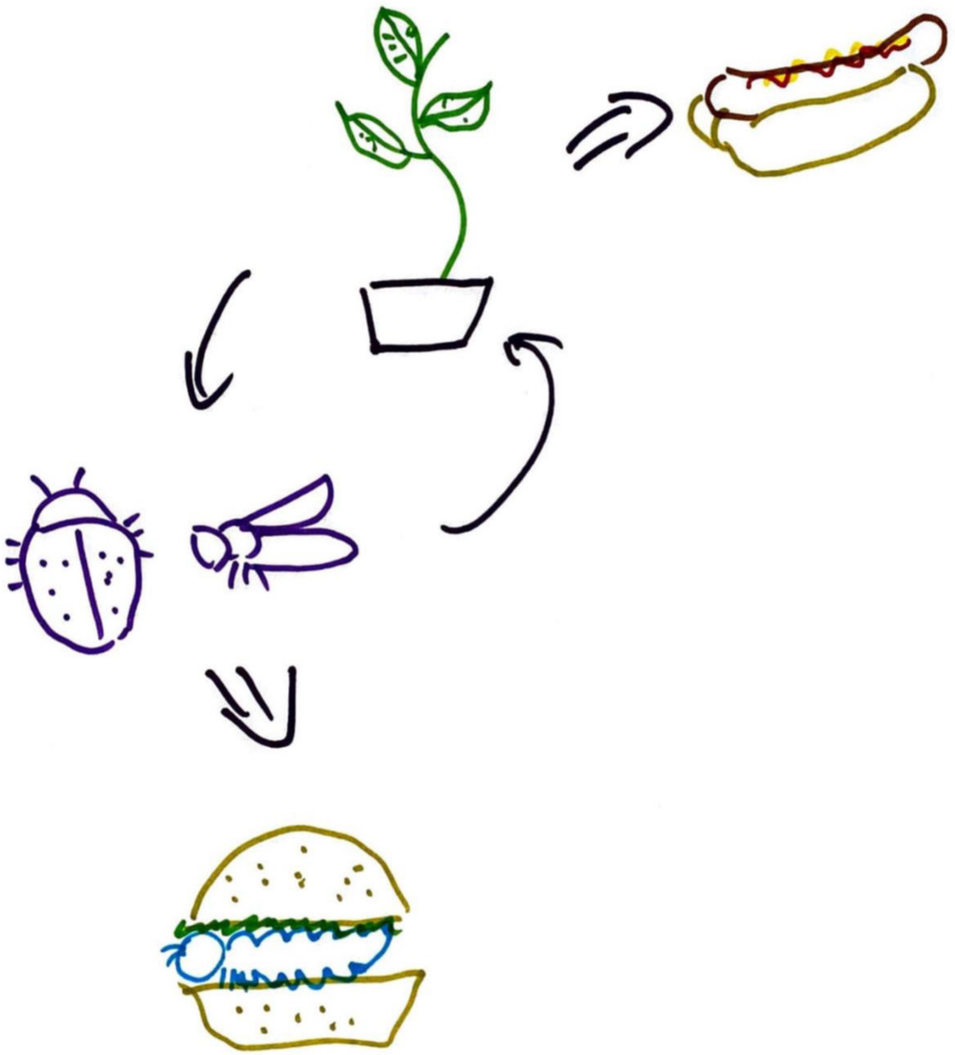
Speculative Design Workshop 2

To me the future of proteins looks like...

- volume /value/ people fed Pyrimid
- different 'protein classes' All the diff. needs

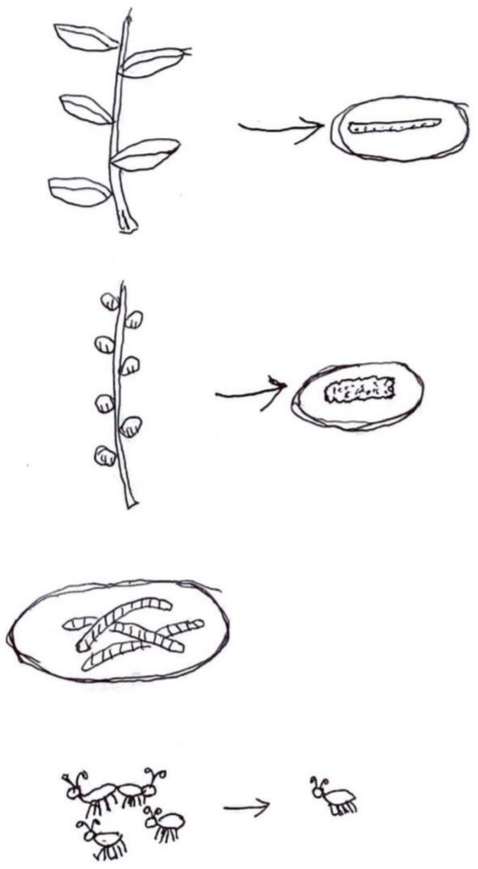
value
high = traditional animal - valuing them more
middle - insects plant
low = fake/ factory protein

To me the future of proteins looks like...



Speculative Design Workshop 2

To me the future of proteins looks like...



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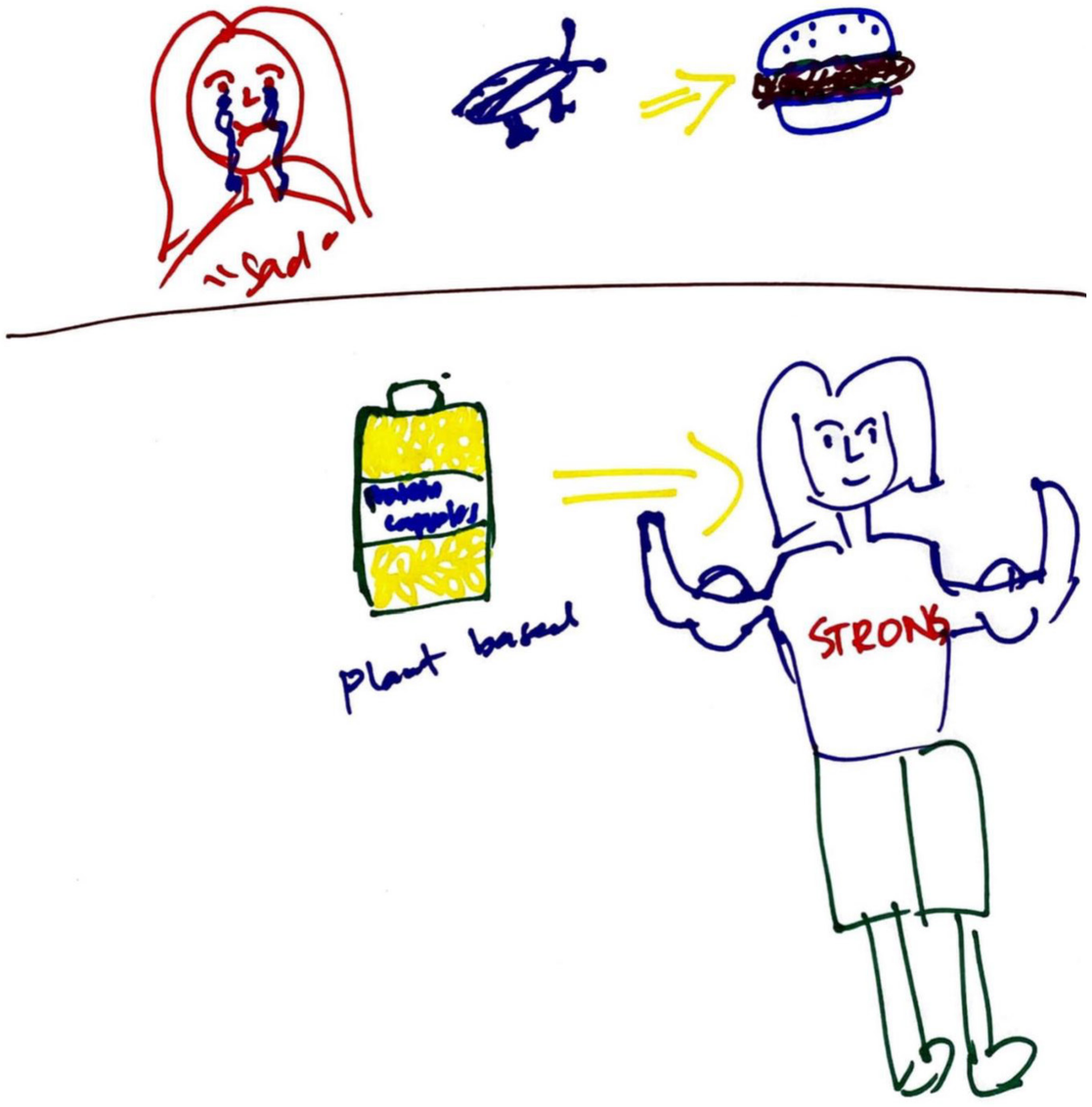
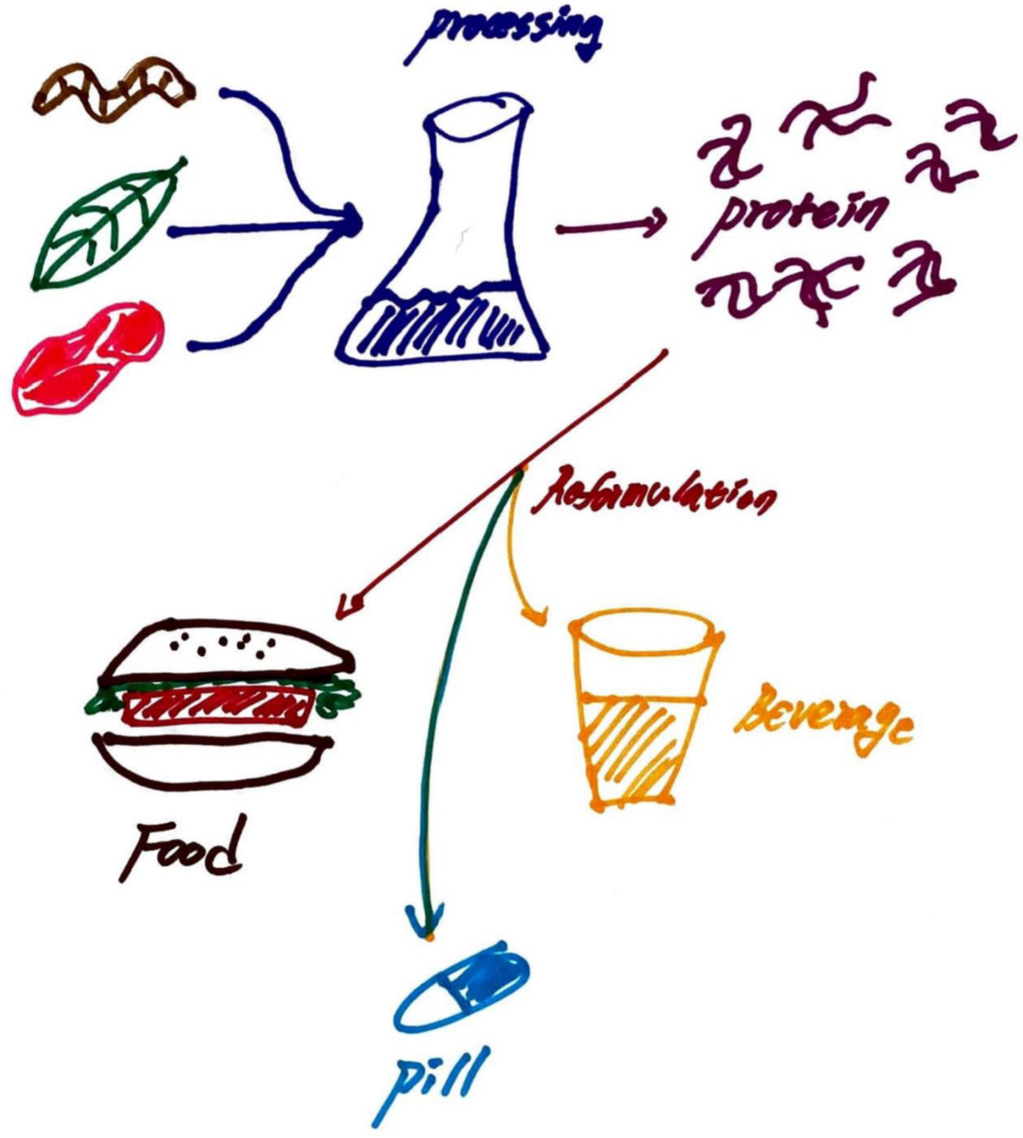
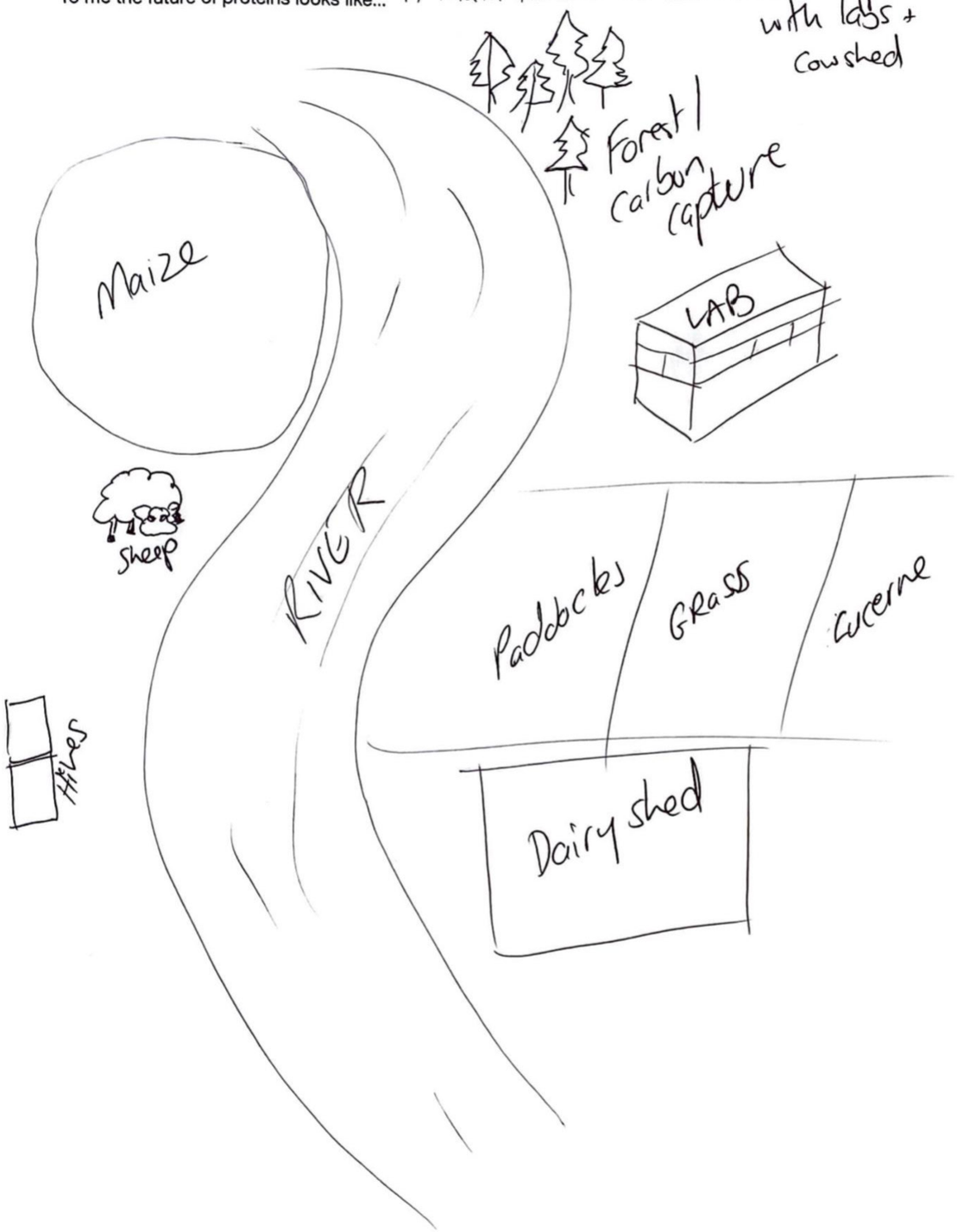


Speculative Design Workshop 2

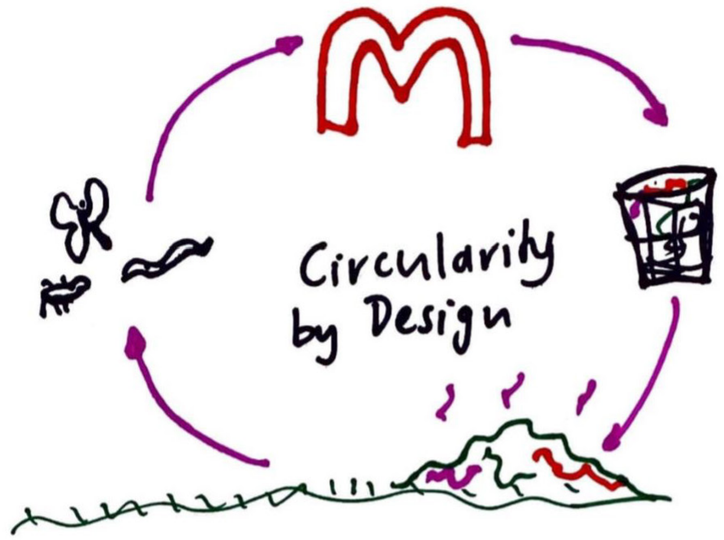
To me the future of proteins looks like...

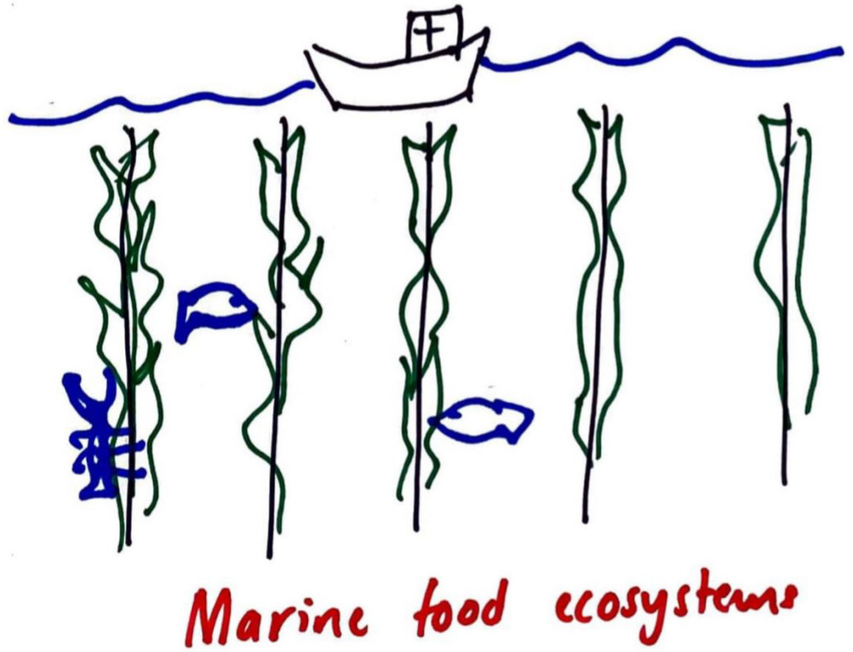


To me the future of proteins looks like... A multi-functional farmstead replete with labs + cowshed



To me the future of proteins looks like...





To me the future of proteins looks like...

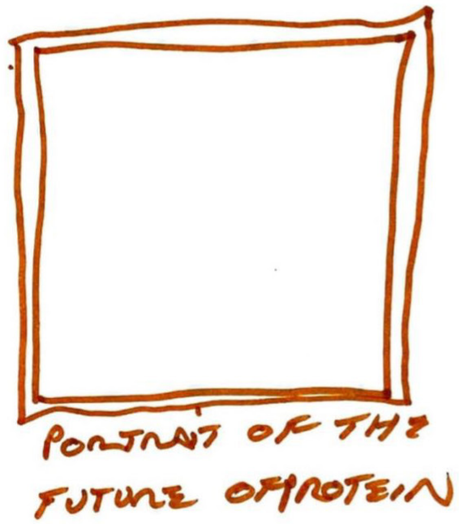
Sustainable / reusable / recyclable resources

Speculative Design Workshop 2

To me the future of proteins looks like... TO ME...

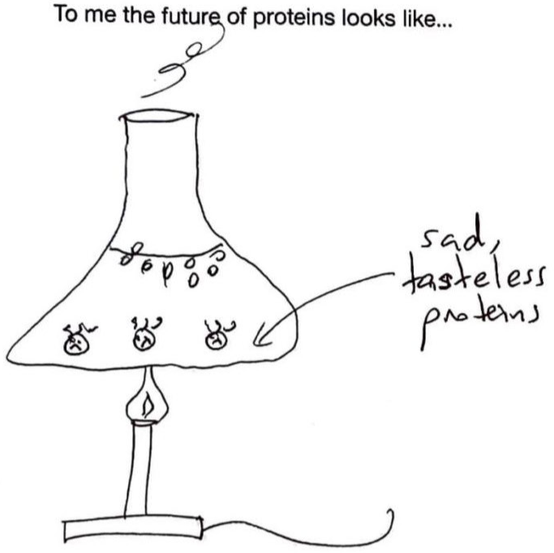
THE FUTURE OF PROTEIN IS ONE WHERE WE DON'T TALK ABOUT PROTEIN. WE TALK ABOUT FOOD AND THE BENEFITS +CHALLENGES OF COMPLEX MATRICES.

WHERE WE DON'T TALK ABOUT COMPOSITION BUT RATHER NOURISHMENT.



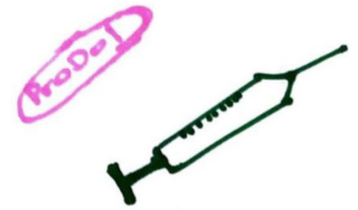
POINT OF THE FUTURE OF PROTEIN

To me the future of proteins looks like...



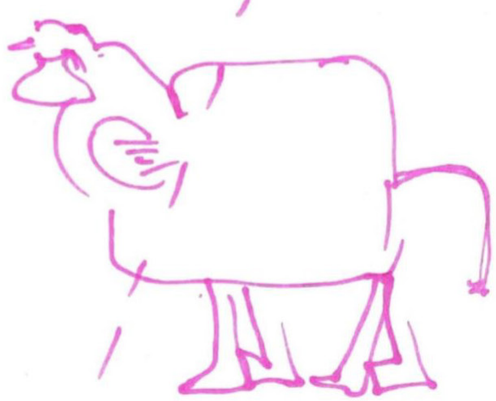
Speculative Design Workshop 2

To me the future of proteins looks like...



nutrition via known dosages.

half of any farm animal.



Definition

What do we mean by alternative proteins?

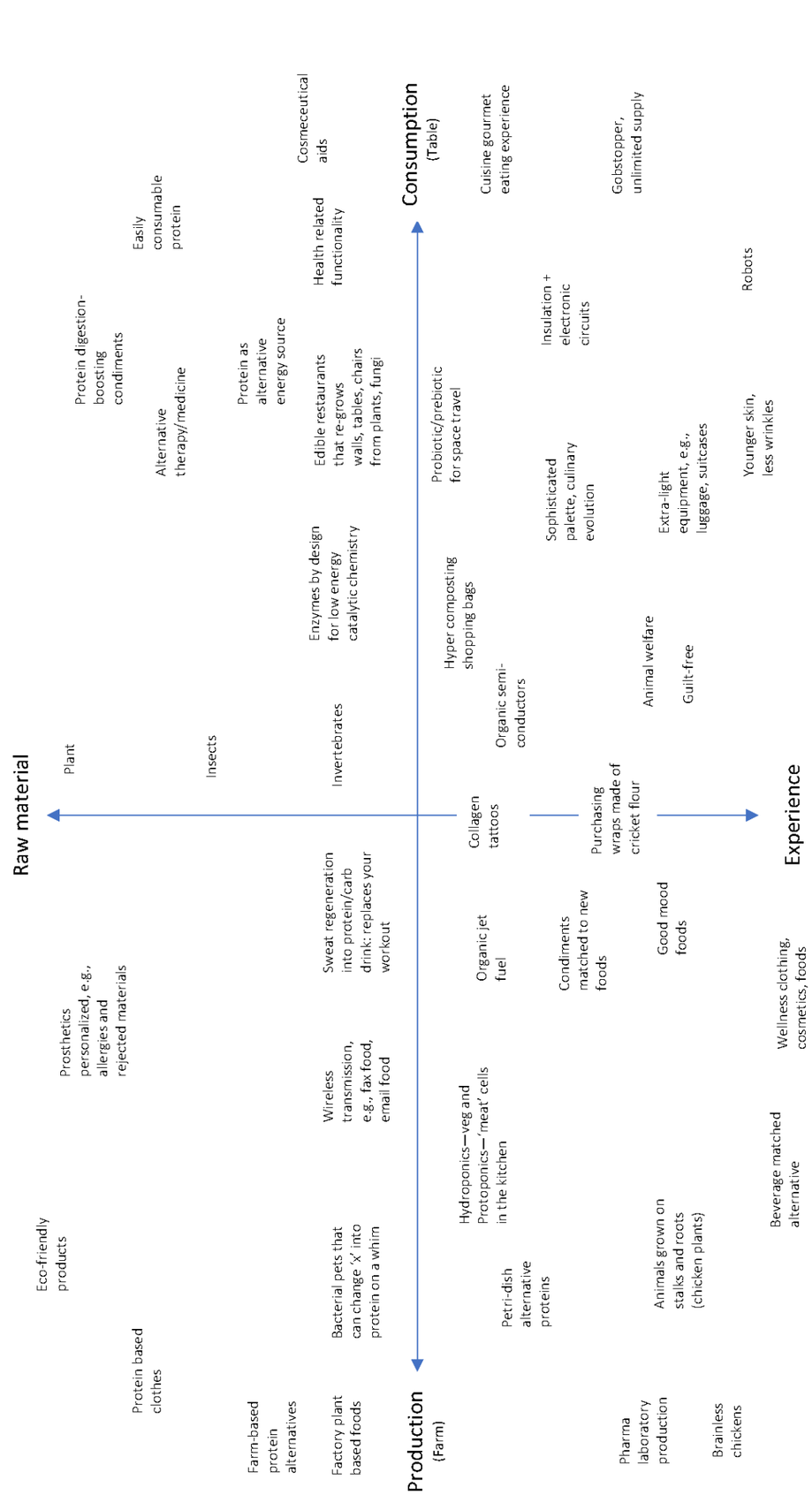
Theme	Responses
Culture, context, perception	Cultural differences (e.g., what is 'alt' varies by culture)
	Cultural association with known protein sources
	Weird food
	Fear mongering
	Consumer acceptability
Not just food	Sustainable source that doesn't wreck the planet
	Vaccines
	Drugs for long problematic disease
	Alternative proteins in cosmetic application
	Protein glue
	Nutritional value of alternatives
	Reformulation
Process, method, design	Protein extraction
	Re-purpose waste
	Proteins other than traditional animal proteins
	What about non-food uses of proteins?
	Proteins from new sources or used in new ways
	Medical/clothing etc.
	Recycled proteins
	Proteins extracted easily and efficiently with reduced waste
	Ultra-processor for taste and digestibility
	Valuing proteins differently based on sequence – animal probably has a higher value
	Dieting protein imbalance: malnutrition vs. too much food
	Safe and friendly (non-lethal, environmentally friendly)
	"Animal free"
	Lipo-glyco-proteins *(are they really protein? Does it matter?)*
	Case in plastics, wool clothes, collagen, gelatin
	Transformation of any proteins to any protein foods
	Non- "animal" proteins
	Plant sources, insect sources sustainable sources/food
	Totally different means of preparation
	Scaling and food quality of proteins: consistency and manufacturing
	Make sure environmental damage of alternative aren't worse than traditional, e.g., wool vs. polyester
	Cultured/printed organs and limbs for transplant
	Proteins can be easily digested by certain group of people, such as designed food
	Non-seasonal
	Plant protein waste
	Totally different means of preparation
Opportunities and drivers	Increased food security for at-risk populations
	Biodiversity and resilience
	New science to discover
	Future study project
	Redistribute to be more sustainable, circular and/or balanced
	Economic growth
	Uncertain impact on environment
	Complementary and sustainable
	Transition to sustainable: economies/industries, societies, ecosystems
	Need to understand digestibility, nutrition and human health links
Other	Alternatives might be different sources, different processing, different applications, different presentations
	Alternative to what?

Vision

Vision focus: the role of science research (service) in responding to consumer demand for Alternative Proteins (product)

Level	Theme	Responses
The Grand Landscape	Resource distribution	Perhaps less water wars
	Moral/ethical responsibility	e.g., Mongantol Seed patents
		Food justice
		Climate justice
		The risk of a Facebook (tech giant) of protein
		Prescription of AI requirements
		Corporate enslavement
	Sustainability	Less plastic waste (vinyl, polyester, etc.)
		Economic + enviro sustainability for NZ
	Decreased diversity	Decreased diversity in landscapes—no animals/plants
	Food production	"peak phosphorous"—how to grow plant naturally
		Printing food
		Hydroponic GM-free crops—no soul
		Personalized nutrition
	Economic Profit	Bring in more economic profit
Societal Landscape	Food equity	Good and reliable nutrition for all regardless of economic situation
		Universal, affordable nutrition
		More resources equally accessible to all people
		Food security
	New opportunities	New products, new opportunites
		New jobs
		Failing to be agile reduces jobs
	Feel-good factor	Happier lifestyle because of choices and less environmental impact
		Moral, ethical, emotional feel-good factor
		Assuage consumers fears that "someone should be doing something"
	Self-sufficiency	Food self-sufficient rural communities
		Indigenous varieties empower indigenous communities
		Viable future for farmers
		License to operate
		Better educated people
		Equal opportunities
		Knowledge sharing
Emotional Landscape	Consumer choice	Consumer / CE
		Safe/healthy foods
		More efficient but also enjoyable eating experience
		Choice availability
		More accessibility by certain groups of consumers
		Enjoyable and nutritious eating experience with lower impact on environment
		Cost-effective protein source
	Environmental impact	Preservation of resources
	Public engagement	Creating the communication channels to inform the public about the new research and products
		Evidence based products/communication
		Science contributes to personal lifestyle choices
		Doing science no one (stakeholders, farmers etc.) prefers or wants to know
		Challenge to conception on natural food
	Feel-good factor	Feel-good factor (no dead animals, environment etc.)
Functional Landscape	Consumer Choice	Can't make enough from current sources
		Good price
		Choices
		Product development and diversification
	Nutrition	Essential nutrition as traditional proteins
	Research	Assess social implications
		Tea o Māori for NZ based alternative proteins
		Information
		Evaluating and quantifying the problems that alternative proteins are trying to solve
		Environmental credentials of alternative proteins
	Economy	Science innovation vs. market push
	Public engagement	Countering misinformation and 'alternative facts'
	Policy	Government coming up with better environmental rules and regulations

Matrix 1 – Future Protein



Futures Canvas

2041 in NZ, transformative scenario

G = group

G1. Sustainable Shelters

G1. Scenario

0. The Possibility:

Name the scenario and describe its potential

- Sustainable shelters—buildings that bio-degrade
- Needed for temporary housing in emergency or remote places, e.g., national parks, remote farm (Crop storage), military campaign, refugee camp…
- Can last up to a few months if spray-coated, or can be used for a few days and then can be broken down and degrades to fertilizer

1. Players

Who is involved in this scenario?

- Shelter inhabitant, builder, material supplier

What communities, organizations and institutions are being included?

- Tourists, military, urban authority, refugees, homeless

What do they value and treasure the most?

- Shelter/protection, mobility

Who do they fear?

- Putting down roots
- Attacked by animals/people
- Lack of personal space
- Hypothermia

2. Context

What is the historical, sociopolitical and economical landscape like?

- Rapidly changing environment
- Short-term, transformative
- Traditional building materials don't degrade → waste, pollution
- Buildings are traditionally expensive and slow to build

3. Challenge

What need, problem or pain is this scenario addressing?

- Housing
- Comfort
- Short-term

What are some assumptions and beliefs that underpin this scenario?

- Population growth
- Greater need for sustainability

- High mobility

4. Trends + Counter Trends

What major trends, drivers and forces are shaping the world?

- Disposable lifestyle
- Live for today
- Look out for #1
- More uncertainty
- Precarious life

What are the counter trends, reactions and responses to these changes?

- Sustainability
- Community spirit
- Intergenerational long-term solution

5. Culture + Values

What are the cultural values and principles determining people's behaviors and conducts?

- Self-centered
- Short-term view
- Scarcity sense

What does society value the most in this scenario?

- Individuality
- Personal space
- Mobility
- Personal choice

6. Technology

Who state-of-the-art technological advancements are impacting this scenario?

- Technology-building materials from nature that are strong, light, waterproof… but biodegradable

What is the relationship between people and technology?

- Knowledge of properties → fit-for-purpose
- Can by DYI—build from modular components
- Nature-based design for whole product life cycle

7. Mood + Vibe

How does this situation feel and look?

- Comfort
- Safety
- Relaxed
- Connected to nature

What are its emotional qualities?

Describe the scene and ambience?

- Empower communities to build their own short-term housing

G1. Situation

Place: House

Offering: Sustainable shelter

Persona: builder

G1. Stuff

- Solvable houses
- Building materials that sprout edible plants etc.
- Construction framework
- Light-weight construction
- Housing shortage + homeless → temporary accommodation in the city
- Emergency shed for: crops, disaster zone, natural park, military/defense refugee camps
- Compact/portable and cheap to produce
- Secure, bulletproof, animal-proof, attractive/colorful
- Waterproof, fire-resistant, wind-proof, insulating, lightweight, degradable

G1. Thing

G1. Implications

What are the implications of this scenario and situation?

- New materials needed

How does this affect the role of AgResearch?

- Designing materials to change the sustainable shelter properties

How might this affect the people involved?

- New stakeholder connections

- New testing and methods: design

G2. Bio-digital Interface @ Palliative Care

G2. Scenario

0. *The Possibility:*

Name the scenario and describe its potential

- Transformed palliative care through bio-digital interfacing of patients with a microchip that doses the brain with psychoactives to create a virtual 'happy place' free of stress and pain
- Potential to network people together to create a wireless (or not) community

1. Players

Who is involved in this scenario?

- Medical community
- Patients and family

What communities, organizations and institutions are being included?

- Local hospices
- District health boards

What do they value and treasure the most?

- Dying with dignity

Who do they fear?

- Death

2. Context

What is the historical, sociopolitical and economical landscape like?

- In pretty open-minded shape with recent reforms in body sovereignty

3. Challenge

What need, problem or pain is this scenario addressing?

- People in palliative care often don't have great prospects or outlooks

What are some assumptions and beliefs that underpin this scenario?

- That people would be okay with lucid hallucinations as a means of escapism or a safe place to go through therapy
- That people are comfortable with digital implants

4. Trends + Counter Trends

What major trends, drivers and forces are shaping the world?

What are the counter trends, reactions and responses to these changes?

- Push back from hyper-connected world + not wanting to be connected even in death
- Facebook, Instagram, Twitter, TikTok creating a hyper-connected world, somewhat shaped to their biases/ideals (rather than realistic reflection of reality)

5. Culture + Values

What are the cultural values and principles determining people's behaviors and conducts?

- Self-determination
- Autonomy

What does society value the most in this scenario?

- Autonomy and dignity in death

6. Technology

Who state-of-the-art technological advancements are impacting this scenario?

- Protein coding
- Biological computers
- Human-machine interfaces
- Psycho-active research
- Neurological science

What is the relationship between people and technology?

- Very-high trust in technology and AI

7. Mood + Vibe

How does this situation feel and look?

- Looks a bit regulative from the outside but feels calming and safe during the experience

What are its emotional qualities?

- Euphoria, excitement, calm, contentment

Describe the scene and ambience?

- Quiet and pain-free

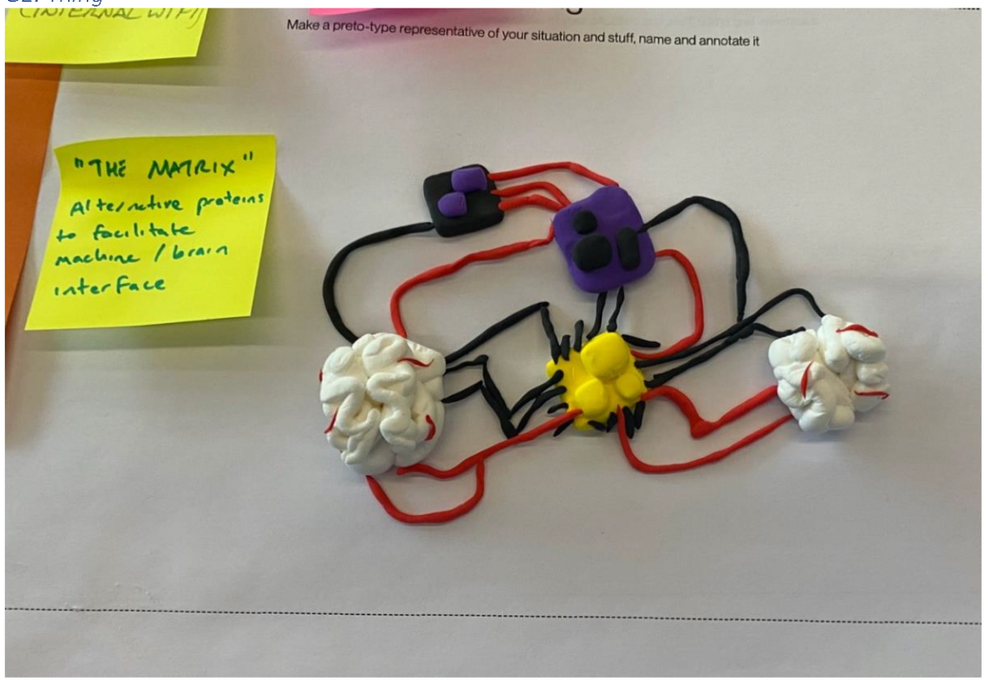
G2. Situation

Place: The ~~home~~ hospice
Offering: Virtual happy place
Person: Palliative care patients

G2. Stuff

- Full medical regime with proto-type included
- Ability to move in and out of happy place
- Biological computers
- Neural implants (internal WI-FI)
- Psychoactive foods, e.g., high tea

G2. Thing



G2. Implications

What are the implications of this scenario and situation?

- With reduced animal production, land-use has switched to producing other natural products—AgR can explore bioactives from other plant + animal products

How does this affect the role of AgResearch?

- Shift away from a focus on agriculture to produce food

How might this affect the people involved?

- Learn new disciplines and skills

G3. Cosmetic + Surgical Alternative Proteins

G3. Scenario

0. *The Possibility:*

Name the scenario and describe its potential

- Alternative protein for cosmetic/surgical industries

1. Players

Who is involved in this scenario?

- People who have a handicap
- Older people
- People who want to become more beautiful

What communities, organizations and institutions are being included?

- Wealthier, appearance-conscious communities
- Hospitals, clinics

What do they value and treasure the most?

- Visual appearance
- Happiness
- Self-satisfaction
- Confidence

Who do they fear?

- Loss of beauty, aging, disability

2. Context

What is the historical, sociopolitical and economical landscape like?

- People are willing to spend when it comes to beauty related things
- People have always been concerned on how they look like
- Some people need prosthetics: more affordable and sustainable options
- World is moving around the idea of sustainability
- Vegans are in action

3. Challenge

What need, problem or pain is this scenario addressing?

- The science, extracting protein from plant or alternative source and using it as raw material for cosmetic purposes and prosthetics

What are some assumptions and beliefs that underpin this scenario?

- Green washing is prevalent

4. Trends + Counter Trends

What major trends, drivers and forces are shaping the world?

- Sustainability
- Organic and earth friendly
- Veganism

What are the counter trends, reactions and responses to these changes?

- Population health effects and benefits

5. Culture + Values

What are the cultural values and principles determining people's behaviors and conducts?

- Religion and beliefs
- Diet and lifestyle
- Economic situation

What does society value the most in this scenario?

- Physical appearance
- Happiness
- Confidence

6. Technology

Who state-of-the-art technological advancements are impacting this scenario?

- 3D printing

What is the relationship between people and technology?

- People are up-to date on current trends and new tech
- People benefit from technology

7. Mood + Vibe

How does this situation feel and look?

- Guilt-free
- Self-satisfaction

What are its emotional qualities?

- Confidence
- Happiness
- Youthfulness
- Frustration—expensive?

Describe the scene and ambience?

- Relaxing
- Cozy

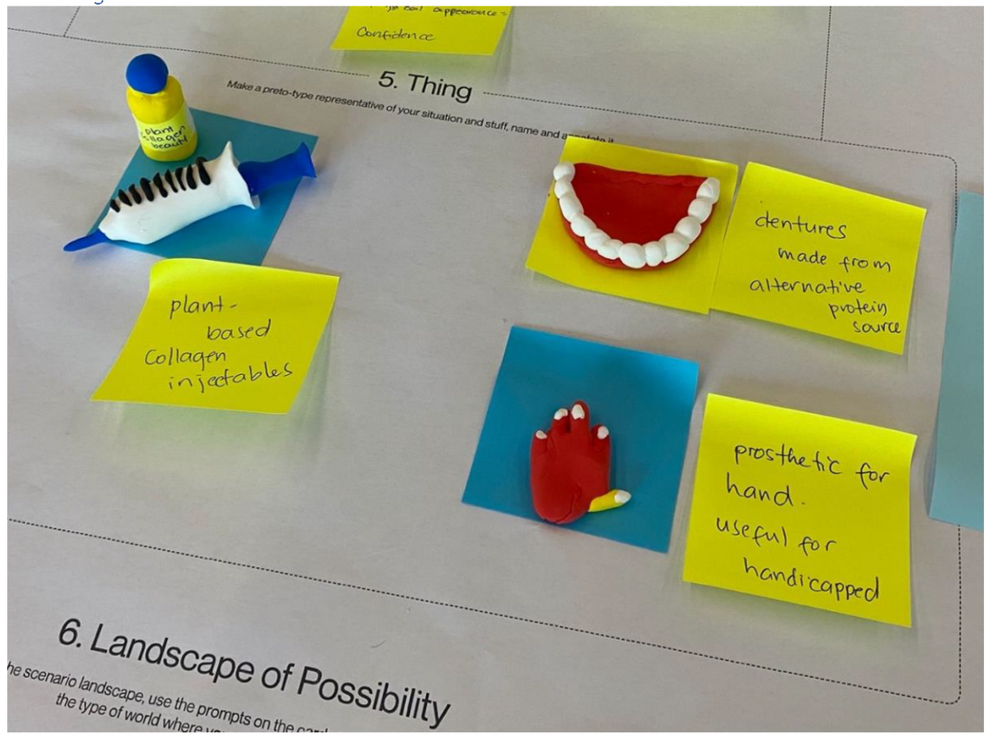
G3. Situation

Place: Cosmetic salons/spas, derma clinic
Offering: cosmetic injectables product and cosmetic salon/spa service
Persona: Older people interested in beauty and cosmetics

G3. Stuff

- Natural, non-toxic prothesis
- Technology—collagen from plants
- Application to client/patient, same as a traditional cosmetic procedure
- Guilt-free experience as it is from a plant, e.g., 'natural' source
- Product and experience caters for all types of lifestyle preferences, e.g., vegans

G3. Thing



G3. Implications

What are the implications of this scenario and situation?

- More money, opportunities and social contribution

How does this affect the role of AgResearch?

- Expansion to another field such as medical/cosmetic science

How might this affect the people involved?

- New job opportunities
- Self-fulfillment and empowerment for users

G4. Fungi

G4. Scenario

0. *The Possibility:*

Name the scenario and describe its potential

- It's 2041, resources are limited. Every bit is required and valuable to society. Fungi (Fusarium Venenatum) is a source of sustenance. However, it's potential is also in packaging, medicinal and possibly in the breakdown of effluent.

1. Players

Who is involved in this scenario?

- Scientists
- Farmers
- Manufacturers
- Shop owners
- Consumers

What communities, organizations and institutions are being included?

- Research institutes
- Factories
- Food suppliers
- Consumer welfare associations

What do they value and treasure the most?

- Sustainability
- Economical return/revenue
- Consumer experience

Who do they fear?

- Waste
- Pollution
- No interest
- Nutrition and health

2. Context

What is the historical, sociopolitical and economical landscape like?

- Food crisis arising from limited natural resources
- Consumers are more and more aware of environmental issues, animal welfare and are interested in alternative proteins
- Reduced waste or zero waste or circular bioeconomy becomes the new norm

3. Challenge

What need, problem or pain is this scenario addressing?

- Expanding the availability of alternative protein sources without putting a burden on the environment

What are some assumptions and beliefs that underpin this scenario?

- The availability of technology at processing and extracting fungi origin protein
- Transforming the protein material for use beyond food, i.e., biodegradable packaging

4. Trends + Counter Trends

What major trends, drivers and forces are shaping the world?

- Zero waste
- Circular economy
- Policies on sustainable and regenerative farming more in place

What are the counter trends, reactions and responses to these changes?

- Potential health risk from mycoprotein in meat
- Challenges the traditional meat industry

5. Culture + Values

What are the cultural values and principles determining people's behaviors and conducts?

- Ensuring a sustainable lifestyle shared equally among members of society

What does society value the most in this scenario?

- Look into the future
- Clean and sustainable farming/manufacturing

6. Technology

Who state-of-the-art technological advancements are impacting this scenario?

- Ability to transform similar raw material for different applications

What is the relationship between people and technology?

- Technology is being driven by people due to the limitation in resources
- Waste no longer holds the cotemporary definition, what is currently being viewed as waste, will be a resource in 2041

7. Mood + Vibe

How does this situation feel and look?

- All is normal and usual, it's just a new norm and tradition

What are its emotional qualities?

- Feel happy and guilt-free, as what you're eating and producing will go back to nature in a circular way

Describe the scene and ambience?

- Most people have moved on to alternative protein products
- With refined food quality, no one sees this as 'alternative meat products' but as a new sausage product

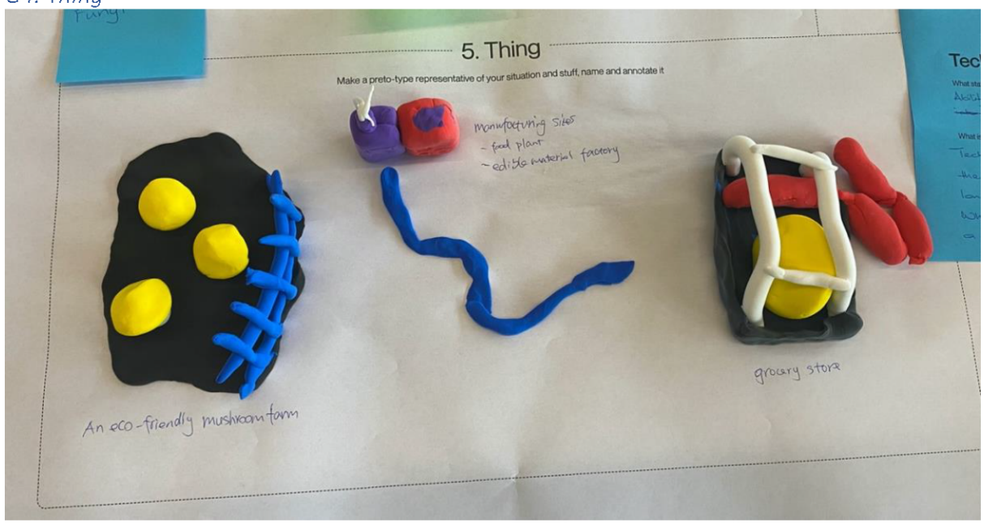
G4. Situation

Place: Grocery store
Offering: "Zero waste" vegetarian sausage
Persona: people—environmentalist, conservationist

G4. Stuff

- Furthering biomimetic research and tech to extract protein from waste stream to make other supporting products
- Fungi (Fusarium Venenatum) extracted from the soil to grow in the lab to produce the "meat"
- Build an eco/sustainable farm by controlling pests and nutrients
- Mycelium from mushroom to be used to make the package

G4. Thing



G4. Implications

What are the implications of this scenario and situation?

- Consumption of alternative proteins is the norm
- Use of alternative protein as a food resource is not considered “alternative” in 2041

How does this affect the role of AgResearch?

- Expand to holistic agricultural research; go beyond farming, agri-foods etc.
- New research protocol and method—closer and more connected to society, e.g., local farmers

How might this affect the people involved?

- Scientists communicate more with society, e.g., consumers, marketing people, suppliers etc.

G5. Clothing Substrate

G5. Scenario

0. The Possibility:

Name the scenario and describe its potential

- Using inedible protein sources, avoiding waste, generating a material that is home-recyclable
- Potential: re-use of waste

1. Players

Who is involved in this scenario?

- Domestic household
- Manufacturer
- Protein maker

What communities, organizations and institutions are being included?

- Councils
- Schools

What do they value and treasure the most?

- Sustainability

Who do they fear?

- Loss of resources
- Pollution of landscapes

2. Context

What is the historical, sociopolitical and economical landscape like?

- Complicated
- Strong government
- Income inequality

3. Challenge

What need, problem or pain is this scenario addressing?

- Disposal of waste
- Cost-effective availability of protein

What are some assumptions and beliefs that underpin this scenario?

- People place sustainability as top priority

4. Trends + Counter Trends

What major trends, drivers and forces are shaping the world?

- Climate change
- Pressure on resources
- Fashion

What are the counter trends, reactions and responses to these changes?

- Circular bioeconomy

5. Culture + Values

What are the cultural values and principles determining people’s behaviors and conducts?

- Inclusivity
- Diversity

What does society value the most in this scenario?

- Access to talent
- Equity

6. Technology

Who state-of-the-art technological advancements are impacting this scenario?

- Biofuels
- Solar
- Extrusion technology of 3D printing

What is the relationship between people and technology?

- Harmonious
- Always developing

7. Mood + Vibe

How does this situation feel and look?

- 'Normal'

What are its emotional qualities?

- Guilt-free, feel-good

Describe the scene and ambience?

- Domestic
- Comfortable
- Homely

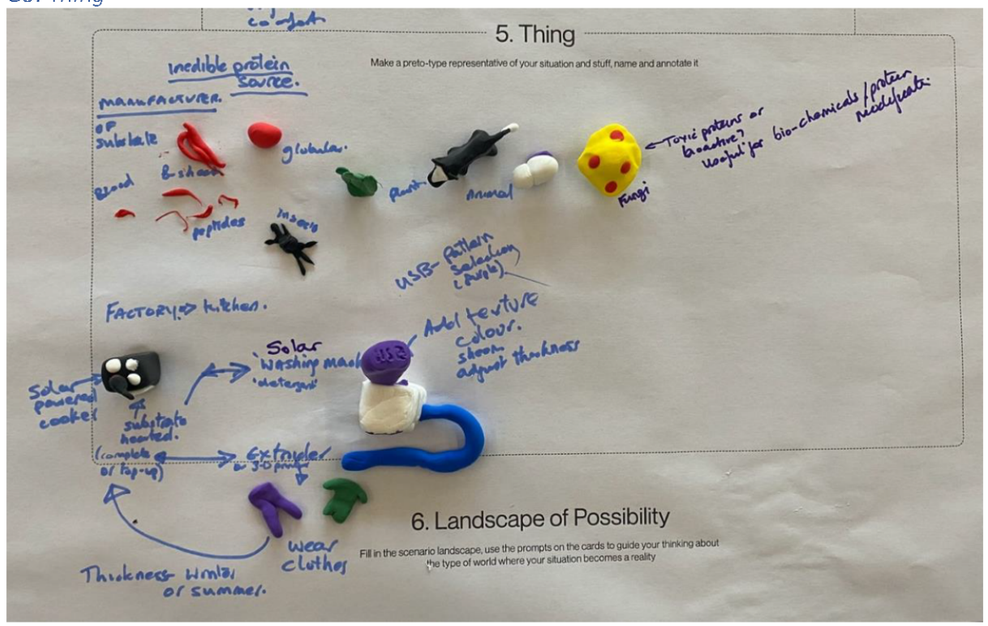
G5. Situation

Place: Shop → factory
Offering: product—recyclable clothing
Persona: stakeholders and people—environmentalists

G5. Stuff

- Clothes you can eat or clothes your dog can eat
- Edible packaging
- Clothes → wear → solvable → extruder (for new outfit)
- Inedible protein source can be used for clothing manufacture to soluble which can be 'washed' and re-extruded into new clothing
- Protein source (inedible)
- Initial manufacturer of 'clothes' or substrate
- Washing machine maker
- Pattern designers
- Dye and 'fabric' modifiers
- Science in protein; for behavior etc.
- Check anti-bacterial properties
    - Shelf-life, degradation, etc.

G5. Thing



G5. Implications

What are the implications of this scenario and situation?

- Clothing manufacturers won't be happy
- Software design/pattern markers are very happy
- Roles for agriculture and horticulture

How does this affect the role of AgResearch?

- Fiber team → role
- Uses of protein (inedible)
- Protein behavior—current but needs extending
- 3D printing, AI for protein use discovery
- Engineering
- Software development of patterns
- Shell-life, reuse studies

How might this affect the people involved?

- Changing roles
- New roles and specialties
- Need to produce 'raw' materials still → agriculture/horticulture or forestry

G6. Farms in Space

G6. Scenario

0. The Possibility:

Name the scenario and describe its potential

- The moon needs biomass because it currently has none
- Biomass can then be purposed into many things: food, fuel, construction

1. Players

Who is involved in this scenario?

- Colonists
- Mega food tech company
- Deep sea divers (for fumaroles)

What communities, organizations and institutions are being included?

- Usual international space agencies

What do they value and treasure the most?

- Survival

Who do they fear?

- Dying
- Conflict
- Inability to colonize beyond Earth

2. Context

What is the historical, sociopolitical and economical landscape like?

- Earth is failing
- Less of resources
- Cooperation among desperate nations

3. Challenge

What need, problem or pain is this scenario addressing?

- Over population
- Pollution
- Global collapse

What are some assumptions and beliefs that underpin this scenario?

- Cooperation
- Fumarole microbes can grow on mars

4. Trends + Counter Trends

What major trends, drivers and forces are shaping the world?

- (As in context)

What are the counter trends, reactions and responses to these changes?

- Collaboration over competition because we've already competed the resources to extinction

5. Culture + Values

What are the cultural values and principles determining people's behaviors and conducts?

- Non-class system
- Equitable distribution
- Trust and transparency

What does society value the most in this scenario?

6. Technology

Who state-of-the-art technological advancements are impacting this scenario?

- Miraculous bioreactors powered by radiation
- Functional microbes
- Utilization of biomass

What is the relationship between people and technology?

7. Mood + Vibe

How does this situation feel and look?

- It's a hoot

What are its emotional qualities?

- Hope, inspiration, futureproofing

Describe the scene and ambience?

- Mirthful, with heaps of modelling clay

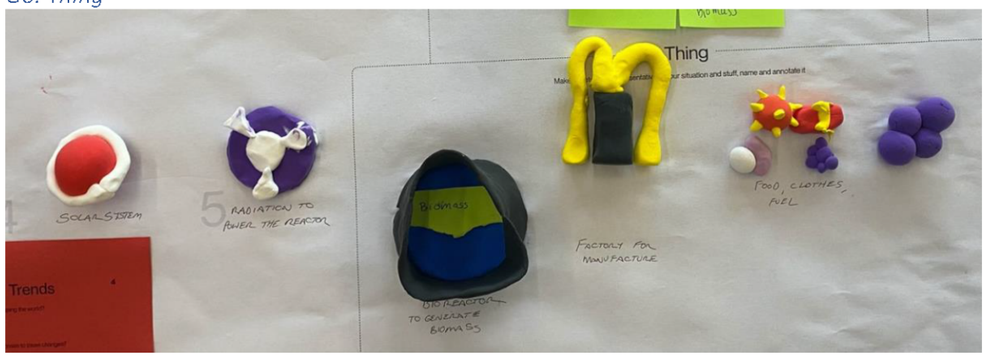
G6. Situation

Place: Moon Aotearoa, Moon Zealand, New Zealunn
Offering: Survival/supporting life
Persona: Producer of food (for people living on the moon)

G6. Stuff

- Limited resources; raw materials, energy, non-earth materials
- "Deep dark" "bacteria" from fumaroles grown in reactor vessels = biomass
- Automat need "energy source"
- Radical

G6. Thing



G6. Implications

What are the implications of this scenario and situation?

How does this affect the role of AgResearch?

- Partner with NASA
- Does our gut microbiota require gravity?
- Extend gut-brain axis research to zero gravity and sterile situation

How might this affect the people involved?

- They will be re-educated in a camp

Workshop 2 (Palmerston North)

To what extend did the approaches used in this workshop help you to think in a different way?

1	2	3	4	5	6	7
Not at all			To some extent			To a great extent

4, 4, 4, 5, 5, 5, 6, 6, 6, 6, 7 = 5.3 average

Comments

- Nice frameworks – I like the matrix axis (raw material—experience)
- Loved the model building, it really helped consolidate how the concept might work in practice
- Some of the scenarios are very general/vague
- It allowed for mind bending ideas to flourish
- Already working in plant protein food area
- I'm still not entirely clear on design-led thinking

If we were to use these methods again, how would we adapt them to be more useful?

- Futures canvas: the 7 cards were a lot to fill in and could be simplified
- More time for the roundtable on futures canvas to build on idea/scenario with input (e.g., switch teams halfway)
- Maybe more specific guide questions, scenario
- Making stuff out of the modelling clay
- Not sure
- Remove some of the constraints on the order of how we proceed
- Add participants external to AgR with different roles and views
- Putting current technology in the perspective of the future and how would current technology/knowledge step-up as a solution or resource to further the research in alternative proteins
- Very broad
- Maybe more time on the slides at the beginning of your introduction-to understand the role of design

What did you particularly enjoy?

- Chance to draw and build instead of writing
- Seeing all the model scenarios built from some really crude post-it notes, really creative extrapolation letting an idea be built out by a different group
- Doing the product prototype
- Brainstorming and creating the scenario
- The interaction, pairing or grouping, as well as individual idea generation. A good diversity of that
- Discussing options and preto-typing
- The futures canvas
- The session on what alternative proteins mean to me
- Futures canvas—clay is therapeutic
- Last stage = problem solving, which we tend to be good at

What did you find challenging?

- Vision board: 1/2/3/4 distinctions weren't super-clear
- To move away from food as a primary application
- Thinking outside-the-box; alternative protein source use apart from food
- Thinking about something we can do beyond food research
- Seeing the path from ideas to something concrete
- When the scenario [example] of each step is given during the mediate session. It can sometimes confine the space for creativity
- Think transformative
- Making an idea complete and sound within the bounds of reality
- The last session with clay – the elements didn't fit together well in my mind—too complex and disjointed, and didn't seem to flow well
- Answering the colored questions, not sure how this added to the itinerary
- ?

Have you worked with designers before?

No = 6

Yes = 4

Indirectly = 1

Describe what 'design' means to you:

- Instantiating solutions that meet unarticulated needs/desires through "system 2" emotions, desires
- Converge and make more concrete and tangible
- Something that makes a picture of what something will look like once it's done
- Starting from the scratch, looking from definition to imagining what we can do
- Use of form and function to give a result that is aesthetically pleasing and functional
- Creative, innovative, trendy
- Create
- Progressing from the idea to understanding it's potential
- A form having some kind of function and appearance
- Design: something put together to a speculation, following a thought session. Usually 'design' is for a specific customer or purpose
- In my experience, helps with visualizing/expressing a known idea

How might design fit within the broader science research area?

- Part of programme logic science project planning
- MBLE sessions, ideation or SSIF
- It gives a more interactive and visual approach to idea/product development
- Emphasise creativity
- It might help structure and organize/group some of the innovative ideas and pull the people interested in the similar topics together
- Create new research ideas
- Allowing current research to be aimed differently
- Still not sure
- We already design experiments, strategy design is an extension.
- ? I really don't get it yet

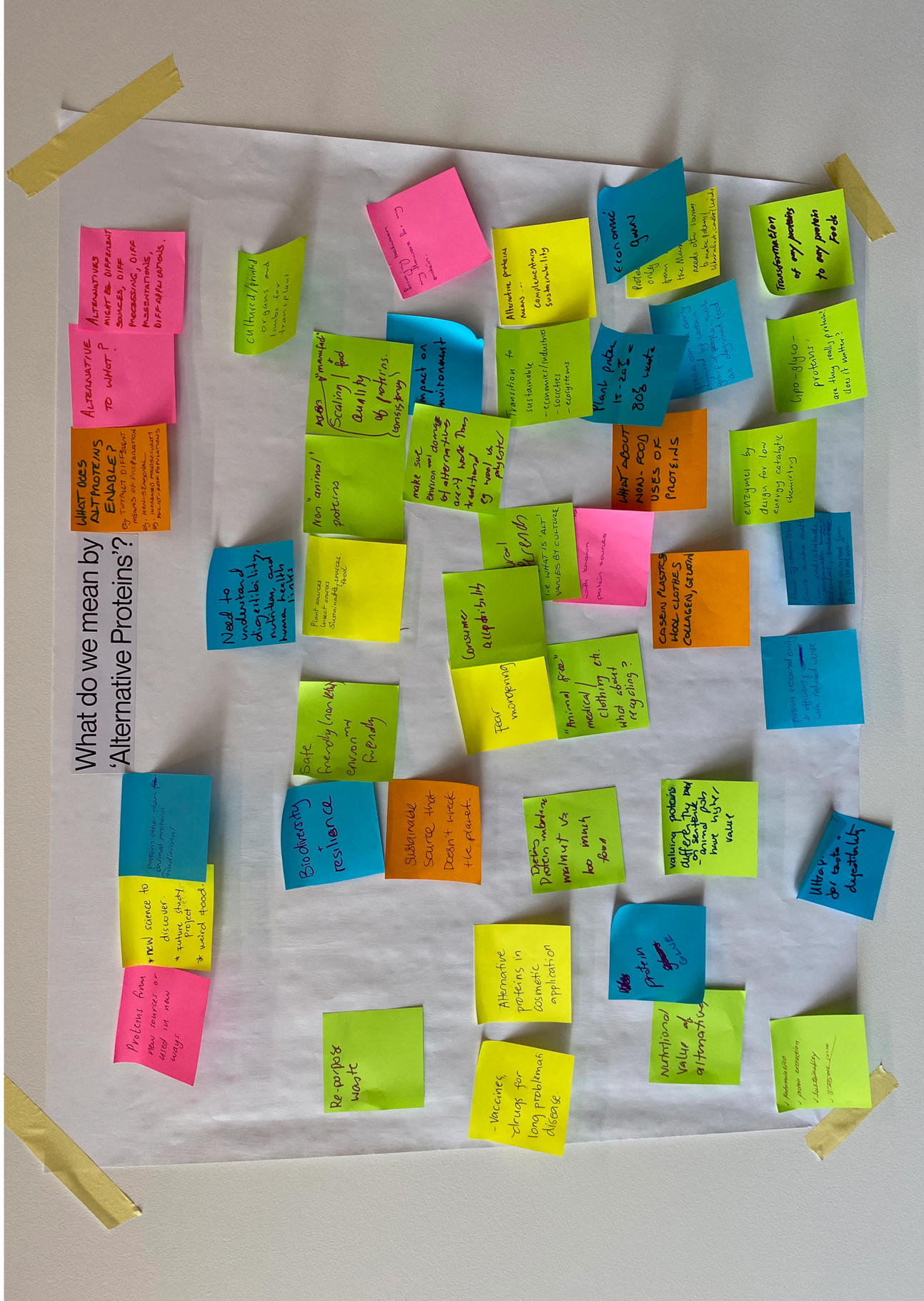
How might design support you in your role and work?

- Support science communication, figure/image design
- Make better project proposals
- Bringing creativity and getting out of my comfort zone
- Building with a team
- Not sure
- It can help guide me to define the ideas I might have and put them in a better described picture
- Think out-of-the-box, train your mind to be more innovation driven
- Progressing a concept to a point of understanding it's potential
- Not sure
- I'd argue we already use
- ?

Additional comments:

- Lots of fun! … and challenged my thinking
- Like the hands-on session, which has created more vibe to the workshop. Thank you
- Need to spend more time exploring the meaning of some of the terms that were used, with lots of examples of usage and relevance to science

Good fun. I see some significant ideas worth pursuing coming from this



G nd's Vision

4 Why it matters: Describe the world landscape when the ultimate effect of your work has been reached

The Grand Landscape

3 Why it matters: Describe the societal impact when all people get to benefit from it

Societal Landscape

2 Why it matters: What value does this service and product add to peoples' lives?

Emotional Landscape

1 Why it matters: What does this service and product provide to consumers?

Functional Landscape

Vision focus

...le o... search (service) in responding to
...umer ... Alternative Proteins (product)

Future of Proteins

Raw Material

Consumption (Table)

Production (Farm)

Experience

Ruakura Workshop Documentation

Appendix G

Time (PM)	Activity	Materials	Duration (mins)
12:30	Intro	Info sheet, consent form, Power point	10
12:40	Word Association	Worksheet, pens	10
12:50	Visualisation	Worksheet, felts	15
1:05	Definition Discussion	Post-it notes, paper, felts	20
1:25	Vision	Canvas, post-it notes	35
2:00	Break	Biscuits	20
2:20	Rapid Ideation	Canvas, post-it notes	15
2:35	Futures Ladder Canvas	Canvas, light clay, felts	60
3:35	Implications Discussion		25
3:55	Reflection	Survey	5
4:00	End		

Phase	Time	Activity	Description	Talking Points + Prompts	Duration
Introduction	12:30	Introduction	Introduce everyone, powerpoint	- Introductions, go around the table and get everyone to introduce themselves - 5-minute spiel to provide some background info on the lead-up to my project, the broader project and then I'll go over the workshop aims and structure.	10 mins
Map	12:40	Word Association	Worksheet 1	Checkpoint 1 [Hand out worksheets] 1. Think of some roles you play in everyday life. 2. List the first 10 things that come to mind You do not have to fill them all out 3. Mark where you sit in the sliders. 4. We will then go round the table and share the first and last words from the word association.	5 mins
	12:50	Visualisation	Worksheet 2	1. Visualise what does 'alternative proteins' means to you - try using words and pictures. 2. We will then have a look at each other's drawings and discuss what the future of protein might refer to. - You will not be judged on your drawing ability and you most certainly do not have to be Picasso.	15 mins
	1:05	Definition	Working definition discussion	1. Have a walk around and look at everyone's drawings 2. Have a think about what alternative proteins means to you in a couple words, write your thoughts down on post-it notes. - It does not have to be in detail or resolved. The response can be intuitive. - What do we know about proteins? - What do we not know proteins? - What are some commonalities we are seeing? - What is particularly interesting? - What might future proteins enable? - Shift away from food focus 3. Stick them up on the wall, have a look and we'll cluster them.	15 mins
Map	1:25	Vision	Vision Ladder Canvas	1. Now that we have an idea of what we mean by 'Alternative Proteins', let's create a broad guiding vision. 2. Move over to the canvas [show vision example slide] 3. Have a think about each landscape level and try contributing at least one thing to each level. - If you can add more than one, that's brilliant. - You have about 20 minutes for this, we will then spend the remaining 10 minutes of this activity going through it and clustering by theme. - Try think beyond a food focus, especially try think beyond plants	30 mins
	2:00	Break			15 mins

Multiply	2:20	Opportunity	Matrix: NZ Future of Alternative Proteins	Checkpoint 2 1. Move to matrix 2. Brainstorming ideas about the future of proteins 3. This is a rapid ideation activity. 4. The vertical axis locates raw material and experience on either end, ans the horizontal axis focuses on the places ranging from production to consumption. - This about quantity not quality. Every idea is useful and the wilder the better. - It's about radical ideas that have the potential to be transformational. - Take cues or norms of proteins or food from your everyday life and flip it on its heads. - If you get really stuck, build on top of the examples and evolve or combine them to form a new idea. - I'm asking you essentially to be a designer and come up with new ideas.	20 mins
Mediate	2:35	Futures	Futures Canvas	Checkpoint 3 [Show futures ladder slide] 1. Introduce the Futures Ladder Canvas - This futures canvas was created based off the experiential futures ladder. - The premise behind this is that in order to imagine a future state, we must go from the abstract and general top-level descriptor to a more concrete and specific representation of what the future might entail. - The point of this activity is to progress an idea to understand it's potential. [Show futures canvas slide] - Design and pretotype a Future Protein idea - Quick presentation and discussion on what has been created. - There is an hour for the next activity. 2. Spilt into pairs 3. Choose an idea from the matrix: Take note of the position of it on the axis when you grab it - If you want, grab two post-its and merge the ideas to create an even more radical idea. 4. In the setting row, write 2041 NZ and circle transformative. 5. Identify the place and opportunity. Grab a fresh post-it and put them in the boxes in the situation space. 6. Next, have a think of the type of people in this situation. Create a high-level persona. 7. Build on this future situation. Once again, rapidly ideate stuff in response to this situation. 8. Choose an idea and pretotype it. A pretotype comes before a prototype, it is extremely lo-fi and is used to materialise an idea quick and easily. It does not have to be perfect or resolved. Keep in mind, there are no constraints. - While you do this think about how you use it, the *size, shape, colour, texture, taste, storage, cooking, cultural connotations, production…* 9. Annotate it: what is it? Describe how you experience it or how you use it 10. Fill out the Landscape of Possibility cards - Use your situation, stuff, and think to guide your thinking to construct a scenario of NZ in 2041. This is about describing a possible future scenario, it is not about predicting or analysing the particulars but more so about what might be seen at a glance.	5 mins
Mount	3:35	Discussion	Tabletop gallery	1. Present, go around the table, elevator pitch, describe how this works 2. Discuss the implications of these situations become a reality - How does the scenario, situation, stuff and thing affect AgResearch's role? Jot down some thoughts and add them to each canvas.	25 mins
Reflection	3:55	Survey	Feedback form	1. Form	5 mins

Ruakura Workshop

Worksheets

Think of some roles you play in everyday life:

- Mother, wife, baker, maker
- Father, voter, gardener, citizen
- Dad, gardener
- Dad, husband, granddad, gardener, mover, property manager
- Wife, mother, researcher, business owner
- Connector, ideator, TV watcher
- Photographer, sports watcher, sister, aunt, daughter

'Alternative proteins' word association

1. Progressive, labs, synthetic, vegetables, test tubes, happy cows, healthy environment, future generations, healthy people
2. Not animal, plant, fungi, sustainable (more), healthy, fashionable, controversial
3. Transformation, transition, ethics, food system, environment, economy, equity, food safety, meat, Moa
4. Synthetic beef, non-milk milk, burger ad, when does it have a unique name, accelerating, mega cities/local
5. Petri dishes, insects, yuck, not animal based, plant based, chemicals, crunchy, protein powders, futurish movies, variety
6. Goo, legumes, texture, taste, brown, new/futuristic, controversial, climate friendly, opportunity, healthy
7. Lab, plant-based, disruptive, changing landscape, insects, soy, taste-question?, animals-future roles, choice, healthy

How familiar am I with the concept of 'Alternative Proteins'?

1= Never heard of it 3= Read a couple things 6= Discuss this all the time

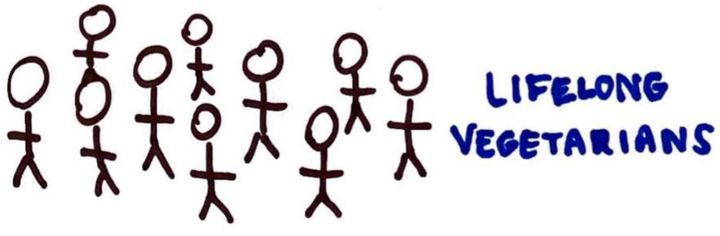
2, 3.5, 4, 4, 4, 4.5, 5.5 = 3.9 average

How do I feel about 'Alternative Proteins'?

1= Hate it 3= Comfortable 6= Super excited

2.5, 2.5, 4, 5, 5, 5, 5.5 = 4.2 average

To me the future of proteins looks like...



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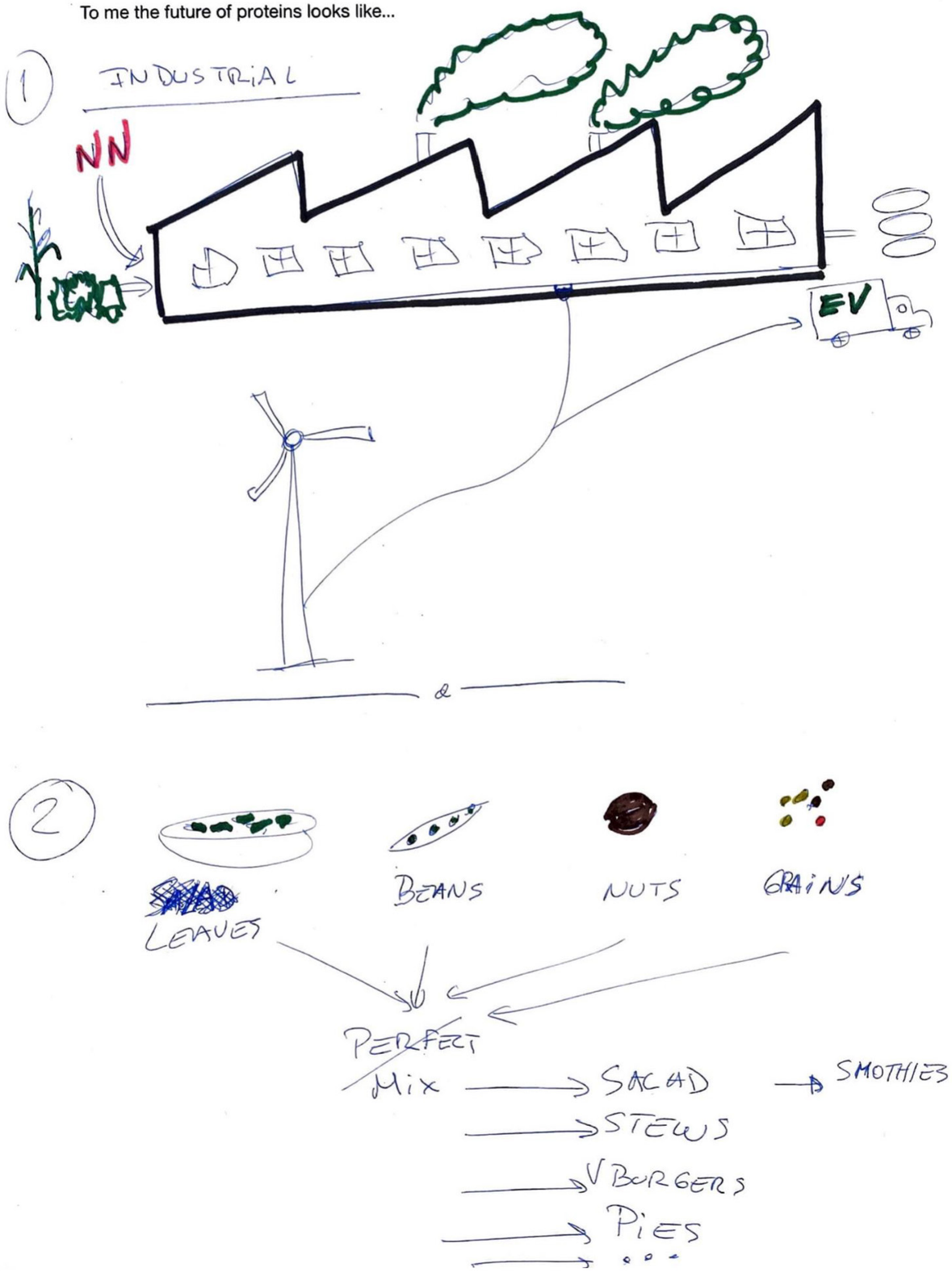

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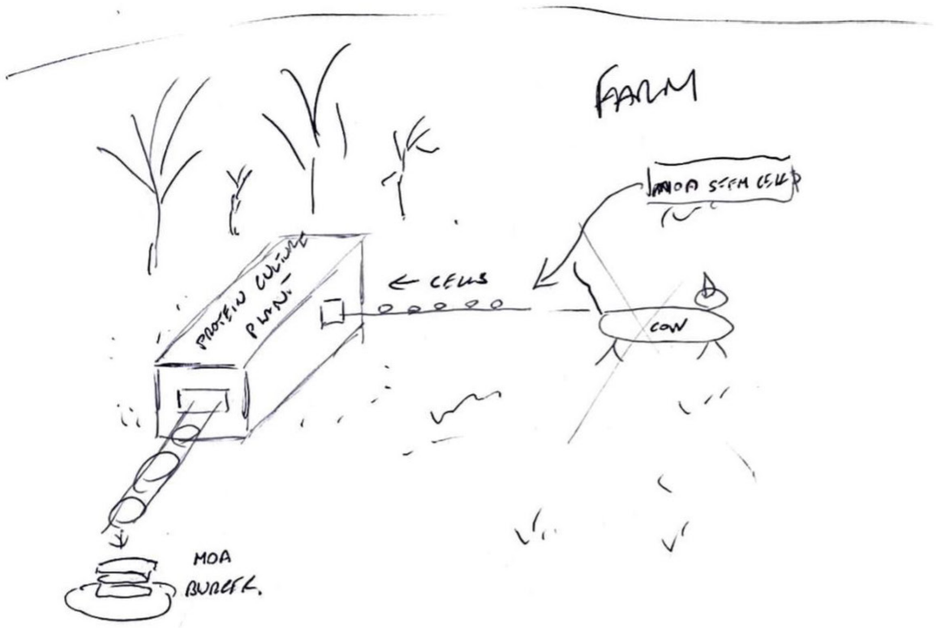
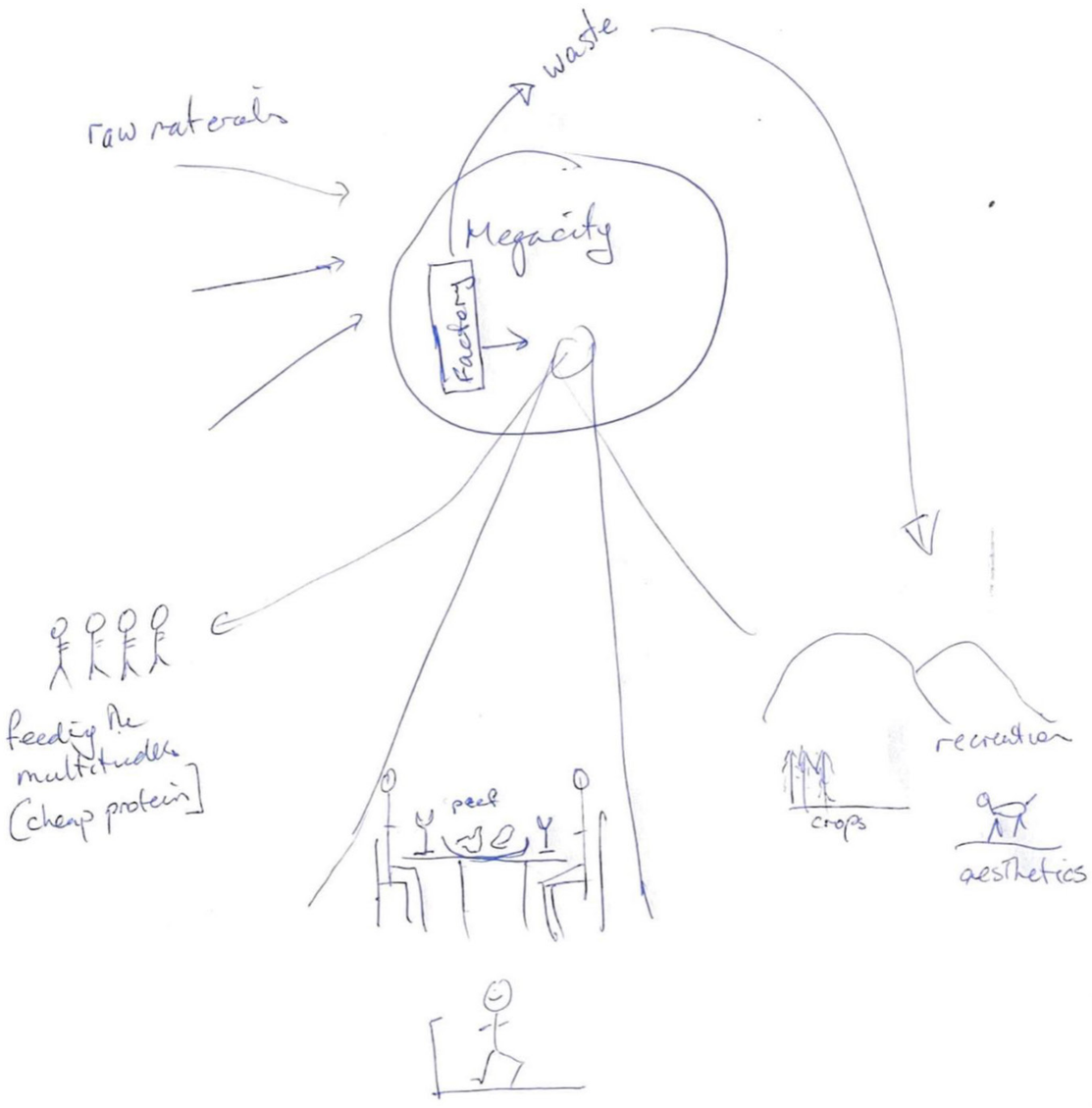


Speculative Design Workshop 2

To me the future of proteins looks like...



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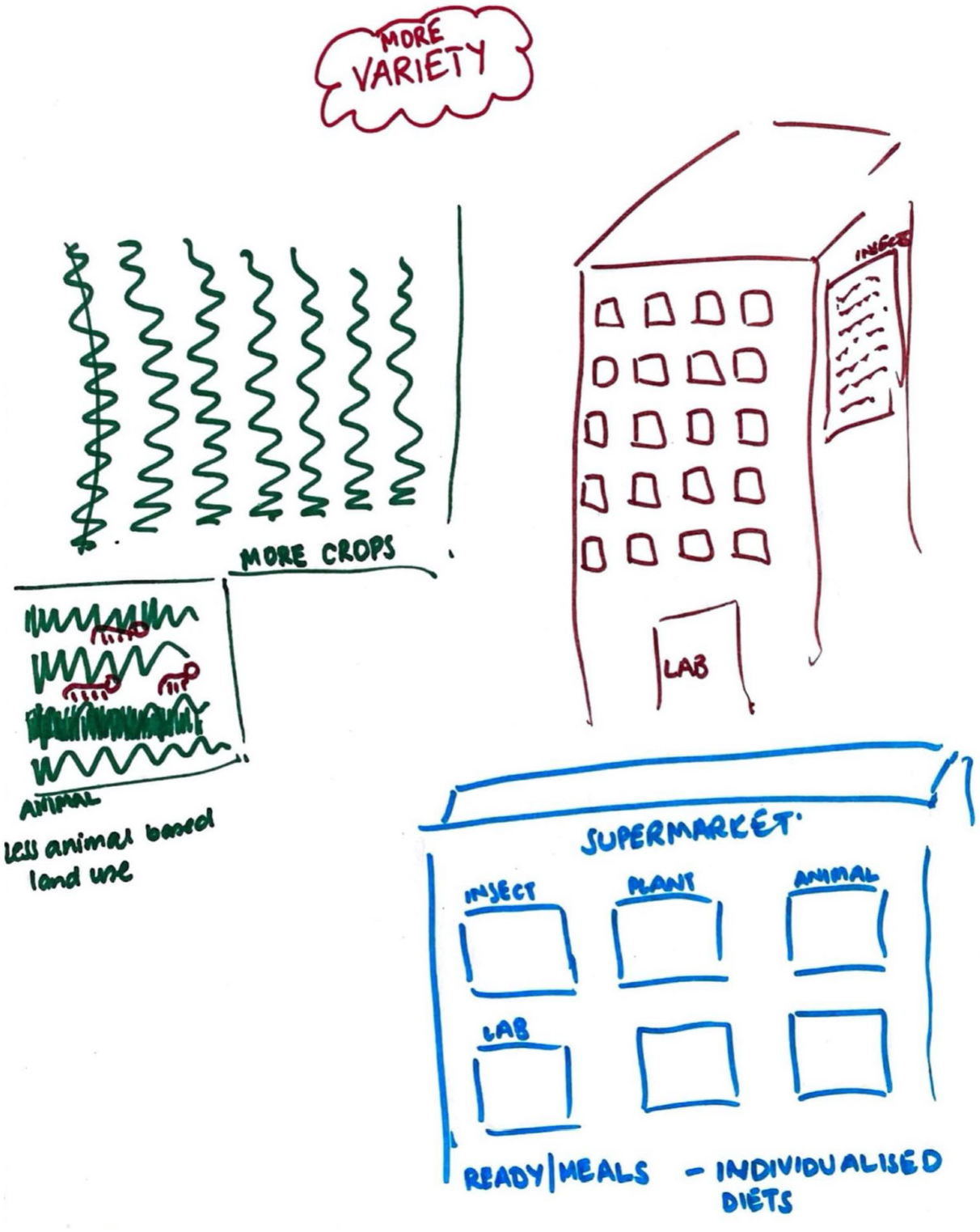
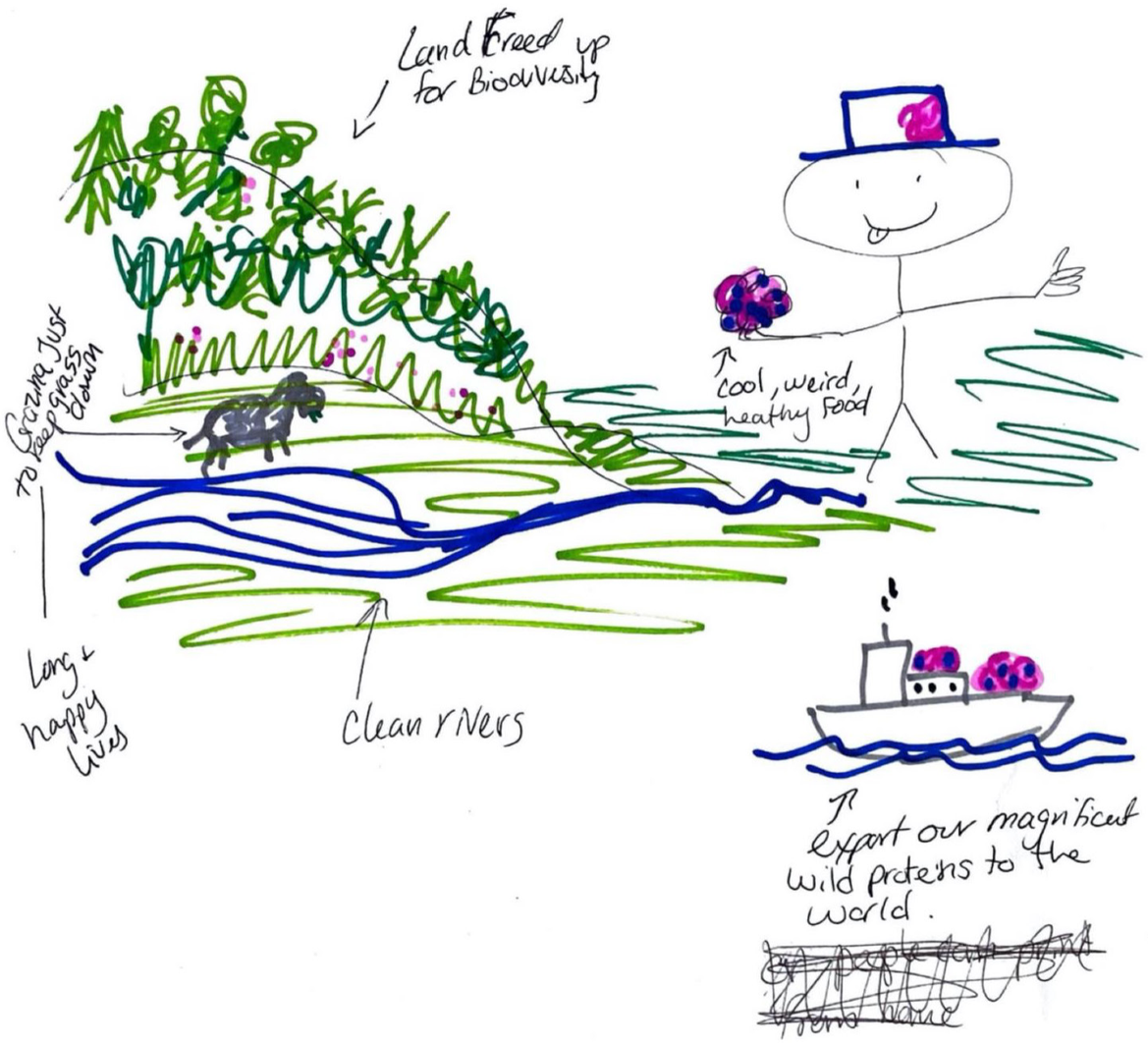


Speculative Design Workshop 2

To me the future of proteins looks like... Choice

To me the future of proteins looks like...



Definition

What do we mean by alternative proteins?

Theme	Responses
Culture, context, perception	Infinite possibilities (presentation)
	Re-definition of food
	Substitution
	A shift away from protein = meat
	Individualized diets
	Meeting needs: protein source, balanced diet, healthy diet
	Changing food options
	Healthy and happy consumers
	Alternative foods
	Customer acceptance
	Must be 'better' than conventional proteins
Not just food	Any kind of 'blobs'
	Cultured human flesh
	Transplants
	Genetically engineered protein for specific purpose
	Structural material (spider webs)
	Supplement
Source, process, method, design	Not necessarily lab grown
	More of the good stuff (vegetables, grains, nuts + seeds)
	Not animal
	Plant based meats
	Plant based and …
	Non-animal products and food components
	Cultured veg, milk
	Insects
	Multiple sources: insects, lab, animal, plant
	What role will animals play?
	Meat, cheese, milk and beyond
Opportunities and drivers	Restored land + rivers
	Ability to feed the world
	Ethical food production
	Affordable and economic for all
	Food for the masses
	Return to system equilibrium: environment, animal welfare, human health
	Increased biodiversity
	Changing landscape
	Creating space for alternative land uses
	Healthy environment
	Sustainable food production
	Our moral duty to the plant
	Less heart disease, obesity and diabetes

Vision

Vision focus: the role of science research (service) in responding to consumer demand for Alternative Proteins (product)

Level	Theme	Responses
The Grand Landscape	Nutritional outcomes	Nourish/feed the world
		Sustainable/equitable access to food globally
	Environmental sustainability	Sustainable protein production systems
		Sustainability
		Biodiversity enhancement
		Reduction of greenhouse gases
Societal Landscape	Improved health and nutrition	No hungry people
		Improved health = less pressure on social/health services
		Happy, healthy population
		Healthier population
		Food security
		Individualized products (meeting health needs)
	Role of animals	Animals are not food (shift in perception of the value)
	Producer systems	Better distribution of protein
		A condensed and more transparent value chain
		Respect for food producers
		Lower food wastage
		Job security
		No more farmers?
		Equity food distribution
	Economic opportunities	An opportunity to redesign our economy around new things
		New careers in food production
		New career options (not just farming)
		Primum non nocere
Emotional Landscape	Alignment with consumer values	Welfare friendly protein
		No animals harmed in the making of this food
		Better for environment
		Reduced cognitive dissonance = happier, more contented people
		Guilty-free food/materials
	Meeting consumer needs	Affordable food that meets dietary requirements
		Improved health
		Affordability
		Healthier environments
		Easy food preparation for busy people
	Lifestyle change	Alternative ways of socializing
	Options for using proteins	Protein based building materials
		Endless variety, only limited by imagination
		Produce proteins for a specific purpose using GE tools
Functional Landscape	Product cost	Affordability
		Low-cost alternative or… high-cost highly functional foods
	Product variety	Improved diet, user specific diets
		Ethical choices
		Healthy food
		Choice of products
		Good tasting alternative proteins
		Anything is possible
	Background information to support	Improved environmental outcomes
		Reduced animals
		Alternative protein products

Futures Canvas

2041 in NZ, transformative scenario

G = group

G1. Smart Muscle Regeneration

G1. Scenario

0. *The Possibility:*

Name the scenario and describe its potential

- Old Aotearoa
- Growing ageing population

1. Players

Who is involved in this scenario?

What communities, organizations and institutions are being included?

What do they value and treasure the most?

Who do they fear?

- Pain
- Old age
- Death
- Pandemics
- Climate change
- Sleeplessness
- Mental health

2. Context

What is the historical, sociopolitical and economical landscape like?

- Fewer, bigger countries
- High-level of government control to combat climate change and pandemics

3. Challenge

What need, problem or pain is this scenario addressing?

- Old people in pain

What are some assumptions and beliefs that underpin this scenario?

- No more pandemics
- People want to live longer
- People or government can afford it

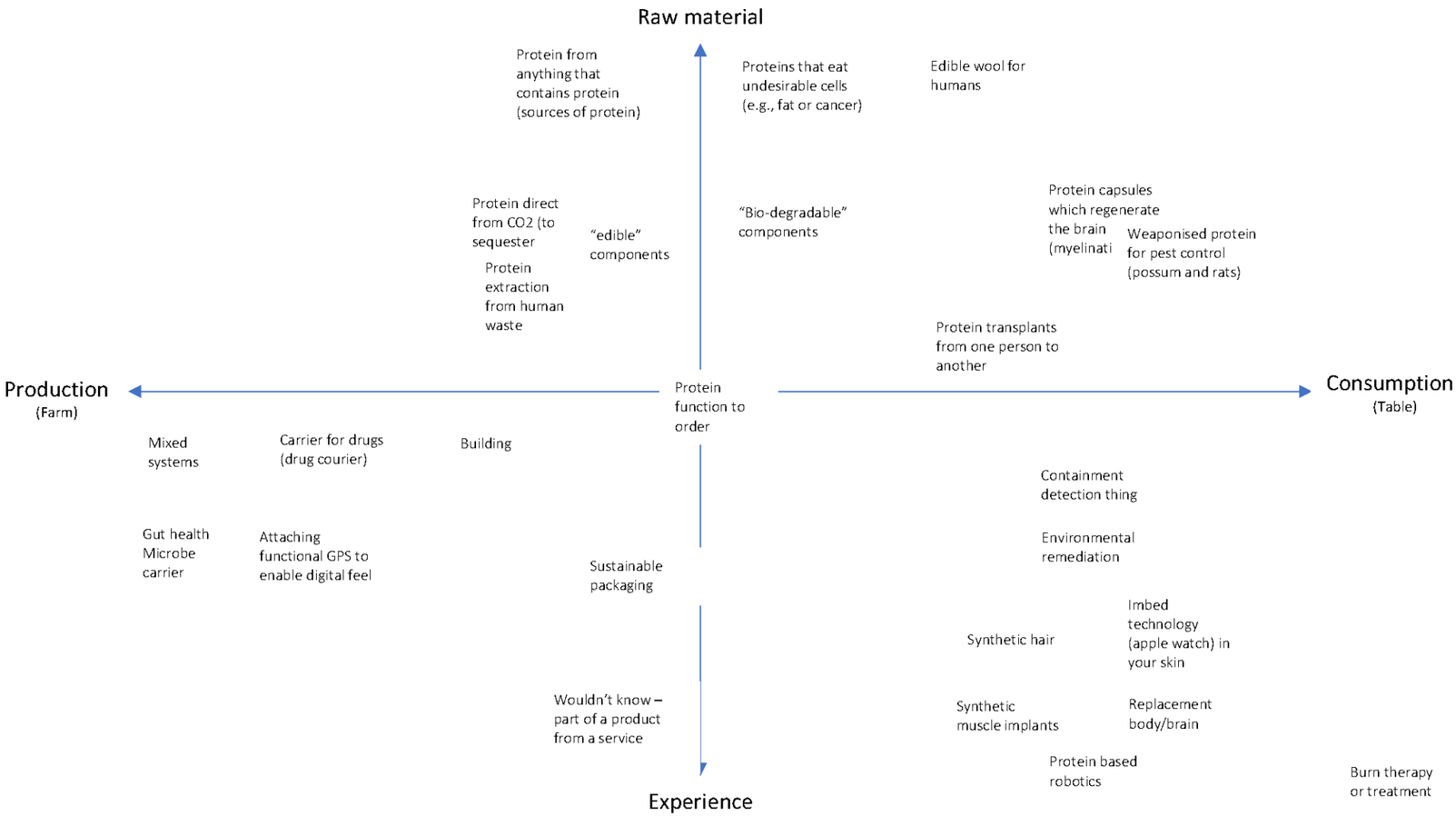
4. Trends + Counter Trends

What major trends, drivers and forces are shaping the world?

- Rising/growing health costs

What are the counter trends, reactions and responses to these changes?

Matrix 1 – Future Protein



5. Culture + Values

What are the cultural values and principles determining people's behaviors and conducts?

- Maori-holistic values
- Healthy land, environment, animals → healthy people

What does society value the most in this scenario?

6. Technology

Who state-of-the-art technological advancements are impacting this scenario?

What is the relationship between people and technology?

- People love tech and use it all the time
- Believe it will solve all their issues

7. Mood + Vibe

How does this situation feel and look?

What are its emotional qualities?

Describe the scene and ambience?

- Anxious and want to take control for themselves, e.g., regenerate

G1. Situation

Place: Production

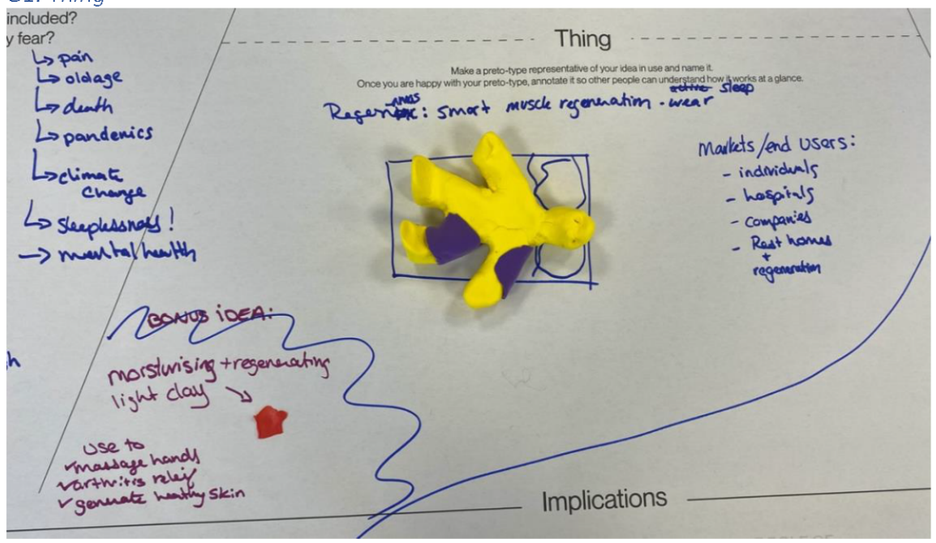
Offering: Product

Persona:

G1. Stuff

- Protein based clothing to help remedy
- Function: remedying, prevention
- Material properties: transmits proteins through skin to muscles
  - Flexible, recyclable, comfy
- Sensors: dosing and muscles
  - Refillable – different goo formulations, soaks in
  - Accelerometers

G1. Thing



G1. Implications

What would need to be done differently if this scenario and idea was to become a reality?

- Need tech to make it work
- Change pajamas—otherwise carry on as normal

How does this scenario and idea affect the role of science research and AgResearch as an organization?

- Happier employees
- New focus on functional proteins to regenerate muscle

How might this affect the people involved?

- Partner with health
- Not agriculture as such but consumers + fiber (clothes) +muscle physiology

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G2. Mars Cars

G2. Scenario

0. The Possibility:

Name the scenario and describe its potential

- Mars
- Endless potential

1. Players

Who is involved in this scenario?

-

What communities, organizations and institutions are being included?

- Progressive, rich people

What do they value and treasure the most?

- Money and exclusivity

Who do they fear?

- Unsustainable old-world ways

2. Context

What is the historical, sociopolitical and economical landscape like?

3. Challenge

What need, problem or pain is this scenario addressing?

What are some assumptions and beliefs that underpin this scenario?

- Need for a circular bioeconomy (zero waste)
- Need for transport
- Need for readily available renewable fuel
- A new model different to Earth

4. Trends + Counter Trends

What major trends, drivers and forces are shaping the world?

What are the counter trends, reactions and responses to these changes?

- Earth ruined

5. Culture + Values

What are the cultural values and principles determining people's behaviors and conducts?

- New values

What does society value the most in this scenario?

6. Technology

Who state-of-the-art technological advancements are impacting this scenario?

What is the relationship between people and technology?

7. Mood + Vibe

How does this situation feel and look?

What are its emotional qualities?

Describe the scene and ambience?

G2. Situation

Place: Consumer in Hamilton

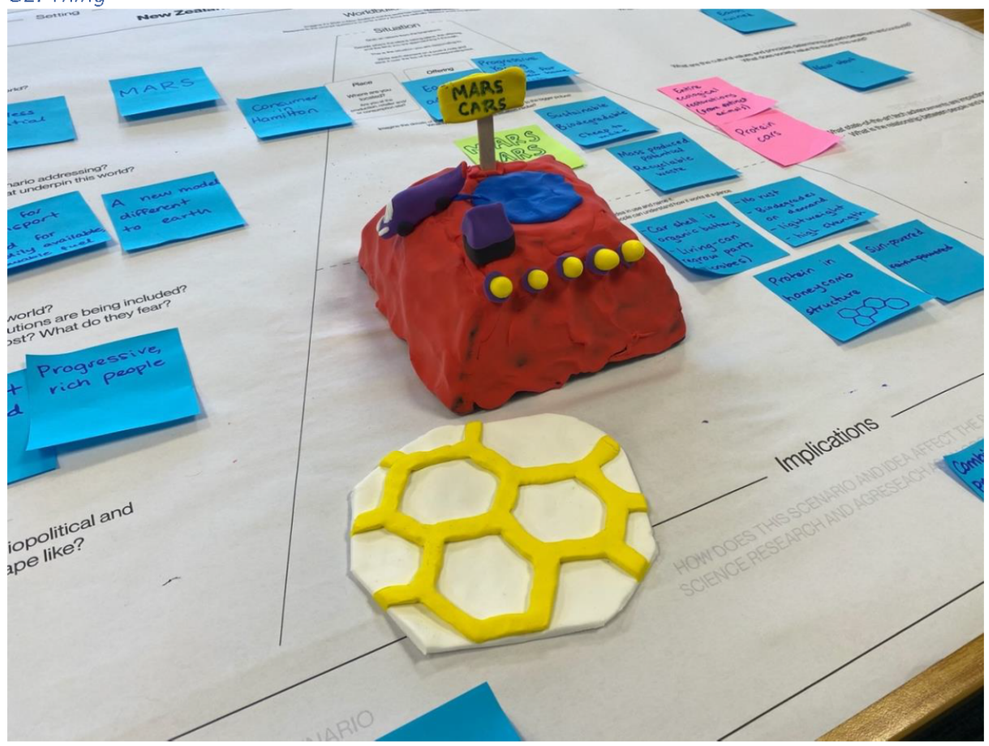
Offering:

Person: Early adopters, progressive + young + rich, looking for a new home

G2. Stuff

- Mars cars
- Entire ecological restorations (from extinct animals)
- Protein cars
- Sustainable, biodegradable, cheap to make
- Mass produced potential recyclable waste
- Car shell is organic battery
- Living-can regrow parts (microbes)
- No rust, biodegrades on demand, lightweight, high strength
- Sun-powered
- Protein honey-comb structure

G2. Thing



G2. Implications

What would need to be done differently if this scenario and idea was to become a reality?

- Protein scientists need to create new materials

How does this scenario and idea affect the role of science research and AgResearch as an organization?

- Combining protein-based structures with function organisms in a fluid medium

How might this affect the people involved?

G3. Dissolvable Packaging

G3. Scenario

0. *The Possibility:*

Name the scenario and describe its potential

1. Players

Who is involved in this scenario?

- Similar to 'today'

What communities, organizations and institutions are being included?

What do they value and treasure the most?

Who do they fear?

- Access to nutritional but easily prepared food
- Waste and food safety

2. Context

What is the historical, sociopolitical and economical landscape like?

- Climate change leading to social disruption
- Poverty
- Inequality
- Malnutrition

3. Challenge

What need, problem or pain is this scenario addressing?

- Plastic pollution
- Water use
- Better nutrition
- No waste

What are some assumptions and beliefs that underpin this scenario?

- Stakeholders would change

4. Trends + Counter Trends

What major trends, drivers and forces are shaping the world?

What are the counter trends, reactions and responses to these changes?

- People want natural foods
- People want transparency but don't have the time to research it

5. Culture + Values

What are the cultural values and principles determining people's behaviors and conducts?

What does society value the most in this scenario?

- Sustainability
- Fear, confusion, conspiracy theories
- People feel insecure

6. Technology

Who state-of-the-art technological advancements are impacting this scenario?

What is the relationship between people and technology?

- Fun but serious

7. Mood + Vibe

How does this situation feel and look?

What are its emotional qualities?

- Feels like something familiar, at least something trustworthy in all [the world's] chaos

G3. Situation

Place: Home

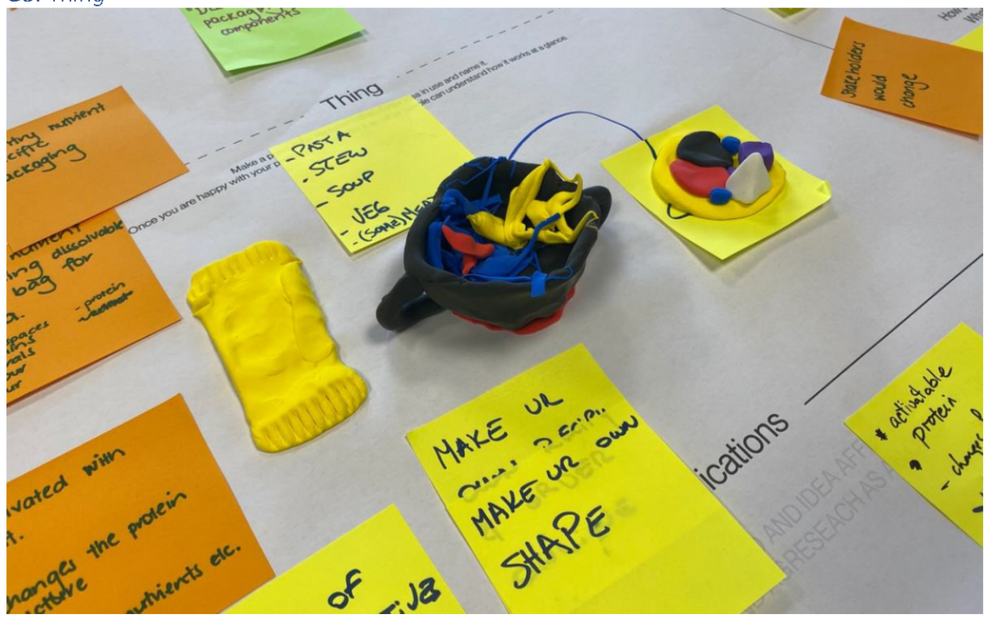
Offering: Product and experience

Persona: house owner

G3. Stuff

- 'Dissolvable' packaging components
- Country and nutrient specific packaging
- Protein/nutrient containing dissolvable plastic bag for pasta
    - Herbs + spices
    - Vitamins
    - Minerals
    - Flavour
    - Colour
    - Protein
- Activated with salt → changes the protein structure → release of nutrients etc.
- Lots of alternatives

G3. Thing



G3. Implications

What would need to be done differently if this scenario and idea was to become a reality?

- How people perceive food packaging
- Trust in the packaging manufacturers to do the 'right' thing

How does this scenario and idea affect the role of science research and AgResearch as an organization?

- Research requirement: Activatable protein that changes function

How might this affect the people involved?

Feedback form

To what extend did the approaches used in this workshop help you to think in a different way?

1	2	3	4	5	6	7
Not at all			To some extent			To a great extent

3, 4, 4, 4, 4, 5, 7 = 4.4 average

Comments

- We definitely generate some novel ideas, especially by the end
- Perhaps needed some external prompts to stimulate thinking in an unfamiliar area
- Did help but took time to think broader scope

If we were to use these methods again, how would we adapt them to be more useful?

- Initially have the 'wacky' thinking to get the way-out ideas
- Consider using more future-forecasting skills
- Make sure focus is on products
- He methods were good, I think it's really important to get the question right
- Think the questions at bit more carefully
- Be clear about the end product being sought and having more prepared questions
- I think it was difficult at the beginning to get out of heads—maybe work on leading up to the crazy ideas rather than starting there (i.e., expecting them while doing the 'what are proteins' questions to do this). It's a hard one.
- There were many new terms thrown around—might need to translate them or spend time going through what they mean.

What did you particularly enjoy?

- Playing with the clay
- Freedom to think outside the square, very futuristic
- The futures canvas work
- Playing with clay and thinking about an actual product for the future
- The company
- Playing with clay
- The last activity!! Thinking through our scenario, and then using clay to make thinking.
- Drawing and modelling clay

What did you find challenging?

- Changing mindset
- The Ruakura's 'science research vision'
- Thinking futuristically and not overanalyzing the question
- Finding the focus
- Thinking creatively in areas of little knowledge
- Everyone getting caught up on the questions/scope—people don't move forward when they get like this and it is frustrating.

- Language + definition of ‘Alternative Protein’ and what we’re trying to accomplish.
- Don’t know enough about protein to make a good contribution.

Have you worked with designers before?

No = 2
Yes = 4
Other = 1 (“I don’t know”)

Describe what ‘design’ means to you:

- To ‘create’ something
- A plan—a starting plan/drawing/model/first thoughts/ideas
- Process of ideation and consolidation that results in concept for development that meets a particular requirement
- Creating something new that fulfils a clear function
- Creating something to fulfil a specific purpose successfully
- Creating something thoughtfully so it is fit for purpose—considering the why
- Create solutions for a problem or situation

How might design fit within the broader science research area?

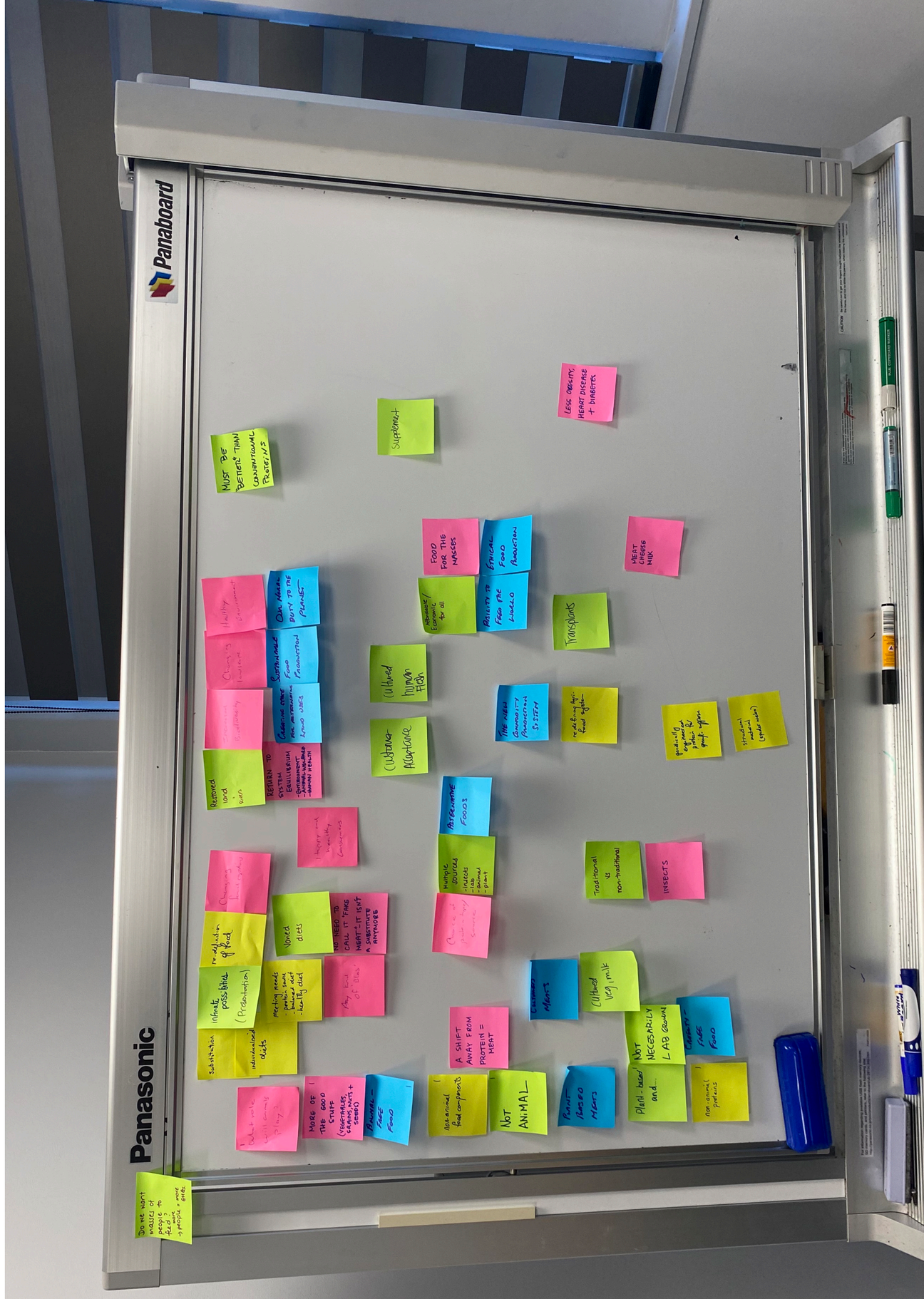
- It could help to think about how to break “strategies” down
- Thinking long term—new areas
- Used a few times, increasingly see it important for product/service, struggling with use in strategy/general planning. Maybe initial experience is too limited
- To come up with new concepts, design new systems
- Everything from strategy to project design to product design
- To help us with new/different processes/ways of thinking.
- Having designers as part of multi-disciplinary team—like social scientists., they help us to ask questions we wouldn’t usually ask
- Design research programmes; design science solutions

How might design support you in your role and work?

- Possibly in the “bidding” process when trying to think outside the box for new ideas
- Getting group/people to think broader—future
- Design appropriate solutions for real-world problem
- Strategic and project design
- Certainly, we could do with more graphic design support, but also on a deeper level with helping us think in a different way
- Create “better” solutions, new ideas?

Additional comments:

- It was a fun workshop with some cool ideas that came out in the product development stage
- Good job!!
- Thanks for today—some really useful ideas to build to build on!
- Thanks very much it was very enjoyable and I especially loved the clay



Ruakura's Vision

4 Why it matters: Describe the world landscape when the ultimate effect of your work has been reached

The Grand Landscape

3 Why it matters: Describe the societal impact when all people get to benefit from it

Societal Landscape

2 Why it matters: What value does this service and product add to peoples' lives?

Emotional Landscape

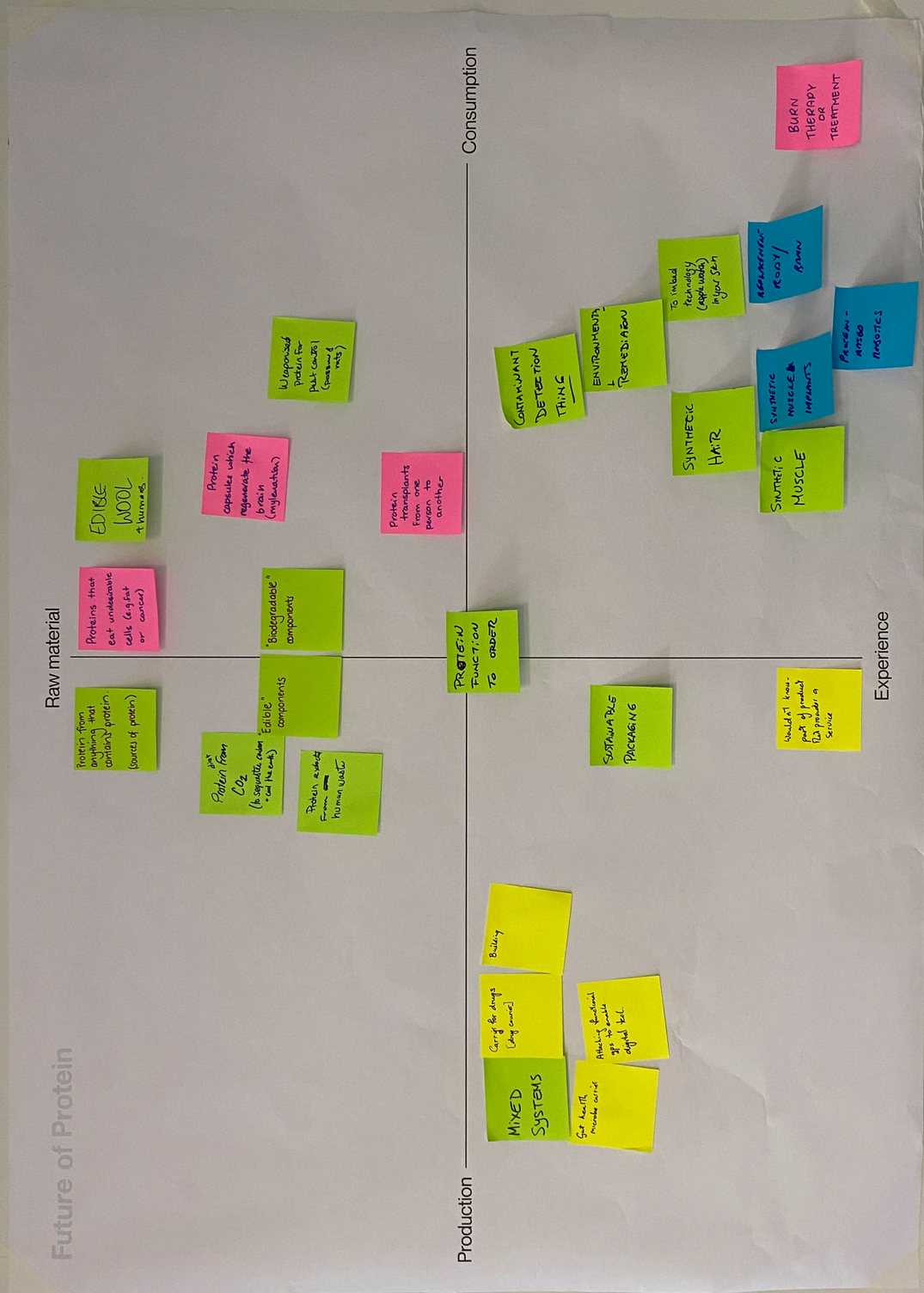
1 Why it matters: What does this service and product provide to consumers?

Functional Landscape

Sustainable animal production systems
NOURISH Feed the world
sustainability
↓ GHG e
SUSTAINABLE / EQUITABLE ACCESS TO FOOD SUPPLIES
BIODIVERSITY PROTECTION ENHANCEMENT
Food SEQURITY
Equitable food distribution
No hungry people
Individualised products (meeting health needs)
Respect for food produced
HEALTHIER POPULATION
NEW CAREER OPTIONS (NOT JUST FARMING)
A CONDENSED AND MORE TRANSPARENT VALUE CHAIN
Happy, healthy population
Animals ≠ food (Shift in perception of its value)
lower food wastage
NEW CAREERS IN FOOD PRODUCTION
AN OPPORTUNITY TO REDESIGN OUR ECONOMY AROUND NEW THINGS
IMPROVED HEALTH = LESS PRESSURE ON SOCIAL/HEALTH SERVICES
EQUITY
Job security
Better distribution of protein
No more farmers?!
PRIMO NON NOCERE
Welfare friendly protein
Improved health
ENDLESS VARIETY - NOT LIMITED BY IMAGINATION
CRUELTY - FREE FOOD / MATERIALS
Affordable food that meets dietary requirement
REDUCED COGNITIVE DISSONANCE = HAPPIER, MORE CONTENTED PEOPLE
NO ANIMALS HARMED IN THE MAKING OF THIS FOOD
BETTER FOR ENVIRONMENT
AFFORDABILITY
HEALTHIER ENVIRONMENT
Alternative ways of socialising
Easy food preparation for busy people
Produce proteins for a specific purpose using GE tools
Protein based building materials
AFFORDABILITY
Improved environmental outcomes - reduced animals - alternative protein products
Improved diet user-specific diets
Choice of products
GOOD TASTING ALTERNATIVE PROTEINS
Variety
HEALTH
low-cost alternative or high-cost, highly functional foods
ETHICAL CHOICES
HEALTHY FOOD
Anything is possible?

Vision focus

The role of ~~science research (service) in responding to consumer demand for~~ Alternative Proteins (product)



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