Coordinating Diet

1 - 3

Interviews & Survey

Problems & Personas

3 - 6

Studies & Diary

Insights & Opportunity

6 - 9

Ideation & Codesign

15 Sensible Ideas

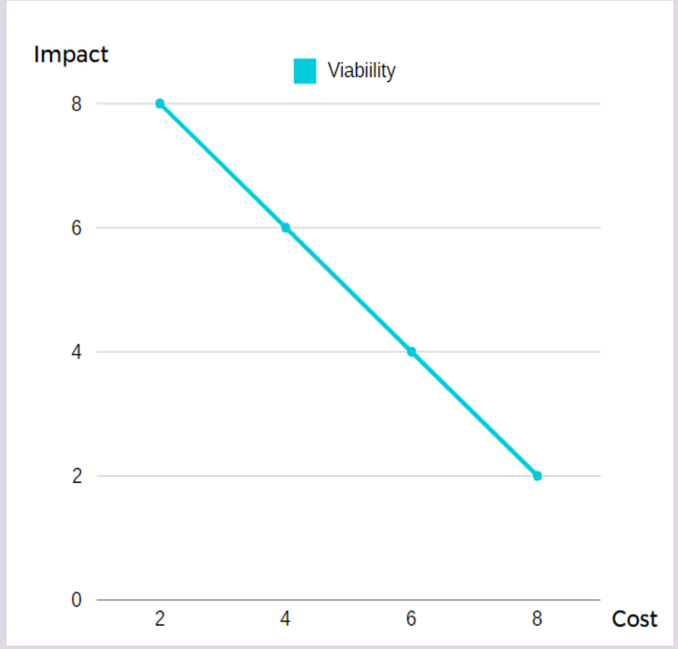
10 - 13

Prototypes & Feedback

3 Final Ideas

The objective is to design a human experience, optimising for desirability, viability and feasibility.

This space can be reduced to ease of supply (cost) and satisfaction of demand (impact).



To maximise impact, I take a data-driven approach to making stakeholders heard, so no voice is reduced by my assumptions or biases, and no groups are minoritised.

To minimise effort, I use qualitative and quantitative data to understand stakeholder behaviour, and research existing solutions prior to ideation so that no ideas are wasted on incorrect theories. I develop a comprehensive summary of pain points within the theme of the objective, which my ideas may choose between.

Abstract

Theme: Food health

Finding the Problem

What's the biggest problem? /1
Who has the biggest problem? /2
What's the best problem to solve? /3

Understanding the Person

Understanding the Person /1
What informs people's actions? /2
The problem is everywhere /3

Design Brief

What are the best Attack Points?

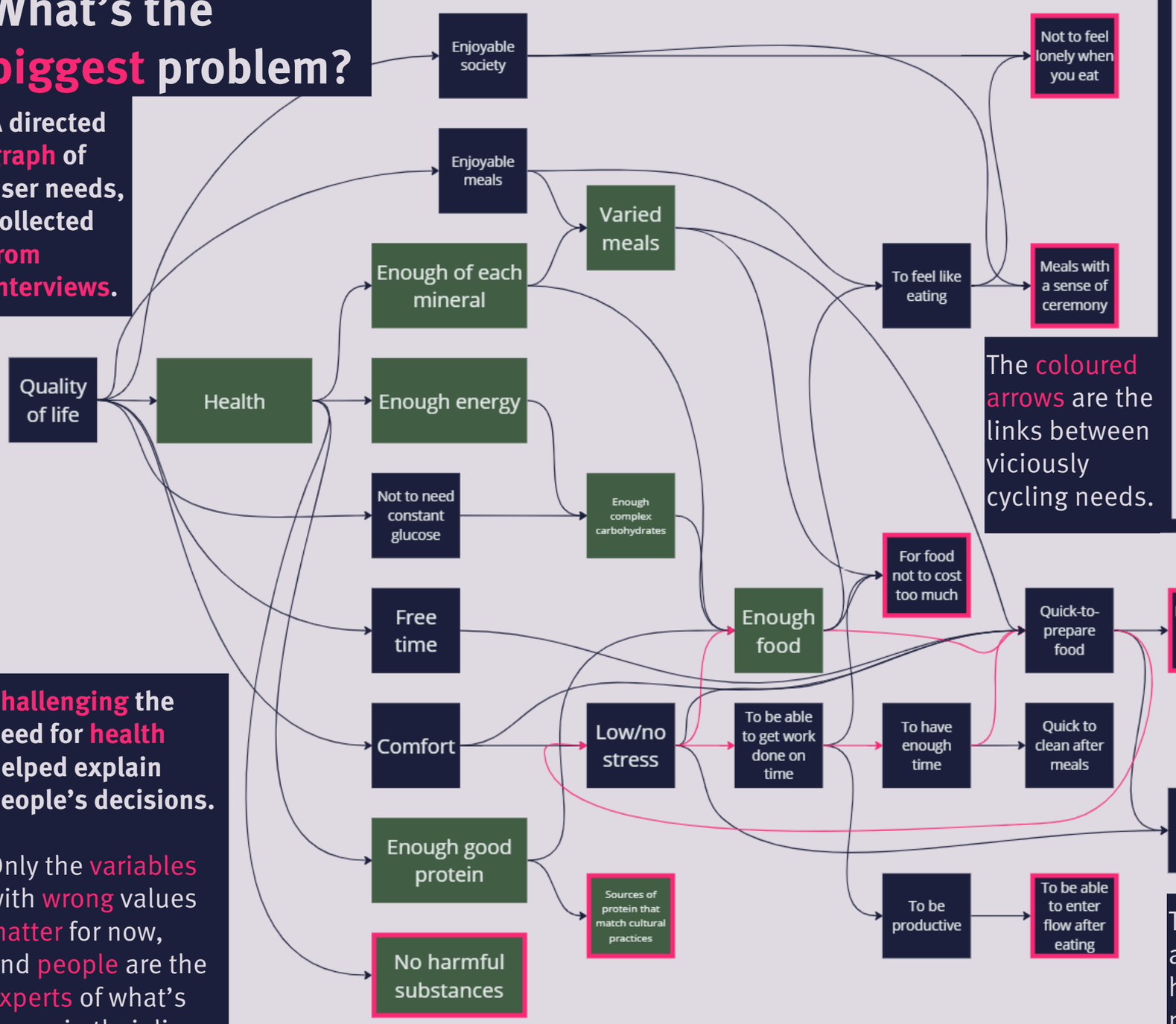
The Solution

Existing Solutions /1
Divergent Ideation /2
Convergent Ideation /3
Downselection /4

Finding the Problem /1

What's the biggest problem?

A directed graph of user needs, collected from interviews.



The coloured arrows are the links between viciously cycling needs.

The highlighted boxes are the needs that have no user-known prerequisite needs.

Challenging the need for health helped explain people's decisions.

Only the variables with wrong values matter for now, and people are the experts of what's wrong in their lives.

What problems affect diet health?

To find an impactful problem, we interviewed 11 students on why they felt unhealthy. We challenged reasons and focused on feelings to establish stakeholder needs, arranging them by causal links in a directed graph.

Regular eating was mentioned the most.

42 survey responses about issues cited in interviews were analysed.

Insights* were drawn from contradictions between means and correlations, and a vicious cycle was revealed between stress, timing and eating patterns.

Who cares? Students.

Primary research is on Imperial students, due to responder makeup.

Issues ranked by importance:

1/ **Focusing between meals**

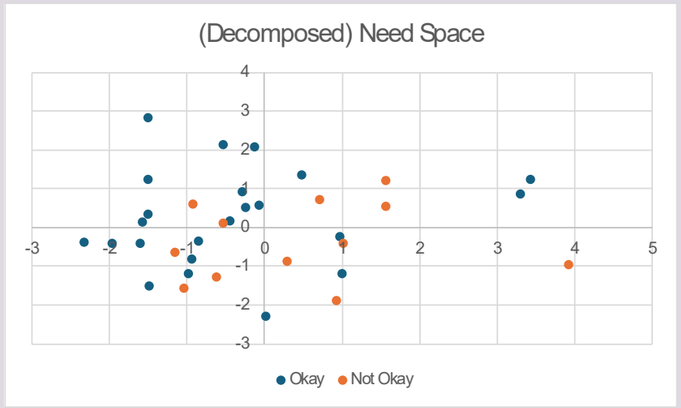
2/ **Planning meals cheap, healthily and quickly**

3/ **Motivation to eat**

4/ **Ability to cook healthy**

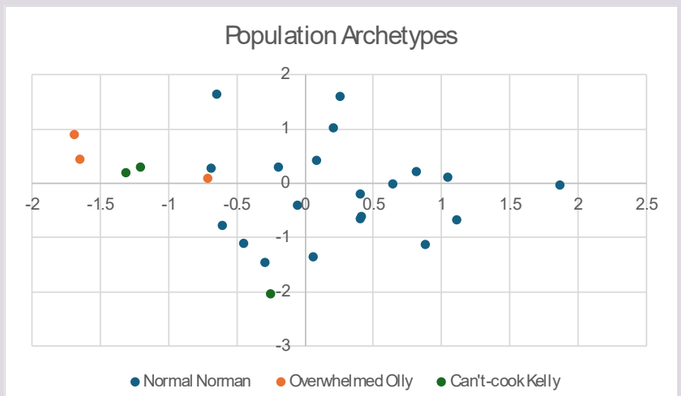
Who has the biggest problem?

In order to find the biggest problem that can be solved by a given solution, I need to find which persona is most afflicted with a single problem. Then, I can taylor the solution to that persona.

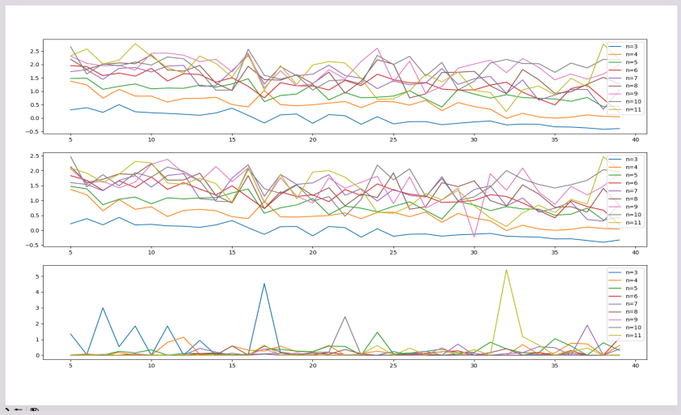


1/ Using principle component analysis (PCA), I found the 5 hidden independent factors that contributed most to health: Overwhelm, Studiousness, Oppulence, Embattlement, & Otherliness. I clustered the data into common need groups.

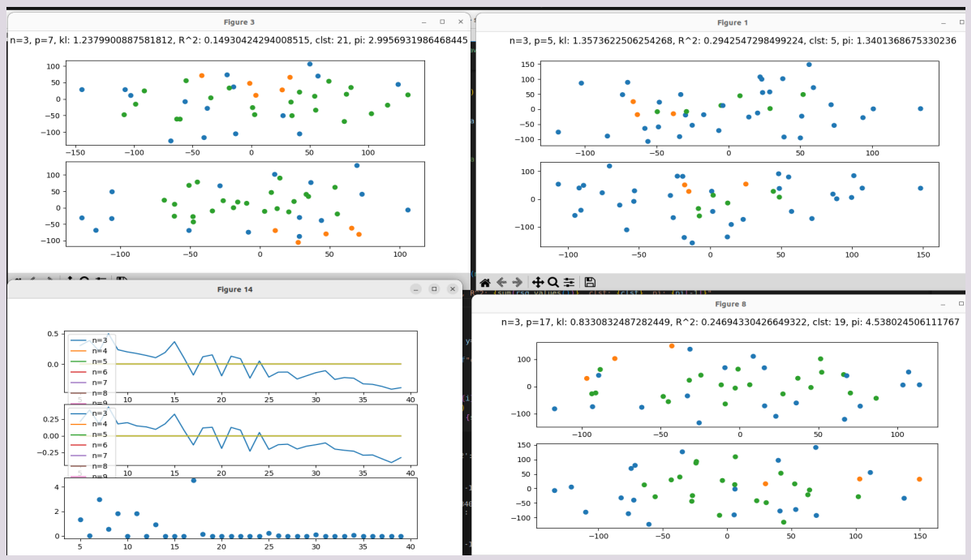
Only 2 clusters emerged, implying that 'Not okay' people are more similar to each other than to 'Okay' people. Furthermore, the 'Okay' cluster is more dense. There seems to be generally a single broadly correct way to live.



2/ I then made the types of people more distinct using t-SNE. The algorithm unveiled three archetypes, fine-tuned to two solutions. One in 3D and one in 11D. This graph is again also a projection. The space has no meaning, only the clusters.



This graph shows the accuracy at each number of dimensions during tuning. The two spikes at the bottom are in accuracy.

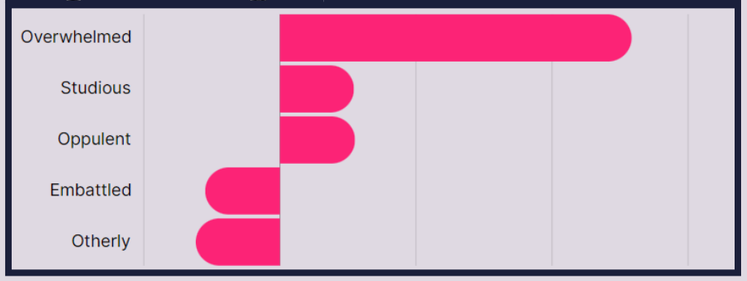


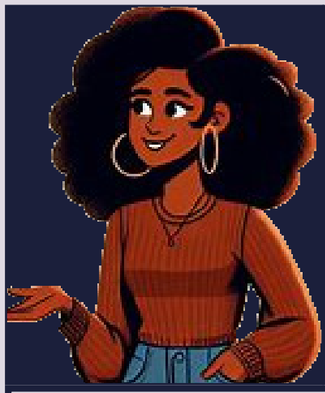
These graphs are several of the most promising attempts of t-SNE to categorise the data into clusters at 3 dimensions. There is a peak in 3D when perplexity = 17.

Finding the Problem /2

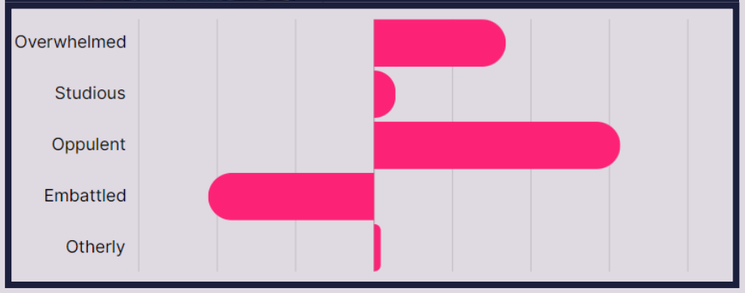


Overwhelmed Olly: stressed by many things, including basic adult tasks; is missing good, decisive eating choices. Cognitive load from stress weakens resistance to temptation.



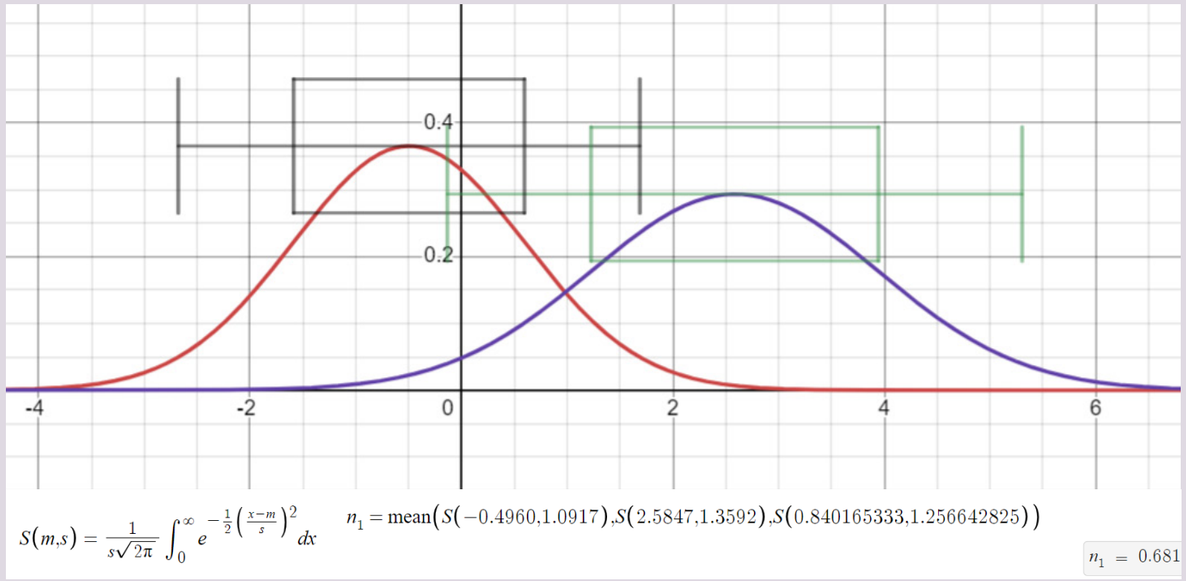


Can't-cook Kelly: Can't really cook, so tends not to and her social life suffers for it. Needs guidance planning meals. Needs tend to intertwine with those of Overwhelmed Oliver



What's the best problem to solve?

With the biggest issues combined with the biggest stakeholder groups, I could now find the intercept of the best problem to solve. Then, I could generate some findings to form insights with.

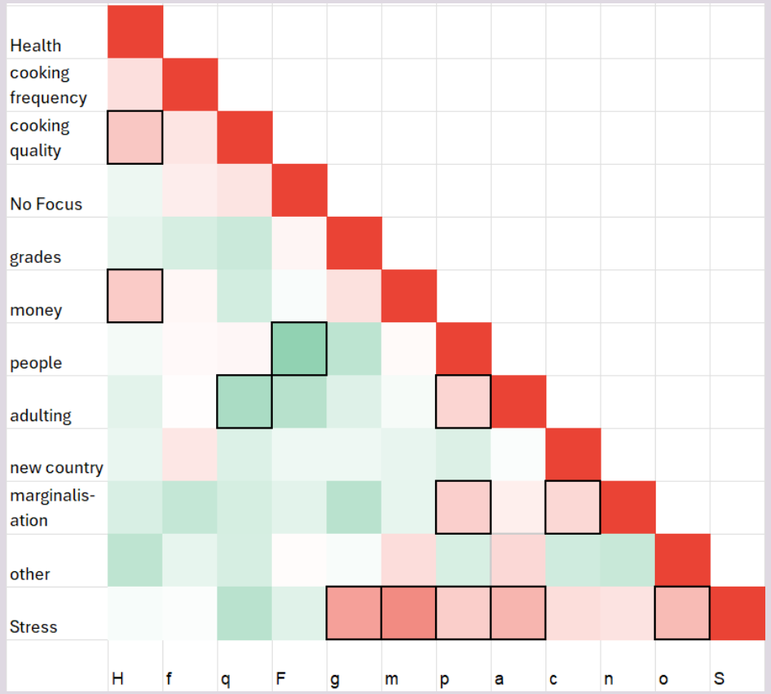


The graph here shows how I used the assumption that populations are normally distributed to find the probability that anyone in any given persona would have a certain need in a certain dimension. Integrating over that, I found the marginal impact of satisfying that need per person.

Finding the Problem /3

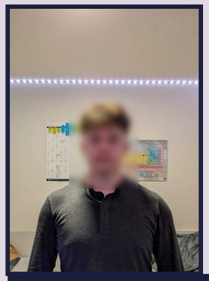
Needs ordered by Marginal Impact:

Efficient direction	68.1%
More socialisation	54.2%
Cooking desire/skills	69.3%
To handle stressors	28.5%
Ability to work	41.4%



Above is a heatmap of PMCC correlations between each of the variables from the survey. Statistically significant links led to findings.

Findings:
1/ Interpersonal stress links to less issue focusing (F69). 2/ Cooking confidence relates to diet satisfaction (C65). 3/ Diet satisfaction is inversely linked to financial worries (C68). 4/ Increased adulting stress ties to overall stress (J74); but isn't primary (U42). 5/ Rare stressors have high impact (M74, X42). 6/ Lower adulting stress correlates with more cooking (E70). 7/ Grades strongly correlate with stress (P76). 8/ New country adaptation challenges increase marginalisation sensitivity (K72). 9/ Better cooking links to better health (C65); eased by lower adulting (E70) and overall stress (E74). 10/ Those under special adulting stress should improve cooking skills. 11/ Financial stress often coincides with other stressors (H73). 12/ Infrequent cooks show diverse, often unhealthy habits; more data needed.



Understanding the Person /1

This is an extreme user who has ADHD. I did a 2 week diary with him detailing his eating patterns.

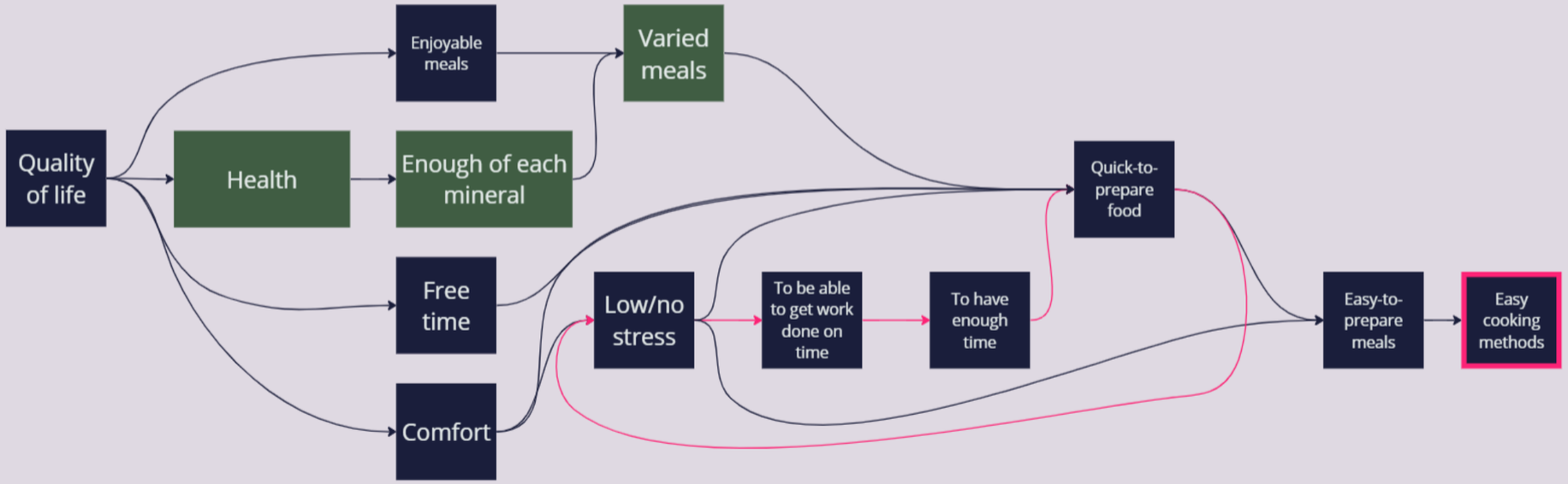
Findings:
1) Misses breakfast by sleeping late, wanting to relax instead of sleep (avoidance? Scarcity mindset?)
2) Lacks energy to cook after long day
3) Wants variety but is too cognitively loaded to plan new recipes
4) Conflicting values of health and cost, health prevails under cognitive load
5) Poor memory of poor decisions, likely due to cognitive load at the time

Understanding the Person /2

What Informs People's Actions?

Understanding the personas' profiles of inclinations/tendencies helps to understand how they would behave when interacting with my product ideas.

Below is a user storyboard over causes instead of time. Pain points are each an unmet need. Arrows point to prerequisite needs. The user follows the arrows backwards from unmet needs to consequences. The 'pain' at each point is irelevant as this is the most 'painful' event, and the attack points are seen.



This is the most common user journey among the 3 persona clusters based on further interviews.

Most people are caught in stressful and unproductive cycles that also have a negative impact on dietary health.

People tend to cook some meals well, and fail to explore varied meals that balance diet.

"Not enough time":
This was the most common complaint, but Sam L. et. al (2019) discovered that this was not valid, as these people had the same time as those expressing having enough time. Primary research found that people simply were intimidated by the task given other urgencies that they felt.

"Hunger":
This slightly facaetious remark referred to the lack of appetite when one should normally be eating. Irregular patterns of hunger could be caused by stress, anxiety or depression, or irregular circadian rhythm. Some respondents simply faced no obstacles to eating, and didn't know what to put.

"I forget to eat sometimes":
Primary research found that people who made this comment tended to also mention either time management issues or being engrossed with work. Those engrossed with work revealed that they chose not to leave work due to urgent deadlines, due to either overcomittment or time management.

Additionally, Cham et al. (2019) posited associations between excessive digital media usage and negative life experiences such as neglecting basic needs like eating. Essentially, yper-engagement and distraction caused by digital media could lead to forgetting to eat.

Many of these behaviours were plausibly explained by scarcity mindset theory, which a very recent study by van der Veer A., Madern T. & van Lenthe FJ. (2024) presented evidence of.

Any source of urgency and stress leads to cognitive loading that reduces attention, promotes present-oriented thinking, reduces empathy (Wanchen Li et al., 2023) and reduces resistance to temptation. Decisions of stressed people are knowingly poor in the long run, but assist in overcoming urgent challenges.

The Problem is Everywhere

Over 4 in 10 students in the UK are food insecure

In order for a product to be truly impactful in broader society, there has to be enough demand for it to be scalable. While I cannot survey/interview 68 million people, I can research the existence of pain points in broader society.
Evidence for deviations from ideal/typical/modelled situations can then be explained and formulated into insights.

Understanding the Person /3

N1: Efficient Direction (Time Management & Study Skills)

Reduced stress eating: Al Shidhani et al. (2023) stated that college students who reported higher levels of stress were more likely to engage in emotional eating.

Planning for meals: Ducrot P. et al. (2017) showed that planning meals in advance was associated with a healthier diet and lower prevalence of obesity in adults.

N2: More Socialization

Social support for healthy habits: Ball K. et al. (2010) found that social support networks can positively influence dietary habits, promoting healthy food choices and discouraging unhealthy ones.

Reduced social isolation: Reicks M. et al. (2019) and Thompson T. (2019) demonstrated a link between social isolation and unhealthy eating behaviors, suggesting that social connection promotes well-being and healthier food choices.

N3: Cooking Desire/Skills

Greater control over ingredients: Mills S. et al. (2017) demonstrated that people who cook more meals at home (accommodation) tend to consume a healthier diet.

Increased dietary variety: She also found that those people consumed a wider variety of healthy foods.

N5: Ability to Work Effectively

Improved focus and memory: Benton (2004) demonstrated that a healthy diet can enhance cognitive function, including focus and memory, which are essential for academic success.

Better sleep patterns: Nemet et al. (2005) found that a balanced diet can contribute to improved sleep quality, which is vital for overall health and cognitive function.

N4: To handle stressors

Reduced stress-induced cravings: Chao A. et al. (2015) stated that stress can trigger cravings for high-fat, high-sugar foods, which can negatively impact dietary health.

Temptation from scarcity mindset: Poulter H. et al. (2022) said that stress among those juggling multiple worries is a risk factor of healthy diet. This is explained by short-term planning due to cognitive load.

NI Student statistics from Devine et al. (2006):
70% like cooking, while 11% dislike cooking. /N3
28% prepared or cooked meals once a day.
Main reasons for not cooking:
- lack of time (57%)
- eating convenience foods/meals (40%) /N3
- unable to afford to cook a main meal every day
86% learned to cook at home, 27% at school, 7% self-taught
79%/11% who like/dislike cooking pre-prepare meals (respectively). /N1

What are the Best Attack Points?

Insights can be formulated by taking the problems we've found, and seeing which human behaviours we can understand to be contributing to those problems. The insight becomes the explanation that ties persona behaviour to the consequent problems.

Design Brief

Insights

It isn't that people can't cook, it's that they can only cook certain things. People need the effective direction (N1) to do the planning needed where they lack familiarity cooking (N3).

People don't believe they have enough time because they don't believe that the time they have is enough, because it passes them by quickly without achieving much. This could be due to tiredness, stress or skill.

People who are cognitively loaded by stress will adopt a scarcity mindset, which distorts their judgement on the value of eating healthy, even though they exhibit a preference towards healthy food when prompted to think long-term. People will oppose making appropriate preparations for ease of dietary health unless scarcity mindset can be overcome.

People only think about food when it's time to eat, preventing them from planning effectively, and leaving them open to be influenced by fast/convenient/expensive food, because it is too late to plan when they do decide to, and/or it would be expensive or laborious.

Some people would eat normally at home, but in uni they are removed from the sense of ceremony that comes from others' behaviours, preventing them from having the social motivation to cook. This is because their lifestyles remove them from social interactions.

Students tend to separate into snacking, health-conscious, vegetarian, and red meat/alcohol/convenience. Health-conscious eats just as much protein as meat/alcohol/convenience, but spends less, implying that N1 effective decisions is more prevalent than money, as a rich diet is in fact affordable.

Opportunities

HMW empower students with a variety of easy cooking methods?

HMW reduce washing up time?

HMW make it cheaper to eat?

HMW empower students with diets conducive to productivity?

HMW create social incentive to cook & eat?

HMW empower students with the information eat healthy food cheaply?

I'm approaching this problem from the demand side, while my teammate is covering it from the supply side. Our HMWs converge when certainty can be created on what will be eaten and when.

Reducing washing up time will likely lead to more physical solutions.

The rest of the issues here are about information. This highlights a market failure of computation between supply and demand of food.

An opportunity to make these solutions viable is to reduce value lost from the economy by wasted supply and unmet demand.

Broad design brief: HMW resolve the mismatch between efficient supply and sufficient demand for healthy food?

Existing Solutions

I looked up existing solutions that addressed each attack point, and then syphoned out methods that they all had in common, and categorised them into broader approaches.

The Solution /1

Economy of scale:
- Specialise production
- Increase volume of transport methods
- Increase bargaining power
- Minimise stock
- Diversify risk/costs

Collectivism:
- Contracts
- Compelling speech/imagery
- Incentivise with self-actualisation

Peer-pressure:
- Social proof
- Peak-end rule
- Gifts
- Curiosity
- Empathy/personification

Risk reduction:
- Avoid risky choices
- Retain risk if losses are cheaper than avoidance
- Share risk
- Contracts (insurance, government backing)

Ultrasonic Cleaner



Dish Washer



STOREREWARDS

Cashback

Huel®

TASTY

SimplyCook

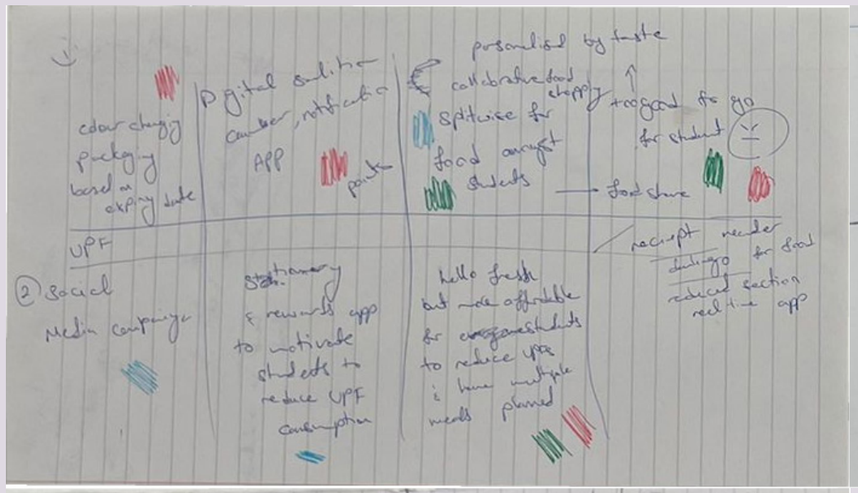
BBC goodfood

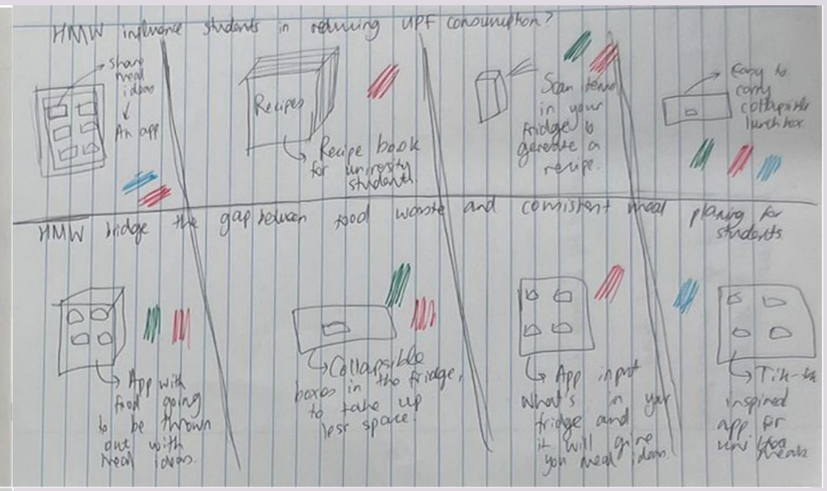
Suggestic

HELLO FRESH

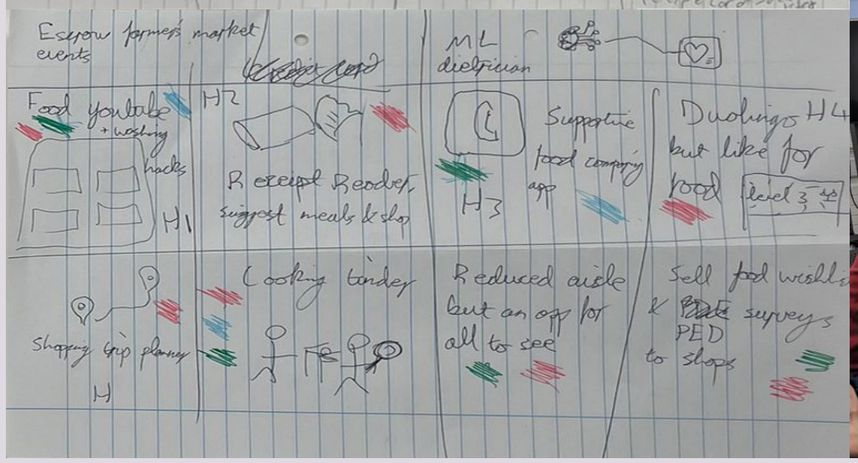
Divergent Ideation

Before coming up with a quality range of ideas, judgement must first be removed. Our first formal ideation session was crazy 8s, producing 24 ideas of various quality. We classified them into financial (green), planning (red) and social (blue).









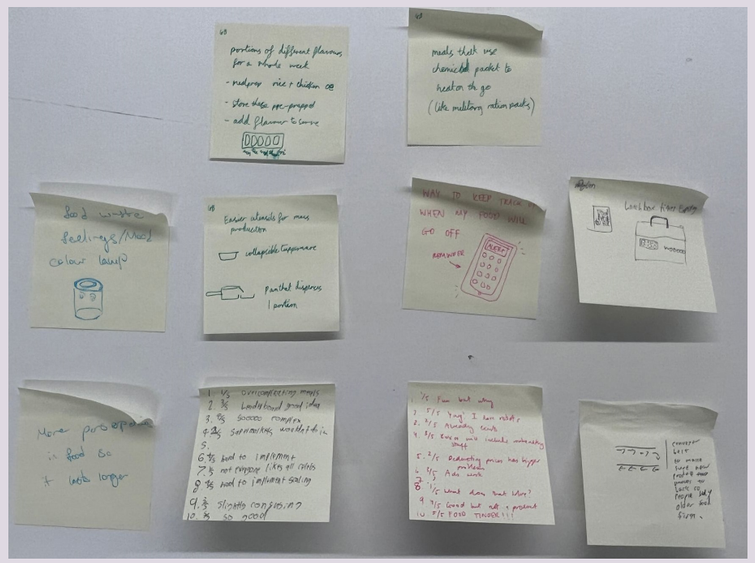
We then followed this with a co-design session where we received feedback on initial ideas and came up with new/developed ideas together, to mould our free ideas into something more human-centred.

Low value ideas were made on purpose to break the ice, and we still focused on their merits.

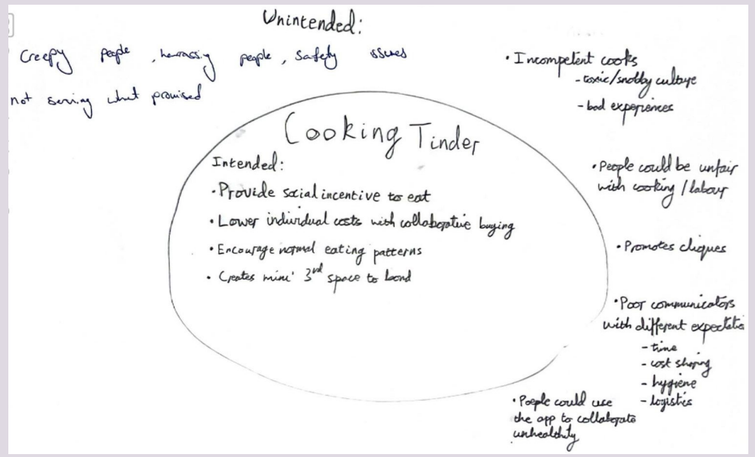


The Solution /2

Ideas generated by codesign group revealed their needs as well as their unique and diverse paths of thought. None of their ideas were particularly valuable but offered some understanding of what kinds of solutions they would be happy with.



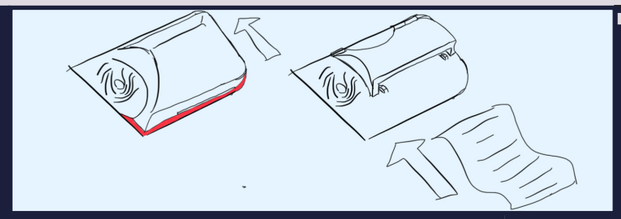
We also considered the consequences of our most promising ideas with the focus group.



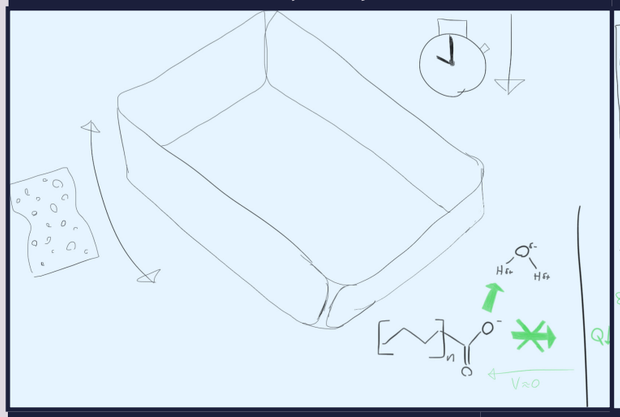
Convergent Ideation

The Solution /3

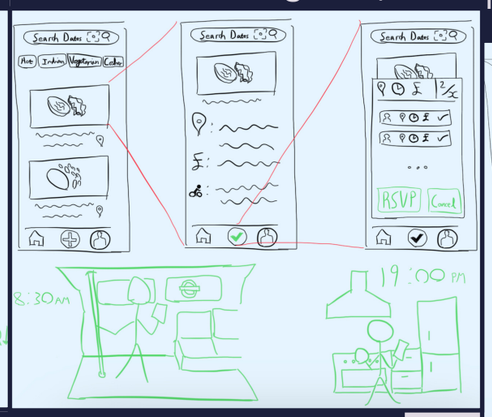
Receipt scanner that swallows receipts and catalogues your food. Notifies before food expires.



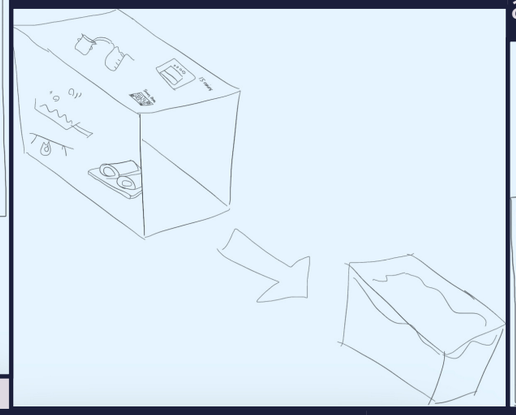
Antielecrostatic tupperware, grease doesn't stick, easy & quick to clean.



Food tinder: explore, meet and share cooking cost/work.



Recipe/advert sleeves for veg.



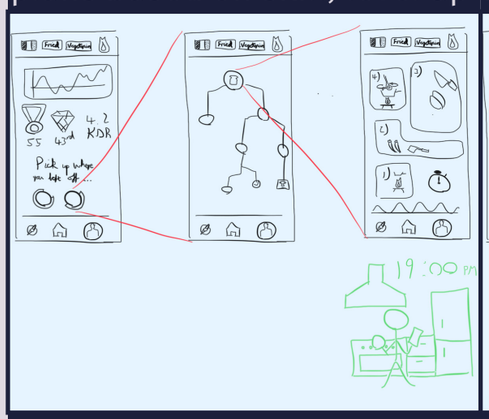
AI sous chef gives notifications around your schedule.



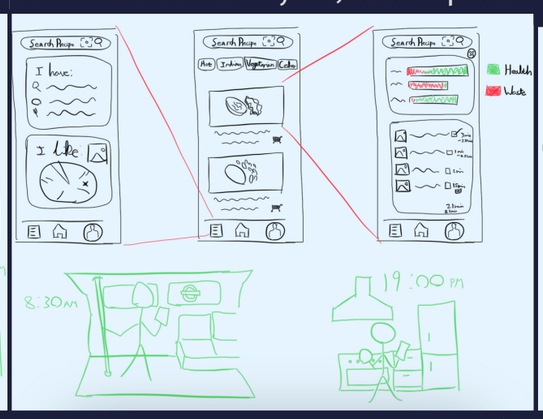
Reduced aisle viewer for all local shops.



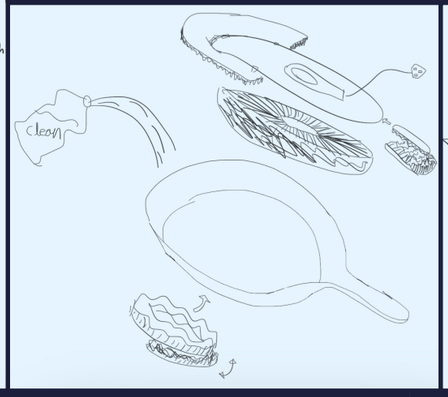
Cooking duolingo. Get recipe plans based on skill, level up



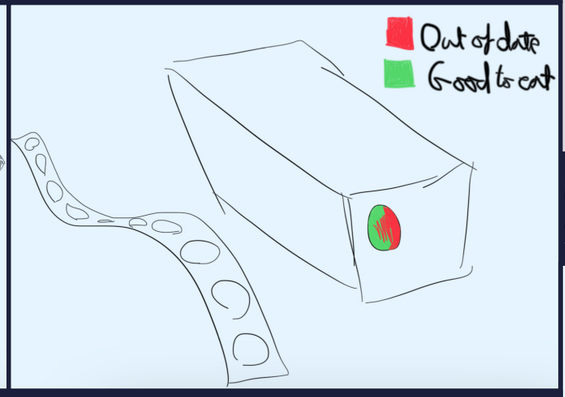
Food youtube. Get a feed of meal ideas tailored to you, exact plans



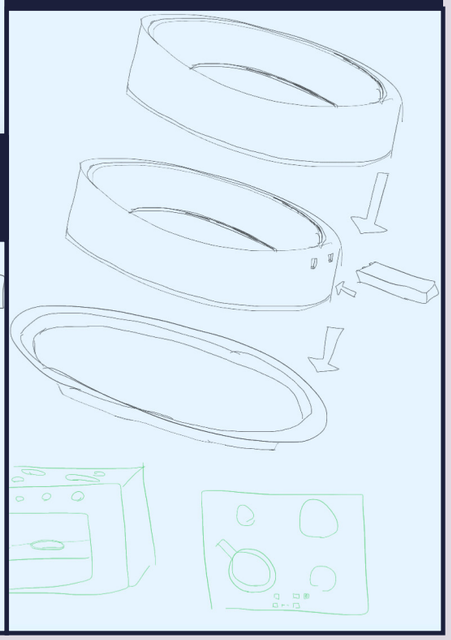
Mechanical rapid cleaner.



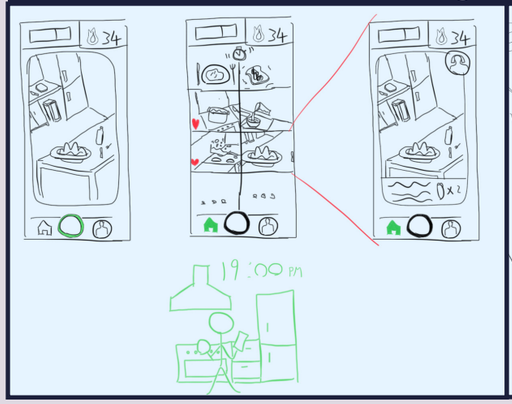
Bio-stickers that indicate expiry.



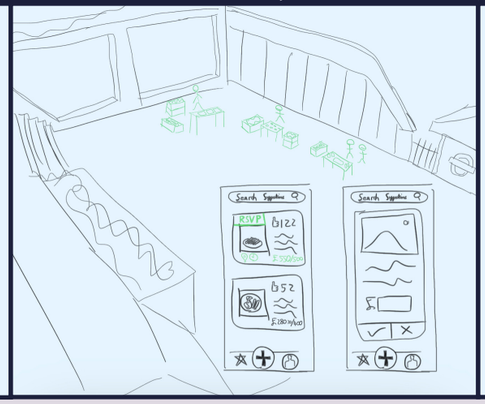
Multi-purpose crockery. Save money, space & time.



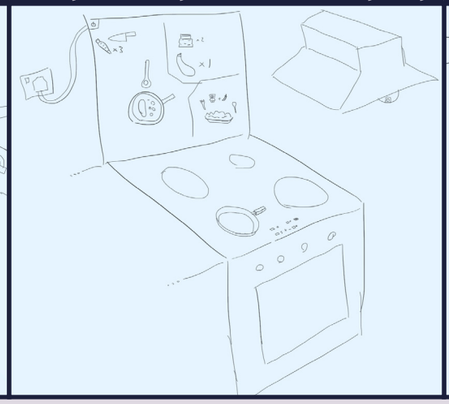
Food BeReal. Supportive environment to learn cooking.



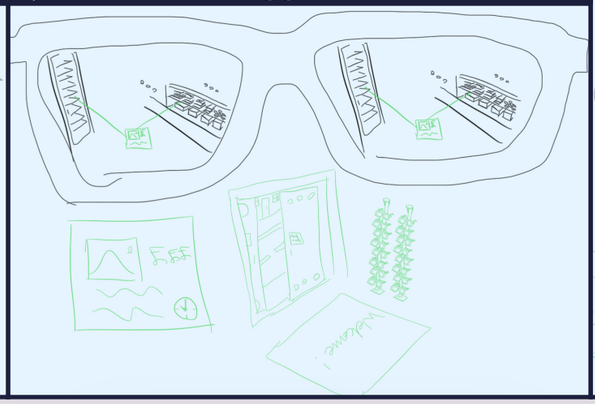
Escrow farmer's market. Vote for markets with your wallet.



Stove portal. See hands-on recipes, reports, meal prep



AR recipe sightseer. Will use eyetracker to suggest food combos.



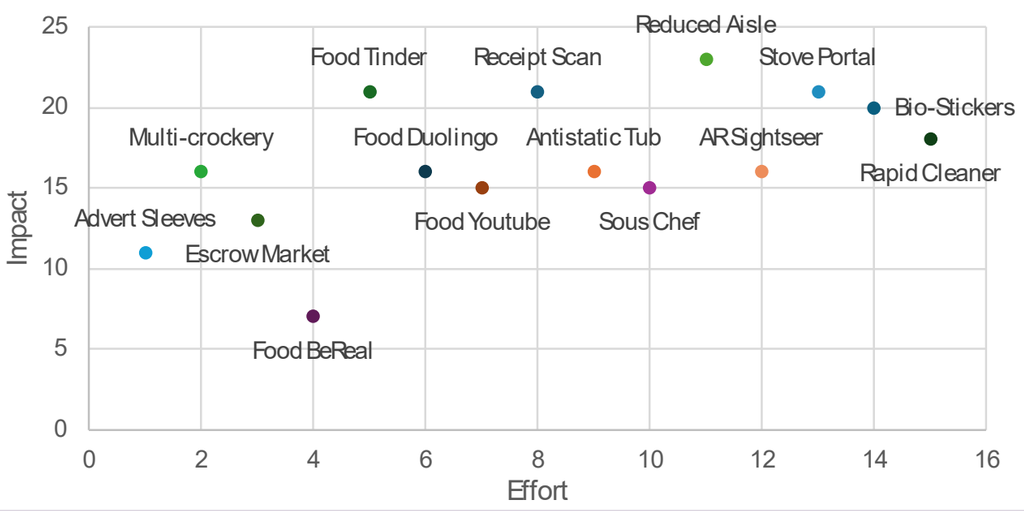
Downselection

After converging into 15 sensible ideas, I downselected them by measuring their popularity among the personas, and ranking them by how confident the team was that we could build the product.

Name	Receipt Scan	Antistatic Tub	Food Tinder	Advert Sleeves	Sous Chef
Norman	7	5	5	6	3
Oliver	7	4	9	2	5
Kelly	7	7	8	3	7
Total	21	16	22	11	15

Name	Reduced Aisle	Food Duolingo	Food Youtube	Rapid Cleaner	Bio-Stickers
Norman	7	4	2	3	8
Oliver	8	6	7	8	4
Kelly	8	6	6	7	8
Total	23	16	15	18	20

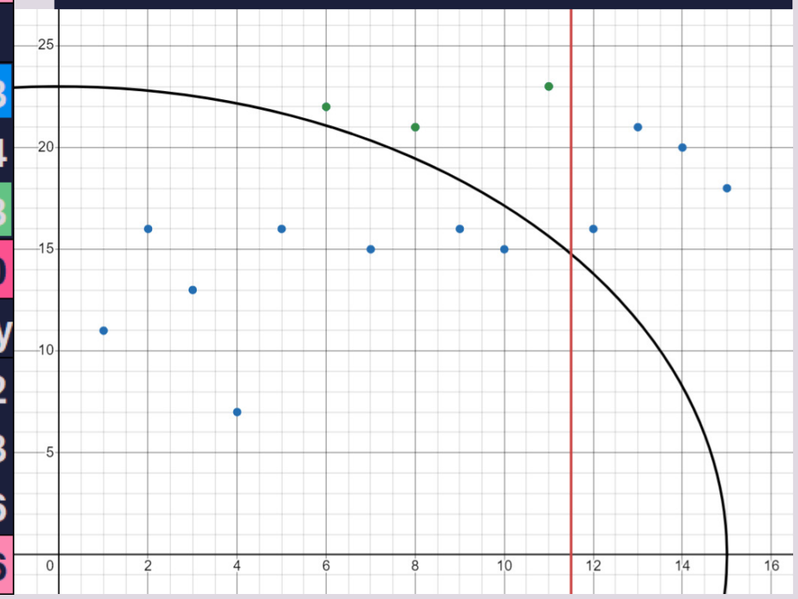
Name	Food BeReal	Escrow Market	Stove Portal	AR Sightseer	Multi-crockery
Norman	0	8	7	2	2
Oliver	3	3	7	8	8
Kelly	4	2	7	6	6
Total	7	13	21	16	16



There is a strong positive correlation between effort and impact, which suggests that there were no low-impact problems on which time was wasted thinking of complex solutions. Unfortunately, it also means there were no majorly 'wow' low-effort solutions with high impact. This is does not mean solutions weren't innovative, as effort ranking also accounts for the team's skillset and deadlines.

The Solution /4

A C-Simplex was used as a filter. The ellipse boundary had vertices at the maximum effort & impact values, discriminatin agains unambitious ideas. The line boundary was to cap the difficulty due to module restraints.



3 Ideas

The Reduced Aisle

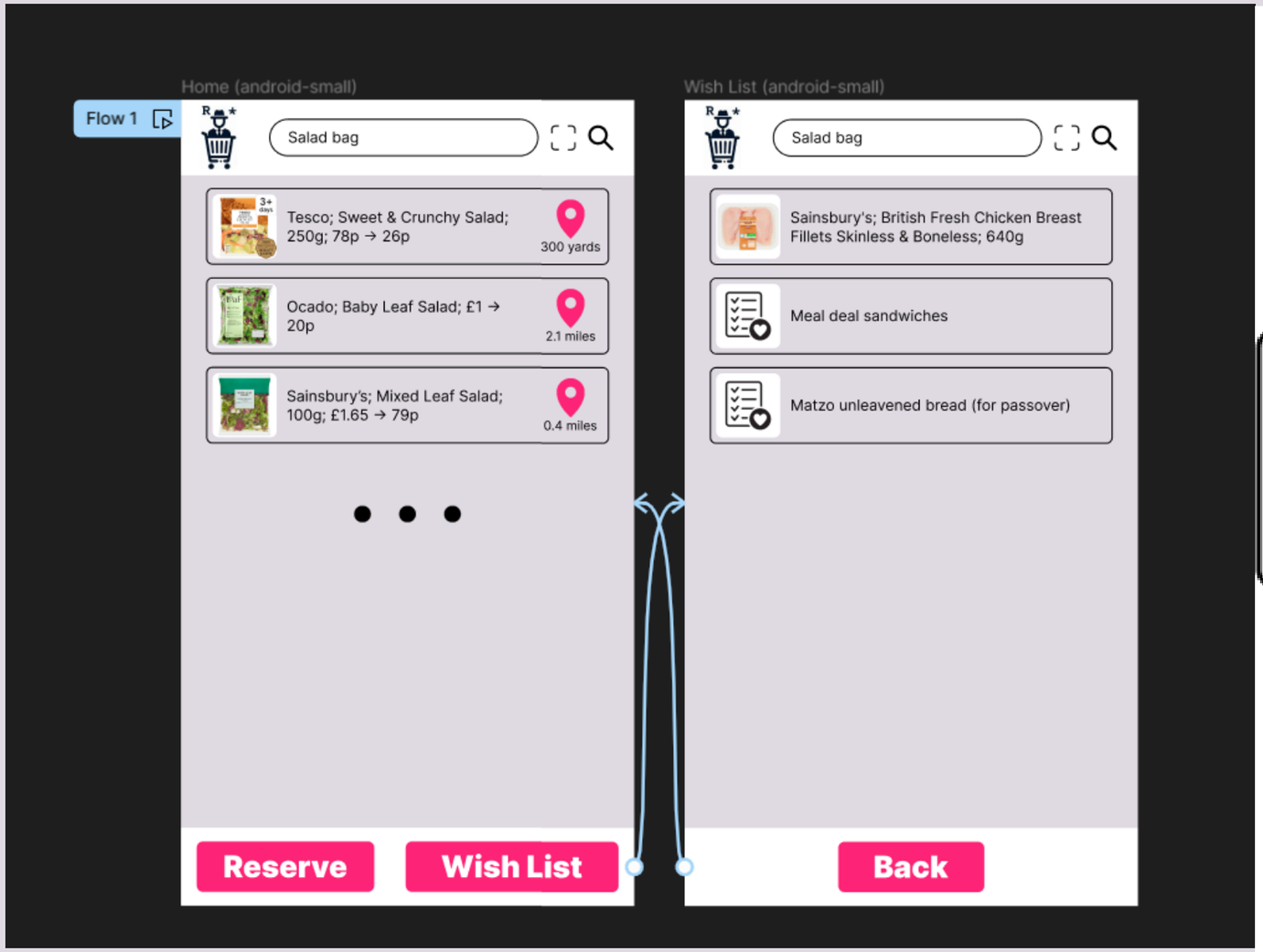
Sous Chef.AI

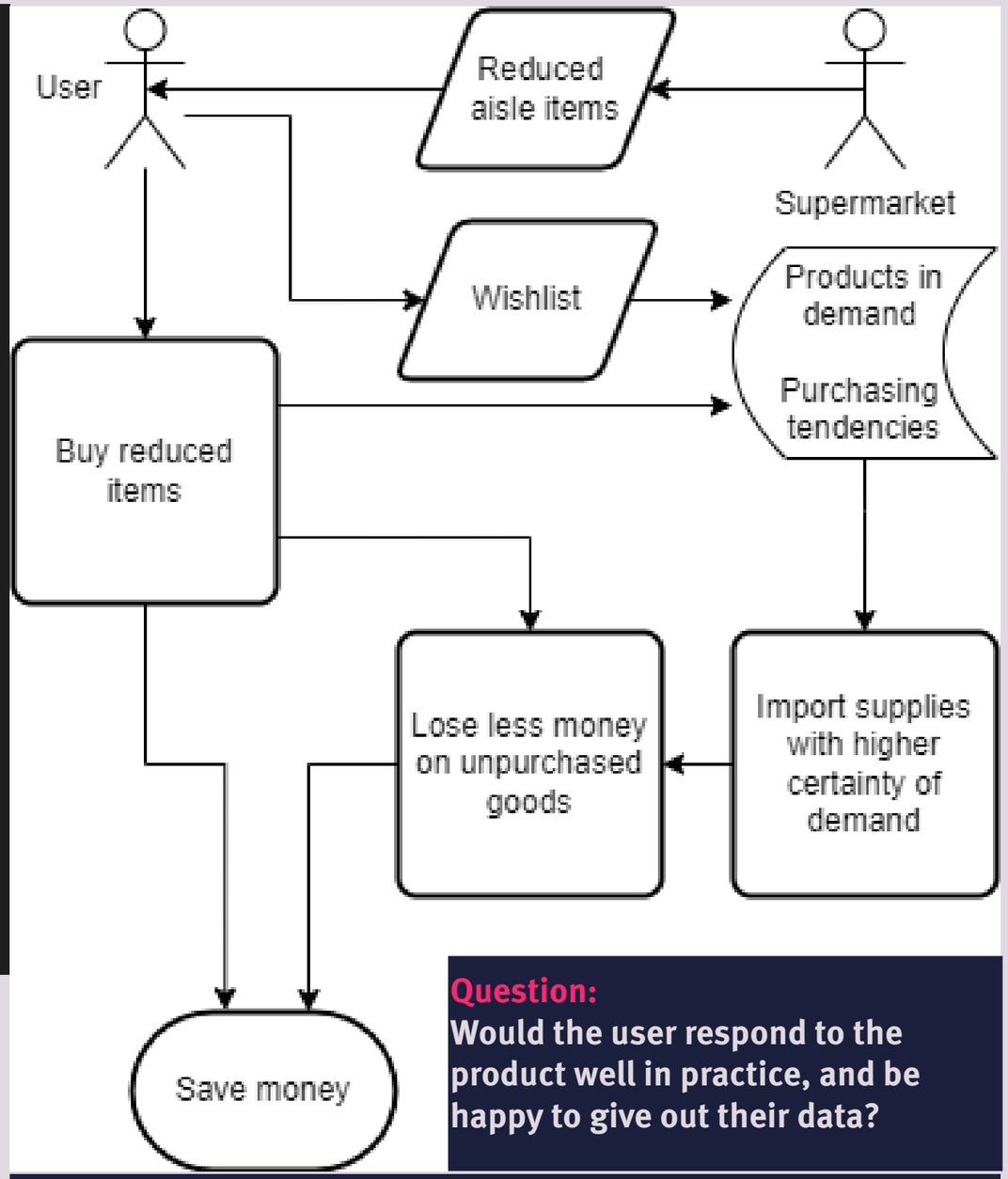
Feeder

Prototype/Idea Development

The overral response to this idea was very supportive, even whithout knowing well how the app would operate. The biggest challenge I saw was how to actually get the information, and how the prices would respond to an influx of demand from the app,

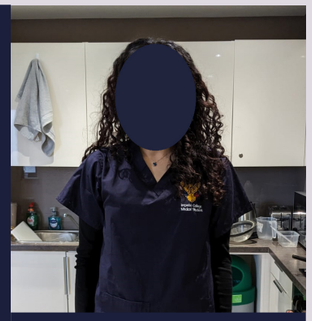
The Reduced Aisle





Feedback:

Participants were happy with the user interface, but expressed concern at how they might interact with those aiming to buy reduced items physically in the shop. I responded to this by adding barcode readers to the physical aisles so that shoppers can also reserve items as soon as they see them.



Participant (Kelly)

Question:
Would the user respond to the product well in practice, and be happy to give out their data?

Answer:
People are happy to give out relevant data since they feel they are also 'winning' the interaction.

Prototype/Idea Development

We were unable to prototype the whole app storyboard because at this point it was quite involved and we were still not completely resolute on its features. One important challenge though was the receipt reader, and how to seamlessly record purchases in realtime.



Sous Chef.AI

Question:

The device was too complex to test the user experience deeply, but we wanted to make the process of scanning receipts much more seemless than other solutions, so we made a lofi prototype to see hoe smoothly women could take the device out of their handbags and use it.

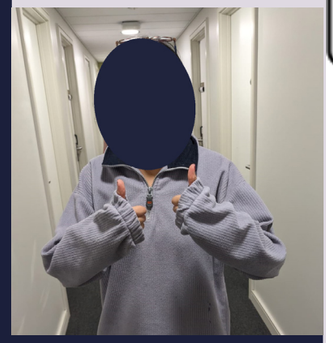
Answer:

The device was quick to operate, although participants had trouble with carfully removing the prototype from their bags. While this was to be expected, durability of such a thin mechanical device is not trivial.

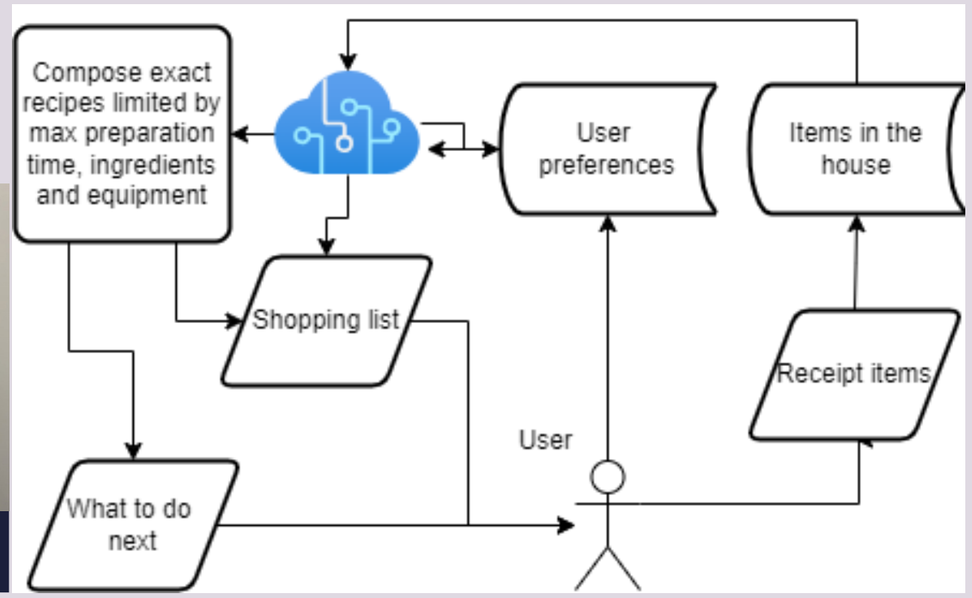
Feedback:

Participants under ‘overwhelmed Oliver’ liked the idea of opening the fridge and not having to think about what they can make. The receipt reader generally had a good response, although a male participant in reference to Jakob’s Law, expressed concern with having to learn a new system, preferring systems he already knew, such as his wallet.

If we choose this product, then we will have managed to fit it into a wallet pocket. The female participants had no such complaint as they were already used to using many different things from their handbags.



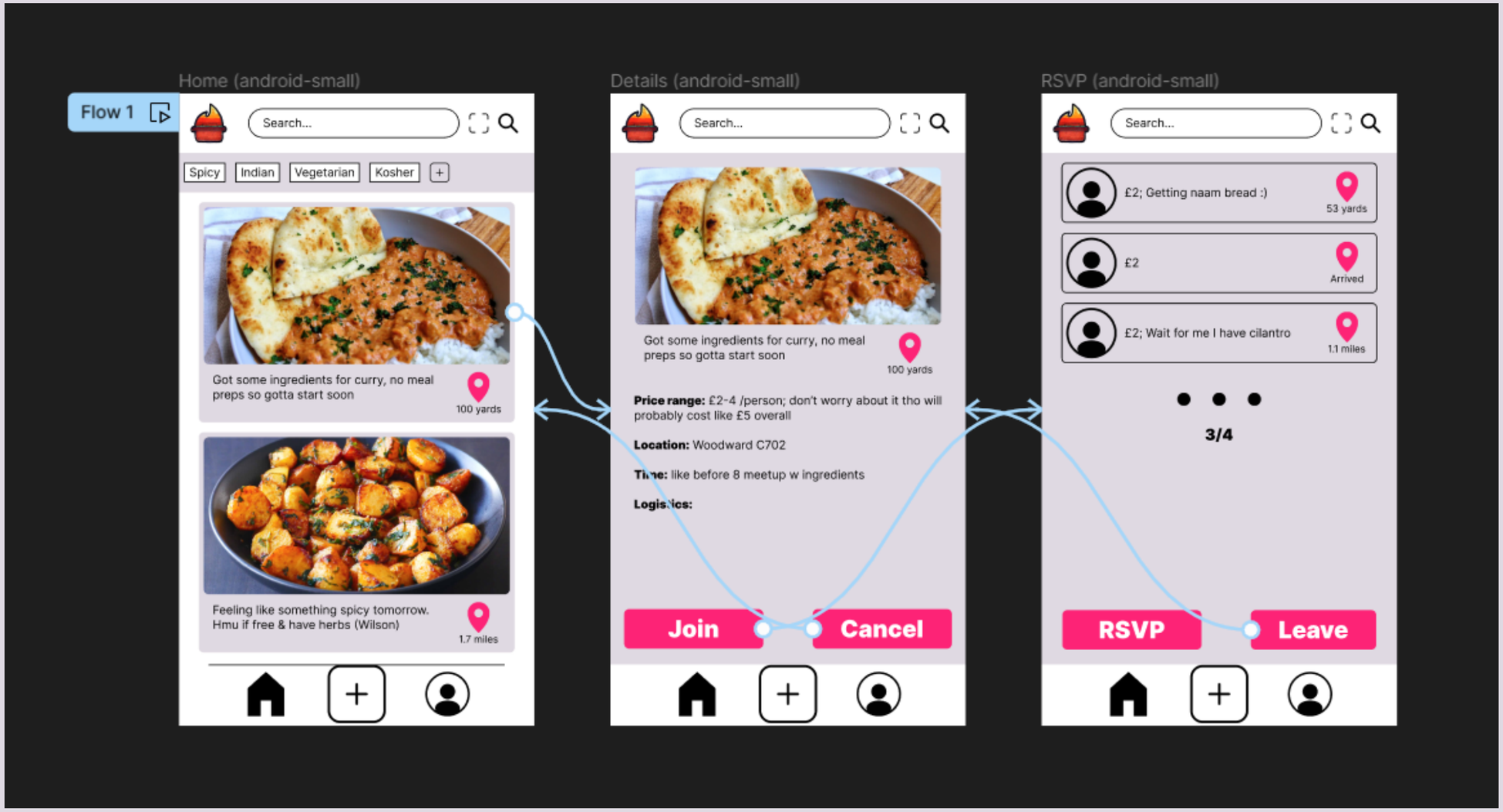
Participant (Oliver)



Prototype/Idea Development

After receiving user feedback, I added a ‘friends’ and ‘mutual friends’ function to the idea, so that you could choose to only cook with people within your trusted social group. I also considered user profile pages with a bio and ‘food portfolio’ to create good matches.

Feeder



Question:

In order to prevent bad experiences from poor communication, a feature of the app would be an LLM that autosuggests details of your plan so that you don’t have to think much or plan carefully. The question was what information was needed.

Answer:

What people additionally wanted to know before pressing ‘RSVP’ was firstly how trustworthy the author of the post would be and secondly what ingredients would be needed/expected to bring.

People also preferred to know the type of person msking the post over a picture of what the food might look like. Another suggestion was which institution users were in.

Feedback:

Participants under ‘can’t cook Kelly’ loved the idea as it brought spontaneity and convenience, although would have only used it a couple times per week at most. This would still achieve the food variety goal.

The main issue with this product was trust. Women especially tended not to want to use the app unless with the friends feature, and some people were uncertain about comptetency of partners, asking for a rating system. This was in conflect with knowing the people you cook with.



Participant (Kelly)

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Appendix

Links to my Work:

- Survey
- Interview recordings
- Survey spreadsheet

- Analysis spreadsheet: https://imperiallondon-my.sharepoint.com/:x:/g/personal/hm1323_ic_ac_uk/EeL88esJGtBMqIJY18UWoJcBJhAtWiR77y5VAfwY1QV-Kg?e=MAhbZr&nav=MTVfeoYwMjA3NTkzLTRBREItNEVGMi05MEQ5LTNFRkZCMoQwNjI5Nno

- Desmos graph: https://www.desmos.com/calculator/chkqcaiidh

- Miro board: https://miro.com/app/board/uXjVN1tzYvE=/?share_link_id=28599746259