Nurturing a Zero Waste Mindset Through a Gamified App

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Abstract

Municipal solid waste has been one of the major issues for modern cities, caused by urbanisation. Each stage from the waste streams is bringing detrimental pollution to our environment, threatening the entire ecosystem, including animals habitats and human health. Regarding the hedonic consumer culture, people have been taught to be irresponsible and to have inappropriate consumption behaviour. Humans usually dispose of things when they are expired, useless, broken or unneeded after consumption. Therefore, it can only improve through reversing the irresponsible behaviour with a more sustainable and healthier mindset. Over the decade, governments, industries and organisations have been working together on waste reduction, yet it needs to grow more. This project aims to explore an innovative-led solution that will inspire people to embrace a sustainable lifestyle in order to minimise their waste production.

This project investigates a new solution based on the zero waste philosophy that helps to change consumption and waste management behaviour. The approach to demonstrate the relation between the waste problem and the reduction philosophy could affect people's impression and involvement. The power of technology enables green information to disseminate efficiently and effectively, but the approach and appearance are also important. It is not just providing information but delivering it strategically and aesthetically, so it is able to help people on their zero waste journey.

I significantly employed multiple disciplines to solve the problem by triggering a long-term green behavioural change. I believe that creative innovation and technology could collaborate to inform the zero waste mindset effectively to the public. Trial and error, heuristic and human-centred design were used to conduct and develop the zero waste concept. In order to trigger a permanent green behaviour, particular conditions are required to start the change and then also to maintain it.

The results from the concept show that the theory of gamification, edutainment, Fogg behaviour and the four pleasures can be adapted to my zero waste app. It has been evaluated and developed into a meaningful application that can motivate people to embrace the zero waste lifestyle. The exploration of this project also provides innovative aspects for other designers to rethink the way we design for waste management and reduction and maintaining a sustainable environment. Interpretation of human factors and innovative technology have also indicated the possibility of minimising waste. Gamification is used to create the challenge, communication, motivation and reward to trigger a sustainable behavioural change. The technology bit allows the information to be effectively and efficiently sent to the public. By following the human factor, Zero Waste Zip is designed to be a very user-friendly app. This allows anyone who uses it feels like they could change the world.

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the Acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Wennie

Wennie Lun
2018

Acknowledgements

Over the year, I have been receiving precious of help and supports from others and I am sincerely appreciated for the following people.

I would first like to express my profound gratitude to my supervisor Professor Leong Yap for the supports to my journey to reach my goal, for the patience and advice to guide me through a scholarly mindset. I received a lot of motivations for his approval and feedback. His attentive guidance helped me to stay productive in my research, practice and writing. This project would not have been possible without his help.

Last but not least, I would also like to express my sincere love to my parents, brother and friends for providing me with the delightful supports and continuous encouragements throughout my year of study. Without their support, I would not be able to accomplish this challenging but meaningful project. Thank you.

Wennie

Wennie Lun

1 Introduction

Kiwis are known for being very environmentally positive and for New Zealand's beautiful ao turoa (nature). However, "New Zealanders dump 2.5 million tonnes of waste in landfills every year and our waste emissions per capita are the second highest in the world" (Z Energy, 2017). When the waste is harming the environment, it is also harming the entire ecosystem and our social health. We are part of the problem! We throw away stuff which cause the waste problem, and it is threatening ourselves. Unless we attempt a waste-free habit, the problem will not stop itself.

More specifically, the waste we produce daily is Municipal Solid Waste (MSW). MSW is detritus and unwanted refuse, and it is being disposed from household to landfill. It is also commonly known as household waste, garbage and trash. Humans have attempted different systems to manage and minimise waste over the years, and yet it can be developed in a more effective and efficient way. Regarding that, the theory of zero waste was specifically established against any kind of waste. While related parties from governments, industries and organisations have been attempting various policies and campaigns over the years, there are still improvements to be made.

From a design perspective, I believe that design can discover a powerful approach to influence people and change the world. According to that, this project is aimed at exploring an innovative-led design solution to minimise waste being sent to the landfill and encourage the zero waste lifestyle. In order to do so, I looked into what human factors can trigger a behavioural change and how it can be adapted with technology. The project is divided into two sections: theoretical and practical. Theoretically, I analyse the waste problem and significant human factors; practically, I interpret the significant theories to visualise the concept.

Triangulation methodology was applied to establish a strategic research and design framework for this project. It was based on cross-disciplines: science, humanities and heuristics to achieve the theoretical and practical interpretation. Therefore, qualitative research, like observation, contextual review and case studies were conducted to identify the problem, analyse the in-depth waste and the humanities context, and to support the design outcome. On the other hand, design thinking was adapted to manage the entire research and design progress.

The background literature, methodology, concept and design development, and discussion were critically explained in this paper. It would indicate what and why I made those decisions and how they fit into my final concept: Zero Waste Zip.

Research Question

How could the application of human factors and communication technology trigger permanent changes of attitude towards a zero waste mindset ?

Aims

This project aims to develop an innovative design outcome to eliminate municipal solid waste by triggering changes of attitude towards zero waste mindset for a sustainable environment.

2

2. Contextual Review

Before stepping into the solution development, I studied everything that is related to waste, including human behaviour. Here are the several important terms and concepts that needed to be determined as background knowledge. More importantly, how does this knowledge influence my project research and concept development.

Figure 1. Landfill landscape. From Idealog. Retrieved from https://idealog.co.nz/venture/2015/05/eco-friendly-product-stewardship-makes-dollars-and-sense. Copyright 2015 by Idealog.

Figure 2. Landfill. Photograph by MPCA, February 1, 2005. Retrieved from https://www.flickr.com/photos/mpcaphotos/22304427613. Used under Creative Commons license CC-BY-NC 2.0.

2.1 Municipal Solid Waste

Municipal Solid Waste (MSW) is detritus and unwanted refuse, being disposed of from household to landfill. It is also commonly known as household waste, garbage and trash (Rubbish, 2018).

2.1.1 History of Waste Management

Throughout the decades, a human has broadly experienced three ways to deal with urban refuse: bury it, burn it or dump it into the deep ocean (Connett, 2013). However, they all end up harming the environment in different levels. Burying it will cause hazardous water leaking out from the trash, and polluting the soil and underground water (Connett, 2013). The process of burning emits greenhouse gases and other severals (Connett, 2013). By dumping trash in the ocean, marine animals will accidentally eat it or get entangled with plastic waste, thus affecting the entire ecosystem. We cannot just stick to studying waste disposal, but we need to look at earlier stages before the waste appears.

Figure 3. The New Zealand waste strategy: Reducing harm, improving efficiency. From Ministry for the Environment by October 2010. Retrieved from http://www.mfe.govt.nz/sites/default/files/wastestrategy.pdf. Crown copyright 2010.
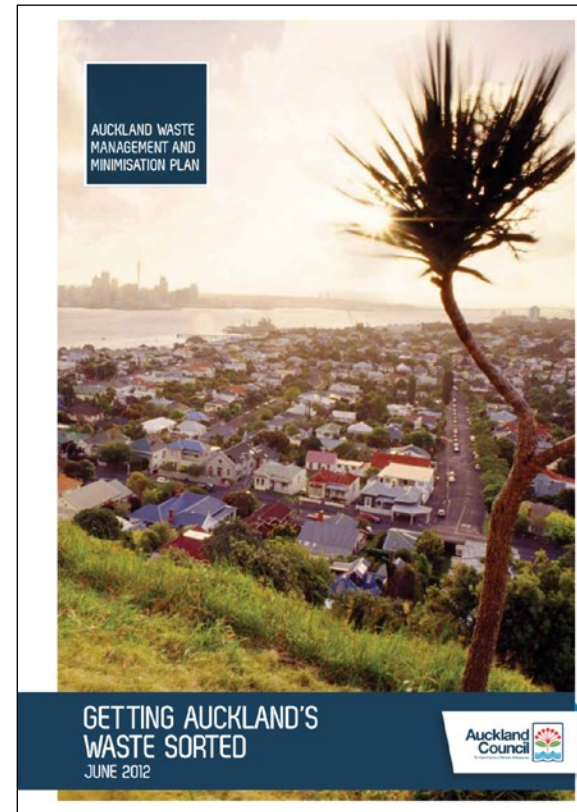
Figure 4. Auckland Waste Management and Minimisation Plan. From Auckland Council, June 2012. Retrieved from http://temp.aucklandcouncil.govt.nz/SiteCollectionDocuments/environment/wastepreventionstudysummary.pdf.

2.1.2 Policy

In 2008, the New Zealand government passed the Waste Minimisation Act and declared an aspirational goal of zero waste by 2040 (Ministry for the Environment, 2010). Regarding "New Zealand Waste Strategy: Reducing harm, improving efficiency"(Ministry for the Environment, 2010), a blueprint that outlines the high standard direction for local councils, and Auckland Council is to publish the Waste Management and Minimisation Plan (Auckland Council, 2012). To make Auckland one of the most livable cities in the world, it targets to "reduce domestic waste kerbside waste from 160 kg per capita to 110kg per capita by 2018 – a 30% reduction and reduce total waste to landfill by 30% by 2027" (Auckland Council, 2012, p.2).

As shown on the Auckland Council website (2018), there are educational programmes and workshops for schools, society and businesses, like Waste Wise Schools and Love Food Hate Waste workshop. However, they are all on-site activities which may have limitations for the location or time so that not everyone can join in. This points out the need for a more flexible and convenient workshop for more people.

"TO BECOME THE MOST LIVEABLE CITY IN THE WORLD, AUCKLAND WILL AIM FOR THE LONG TERM, ASPIRATIONAL GOAL OF ZERO WASTE BY 2040, TURNING ITS WASTE INTO RESOURCES"

(Auckland Council, 2012, p. 21)

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Figure 5. Seagull's corpse filled with plastic trash. From Smithsonian Ocean Portal, Retrieved from http://ocean.si.edu/slideshow/laysan-albatrosses%E2%80%99-plastic-problem. Copyright by Chris Jordan.

Due to copyright issues image cannot be displayed.

Figure. 6. Sealion with plastic bag entangled around its neck. From One Green Planet. Retrieved from http://www.onegreenplanet.org/animalsandnature/marine-animals-are-dying-because-of-our-plastic-trash/. Copyright by LiveScience.

Figure 7. Seagulls descending on rubbish bags left on city street. Copyright 2017 by Wennie Lun.

2.1.3 Socio-Environmental Impacts

Waste does not only affect nature but also our society. Municipal solid waste is a social-environmental problem; it harms our urban environment and also human health (Connett, 2013). The landfill will cause emissions from leachates that pollute our soil and underground water (Connett, 2013). It also contaminates our food chain. When animals accidentally swallow plastic, these animals are then eaten by other higher food chain animals or by humans. This ends up threatening our health and future generations.

All the impacts show the urgent need to develop a solution that will help minimise waste and save our society and environment. This project is focusing on investigating a way to raise green awareness and make the change.

2.2 Causes of Waste

According to William Rathje's words, "our major environmental concerns are either caused by or contribute to the ever-increasing consumption of goods and services" (Lilienfeld & Rathje, 1998, p.25). Consumption is a part of human behaviour that mainly causes the growth of waste.

2.2.1 Irresponsible Hedonic Consumption

Nowadays, businesses are good at offering cunning deals to tempt consumers to buy their products even they do not need them. In 1982, Holbrook and Hirschman noted (as cited in Adomaviciute, 2013, p. 756), "hedonic value is associated with satisfaction of the senses enlarged by experiences of pleasure, entertainment, fantasy and fun". Industries intend to provide the satisfaction of the senses through luxury packaging designs, and yet it can be excessively packaged.

Although we are living in an information overload environment, we still have a chance to change our behaviour, attitude and value to avoid irresponsible and unnecessary consumption that causes waste.

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Figure 8. Over-packaged Easter eggs. From 1 Million Women. Retrieved from https://www.1millionwomen.com.au/blog/5-more-absurdly-over-packaged-food-products/. Copyright 2015 by Bronte Hogarth.

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Figure 9. Over-packaged bananas. From 1 Million Women. Retrieved from https://www.1millionwomen.com.au/blog/5-more-absurdly-over-packaged-food-products/. Copyright 2015 by Bronte Hogarth.

2.2.2 Incorrect Waste Management

Besides irresponsible consumption, wrong waste management can cause useful resources to be sent to the landfill. If we can sort our waste into the right bins like recycling or composting, it can return valuable materials for new production. Mistakes can occur when we have not been educated properly, did not read the council's waste management guide, or because of our laziness.

Both consumption and waste management are associated with human behaviour; therefore, the mission of this project is discovering the key elements to create an exclusive design that will trigger sustainable behaviour change.
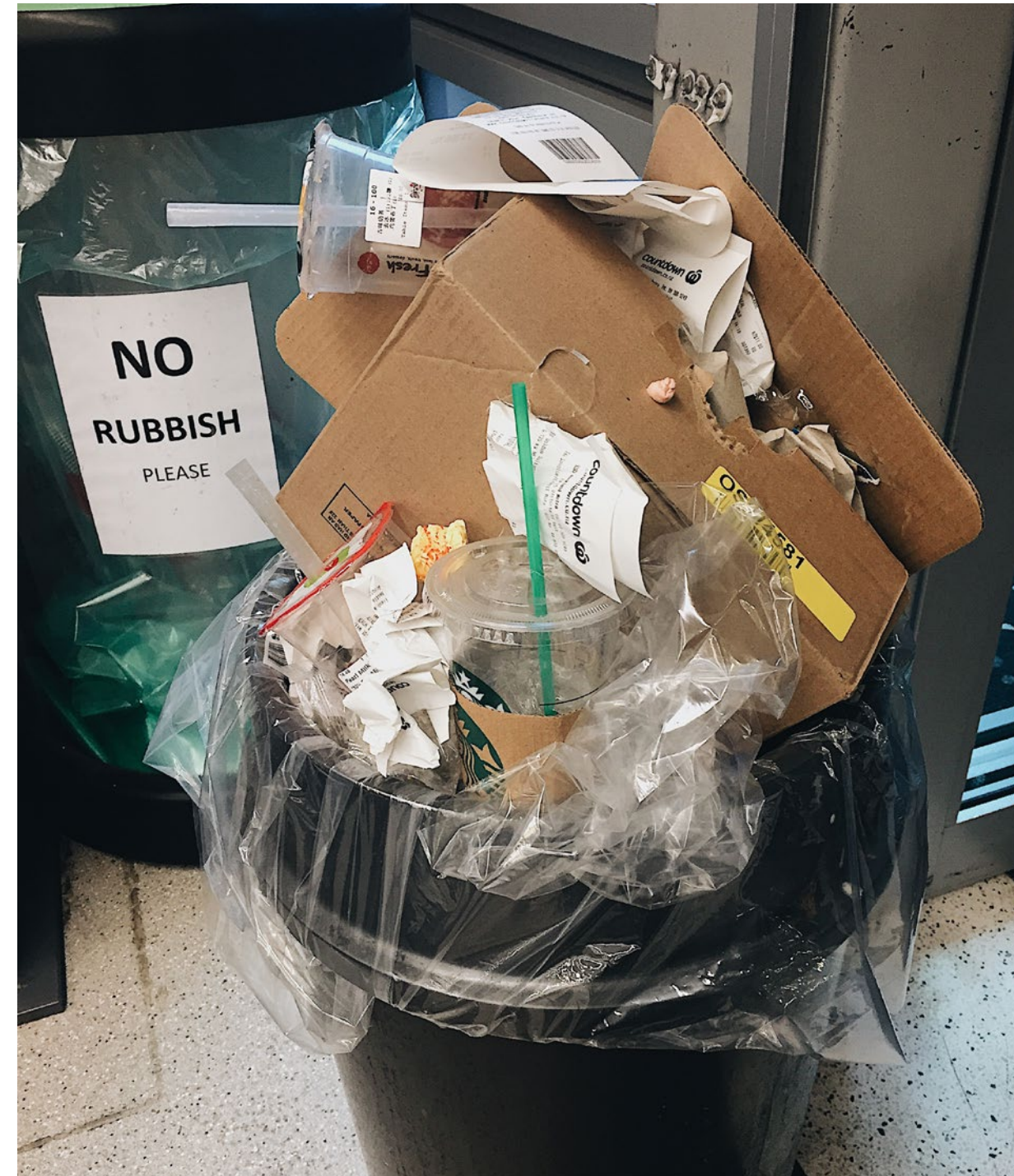
Figure 10: Overflowed rubbish bin Copyright 2018 by Wennie Lun.

2.3 Waste Stream Lifecycle

Waste stream is a system that describes the entire lifecycle of the trash we generate. Different from the past, the New Zealand Government declared that our country needs to move from linear to cyclical resources flows (Auckland Council, 2012, p.22). We need to change the way we think about waste; it is a cradle-to-cradle resource rather than a worthless and dead-end problem. In daily life, we should estimate the lifecycle of our consumption by considering the material and its disposing method. It is valuable to train our mind to think circularly in our daily life. By thinking circularly, our attitude and behaviour will be changed at the same time.

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Figure 11. Linear and cyclical resource flows. Reprinted from *Auckland Waste Management and Minimisation Plan* (p.23), by Auckland Council, 2012, Auckland, New Zealand: Auckland Council. Copyright 2012 by Auckland Council.

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Figure 12. Circular economy. From Instagram. Retrieved from https://www.instagram.com/p/BWpR93SD45O/?taken-by=circular.flanders. Copyright 2017 by Circular Flanders.

2.4 Zero Waste

Fortunately, humans came up with a better way of philosophy to prevent the refuse problem: "zero waste". Paul Palmer is the first one who brought the term zero waste to the public and draws early attention in 1974 for his company, Zero Waste Systems Inc. (Palmer, 2013). It literally means having zero trash sent to landfills, but recycling and composting them instead. In McDonough and Braungart's words (2009), it is more important to adopt a sustainable lifestyle that will thrive in nature, and maintain our social health and future generations. Recently, "zero waste" is the most efficient approach to solve the waste problem and it is being declared as a long-term and aspirational goal in numbers of government and council waste management and minimisation plans (Palmer, 2013).

As stated from Zero Waste International Alliance's website (2009), "changing people's lifestyle and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for other use." It can also be embraced as a sustainable lifestyle to minimise our household waste. The long-term goal is to protect and rehabilitate the ecosystem. When the zero waste mindset is rooted in our mind, we then consciously think sustainably and live responsibly.

If one person can change the world, then a group of people can change the world even faster. To step closer to the aspirational goal, all of us should understand the zero waste philosophy and embrace it daily.

" IT'S NOT JUST ABOUT "SAVING" THIS PLANET, BUT ABOUT LEARNING HOW TO LIVE ON IT "

(McDonough & Braungart, 2009, p. 32)

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Figure 13. Zero waste 5Rs hierarchy. From Only Natural. Retreived from
http://www.onlynatural.ie/zero-waste-guru-delivers-inspiring-presentation.
Copyright 2017 by Michelle Cooney.

2.4.1 The 5Rs

The criteria of zero waste lifestyle are based on the hierarchy of the 5Rs which comes in order: refuse, reduce, reuse, recycle and rot. The term "5Rs" is like a memorable phrase that provides a handy standard that people can reflect on before making decisions that may produce waste (Johnson, 2016).

Refuse

Refuse single-use and disposable items and reduce the inessential generation of waste, like fast food containers, utensils or take away bags. Anything that will end up sending to landfills after being used. It is especially items that are made from plastic because the manufacturing process contains emissions and it is toxic to human health.

Reduce

It is also important to reduce the amount of trash by not creating it in the first place, which is about avoiding overall consumption. Regarding the modern hedonistic consumerism and overconsumption, it indicates we are not only purchasing for basic needs but also pursuing pleasure and indulgence. "The more food that we waste, the more food we need to produce, this constant need to produce more puts additional pressure on the environment" (Love Food Hate Waste New Zealand, n.d.).

Due to copyright issues image cannot be displayed.

Figure 14. Metal bendy straws. From Westelm West elm. Retrieved from https://www.westelm.com/products/metal-bendy-straws-d1244/?pkey=e%7cmetal%2bbendy%2bstraws%7c1%7cbest%7c0%7c1%7c24%7c%7c1&cm_src=PRODUCTSEARCH%7c%7cNoFacet-_-NoFacet-_-NoMerchRules-_-. Copyright 2018 by Williams-Sonoma Inc.

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Figure 15. Pastel furoshiki. From Mourning Dove Studio. Retrieved from http://hippieindisguise.com/wrapping-gifts-with-fabric. Copyright 2012 by Mourning Dove Studio.

Due to copyright issues image cannot be displayed.

Figure 16. Zero waste kit. From Instagram. Retrieved from https://www.instagram.com/p/BXA2rs6DvoY. Copyright 2017 by Journey To Zero.

Reuse

This is about reusing the "waste" materials to produce new products. In an innovation perspective, it is also called D.I.Y.: Do It Yourself. There are various ideas that can be searched for online that show how to reuse household waste for new creations. This will extend the lifetime of the materials before it is actually being discarded. In spite of that, "repair" also apply in this section. Our ancestors used to repair broken objects, like fountain pens, shoes, furniture, radios or even refrigerators. Nowadays, the fixing cost is more expensive than the replacing cost, so we rarely take the option of "repair" into account. If we care about nature, fixing small items by ourselves will reduce waste and resources that go into new production. In person, we can patch holes in our socks or t-shirt, instead of throwing them away.

Figure 17. Recycle Bin in Auckland CBD. Copyright 2017 by Wennie Lun.

Figure 18. Trash Bins and Recycke Bins in AUT City Campu. Copyright 2017 by Wennie Lun.

Recycle

Paper, plastic, aluminium, glass and timber are the most familiar recycle categories we follow to manage our waste. After collecting them, it will be processed and converted to waste materials for new production. However, some materials have a limited number of times to be recycled and converted back to raw materials. For instance, plastic can only be recycled 7-9 times until it shortens the fibre and loses its flexibility (Auckland Council, n.d.). On the other hand, aluminium, steel and glass are the most recommended materials because they can be recycled infinitely (Auckland Council, n.d.).

Although the recycling technology has been improved, the effort and energy that has been involved in the product or food production cannot be ignored. It is important to be aware of the waste hierarchy. As Bea Johnson (2016), a zero waste expert, said "it is more about recycling less"; only recycle what we cannot refuse, reduce or reuse.

Due to copyright issues image cannot be displayed.

Figure 19. Worm farming - Compost collective. From The Compost Collective. Retrieved from https://compostcollective.org.nz/worm-farming. Copyright by The Compost Collective.

Rot

Organic and biodegradable waste can be composted to return the nutrients back to the earth. Worm farming is popular in New Zealand; composting worms produce worm castings and liquid fertiliser by eating through organic waste: food scraps, garden waste, trash paper and cardboard. Those composted materials are excellent fertilisers and great for the garden (The Compost Collective, n.d.).

3

3. Important Findings

There is no doubt that "Zero Waste" is the most advisable and effective way of theoretically prevent damage to the environment and society, compared to cleaning it up (Palmer, 2013). It is not only transforming the waste stream but also preventing the problem before it begins. Such a sustainable theory exists, and yet it needs an exclusive strategy to address the environmental issues, promote sustainable solutions and provide effective tools for people to approach a green lifestyle.

Regarding the literature review on waste, it suggests that human behaviour is the major factor that affects the growth of waste.

ZERO WASTE

Principle of 5Rs
Sustainability
Cradle-to-cradle
Upcycle
Minimise waste

ABOUT WASTE

Unwanted Materials
Environmental Pollution
Harming Ecosystem
Threatening Human Health
Resources Loss

CAUSE OF WASTE

Morden Society
Hedonic Consumption
Waste Management
Overpackaging

Figure 20. Zero waste as a solution theory. Copyright 2018 by Wennie Lun.

I remember Wong (personal communication, May 25, 2012), my high shcool teacher, said that "I alone cannot change the world, but I can cast a stone across the waters to create many ripples." When you do something green today, you might affect people surrounding you, and they will become "you" tomorrow. If not, at least you changed your life and your health! This prompted me to design a unique digital tool to educate people about the zero waste mindset by triggering their permanent behaviour change towards a sustainable lifestyle. Fogg (2012) mentioned that "when we know how to create tiny habits, we can change our life forever". This idea links to my goal, which indicates tiny green habits can end up changing people's behaviour in life or even the environment as a long-term goal. To do so, the study of human behavioural change and the interpretation of the content are important.

3.1 Gaps In the Auckland Environment & Waste Education

Improvement is in demand for the Auckland environment and waste management education, despite different waste minimisation programmes hosted weekly or monthly. Due to the waste issue, the Auckland Council (2012) had declared a Waste Management and Minimisation Plan (WMMP) with a long-term aspirational goal of zero waste by 2040. Local councils and organisations have worked hard to improve waste management, hold educational programmes and workshops for primary schools and businesses. In fact, they are mostly held as an on-site activity in the real world, where people may be limited to the location and time. Some people may find it difficult to arrange their schedule to attend these educational programs, and this is where the gap appears.

An edutainment mobile app will fill in the gap with an innovative solution. The opposite of reality is virtual or digital. When it comes to digital, it means it is easier to access and more flexible to arrange the time and location to learn about waste reduction and management. With the power of technology, users have access to a zero waste community online which enables them to learn and share experiences.

Organiztions / Advantages	Auckland Council	Waste Wise School	Auckland Green Jam	My App
Community	●	●	●	●
Website	●	●	●	●
Online Workshops/ Programs				●
Offline Workshops/ Programs	●	●	●	
Target Audience				
School Kids	●	●		
Teenagers	●		●	●
Business	●			
Adults				●

Figure 21. Auckland environment & waste education gap analysis. Copyright 2018 by Wennie Lun.

Current educational programs for waste management are either targeting school kids, teenagers or workers in businesses, but rarely do they target young adults in general. As mentioned by Johnson (2015), consumer-like households are usually ones who make decisions on household consumption and waste management. This group of people are usually spending time taking care of children, doing housework and grocery shopping for meals, which means they may have difficulties attending any waste management programmes. If there is a delightful app to guide them through waste-free living, it may create a positive contribution to the waste problem.

Furthermore, smartphones are commonly owned by most New Zealanders, and they are being used as search engines and learning tools. According to statistics carried out by Research New Zealand (2015), 70% of all adult New Zealanders own a smartphone, and yet more than 77% of them use apps for referencing information and social contacts. It means that an edutainment app about waste has a potential to reach my target audience.

Due to copyright issues image cannot be displayed.

Figure 22. Apps respondents use on their smartphones and/or tablet by year. Retrieved from Research New Zealand. Copyright 2015 by Research New Zealand.

3.2 Human Factors & Behaviour Change Towards Zero Waste

Regarding the cause of waste, human behaviour is the factor that impacts the growth of waste, and it demands change immediately. As humans, our ways of thinking and behaviour are complicated, and yet there are scientific studies in psychology, sociology and physiology on the interaction between humans and content of interest.

Whenever it comes to environmental issues, we think of it distantly in time and location, but we do not necessarily need to consider it because we believe it only needs to be thought of by future generations (Branin, Wheelock, Long & Bethea, 2017). At the same time, we as consumers, humans who live in the mother nature, are among the most impacted and we could be the solution bearers.

MY ZERO WASTE APP
Edutainment & Gamification
Inform the waste problem
Provide 5Rs tips
Online Zero Waste Society
Joyful, Lighthearted & Valuable

Physio
UX & UI
Visual Elements
Moition Transition
Sound Effects

Ideo
Values
Environment & Society Sustainability
Society responsibility
Self-fulfillment
Self-esteem

Socio
Online Zero Waste Society
User Generated Content
Dynamic Learning Community
Experience Sharing
Discussion & Improvement

Psycho
Emotional storytelling
Infographic representation

Figure 23. 4 Pleasures adaptation diagram. Copyright 2018 by Wennie Lun.

3.2.1 Modifying Behavioural Change Through the 4 Pleasures of a Design

The four pleasures is a framework that helps to structure the experience approach to a pleasurable design (Jordan, 2003). Emotional, hedonic and practical benefits are associated with the app to create a joyful, lighthearted and valuable experience.

Physiologically, the UX and UI are user-friendly designed for a sense of pleasure. The aesthetics in graphics and interactions can create a visual satisfaction with colours and layout. If interactions like buttons or page transitions come along with specific sound effects, users will have the satisfaction of hearing them. By creating a satisfaction of sense, users can have a pleasurable experience of learning, and shifting to a sustainable lifestyle through the zero waste app.

Sociologically, the app emphasises user-generated content which creates a dynamic learning community among users. In the app, they can share their experience of their zero waste journey, and discuss questions to stimulate competition for improvement. A positive learning environment will automatically build a zero waste society where they can meet people who have the same interest in a waste-free lifestyle.

Psychologically, emotional storytelling is applied to promote and communicate the need to reduce waste. Adopting a sustainable lifestyle will eliminate the harmful effects of the environment then drive it for our future generations. On the other side, users can quickly understand the 5Rs practice and how it creates positive impacts on society and the environment with infographic representations. Infographics can improve a quick and clear understanding of information and knowledge through visual representation. The combination of emotional storytelling and infographic representations will encourage people to take the first steps by learning about waste minimisation through the app.

Ideologically, the sustainable content in the app emphasises the value of environmental and social responsibility. It embodies the fact that users care about the environment and society's health. Therefore, they are involved in solving the waste problem as well. Once they get accustomed to the 5Rs principle and start embracing the practice as a sustainable lifestyle, they are increasing their self-fulfillment and self-esteem with the feeling of social and environmental contribution. The values are the factors that motivate people to use the app and make positive changes.

3.2.2 Fogg Behavior Model: Triggering Behavioral Change Through the App

The Fogg behaviour model provides a guide for designers to identify the three key elements that will influence any kind of behaviour change. The model visually highlights the relationship between motivation, ability and trigger. In Fogg's studies, he advocates "the three elements must converge at the same moment for a behaviour to occur" (n.d.). However, when it does not occur, it means the elements are either missing or need to be readjusted. Regarding the model, to achieve the goal of permanent behaviour change towards zero waste, I need to adjust the elements carefully.

It prompted me to adapt the model and to map out the essential elements of the zero waste app. The motivation is influenced by gamification and edutainment, triggered by the four pleasures.
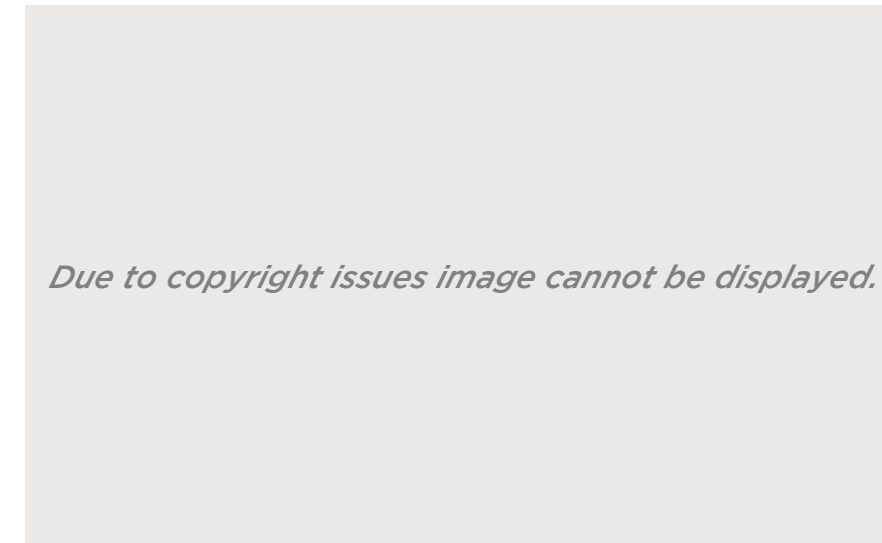
Figure 24. Fogg Behavior Model. From BJ Fogg. Retrieved from http://www.behaviormodel.org. Copyright 2007 by BJ Fogg.

Fogg Behaviour Model (Zero Waste Zip)

High

(Motivation)

REDUCE WASTE
(trigger success)

• Encourage the transition to a low waste lifestyle

• Green consumption

• Permanent behabior change towards Zero Waste

Increase waste
(trigger fail)

Low

Hard

(Ability)

Easy
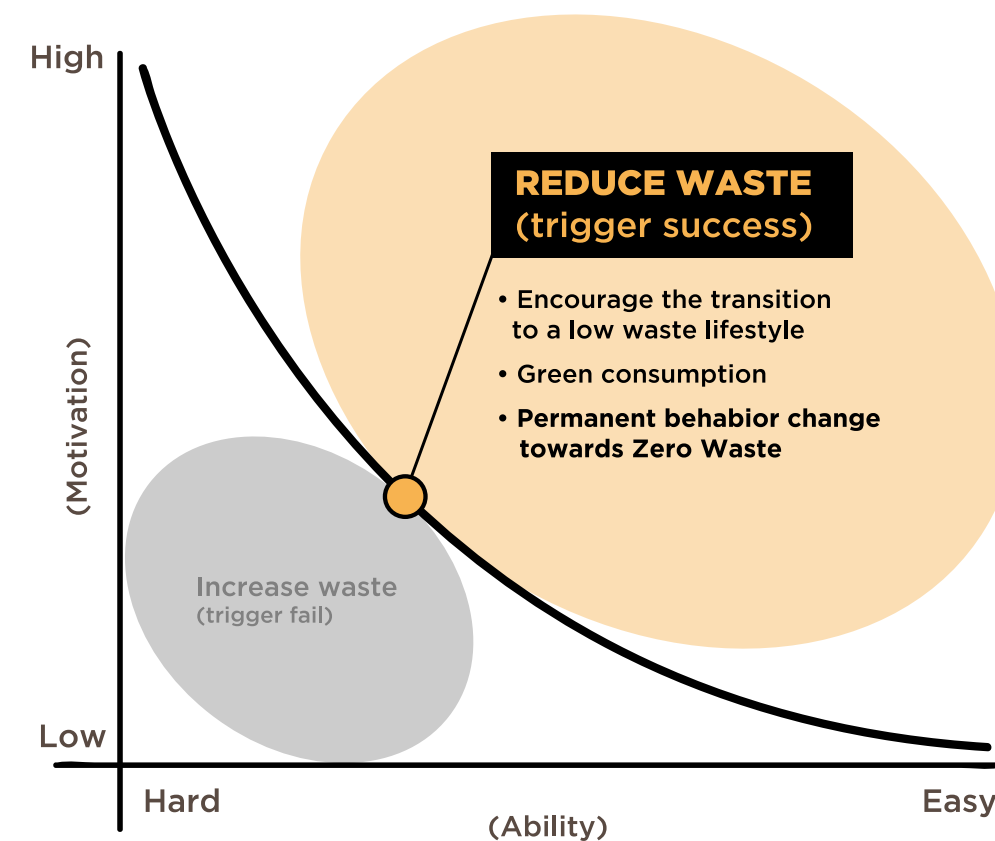
Figure 25. Zero waste zip Fogg behavior model. Copyright 2018 by Wennie Lun.

3.3 Project Direction

The overall findings can be summarized in Figure 26 which indicates my project direction with WHAT WHY and HOW questions: for example, what is happening with the waste problem, why is waste an urgent problem, what is the appropriate solution, how do you inform and encourage people to find a solution, what kind of theory can strategically advance a design solution, how do you reinterpret the solution to the public, and what media will be used for the concept outcomes?

MOBILE APP
(media)

TECHNOLOGY, HUMAN SCIENCE, DESIGN
(strategy)

ZERO WASTE
(solution)

ECOSYSTEM, SOCIAL HEALTH, FUTURE GENERATIONS
(impacts)

WASTE GROWTH
(problem)
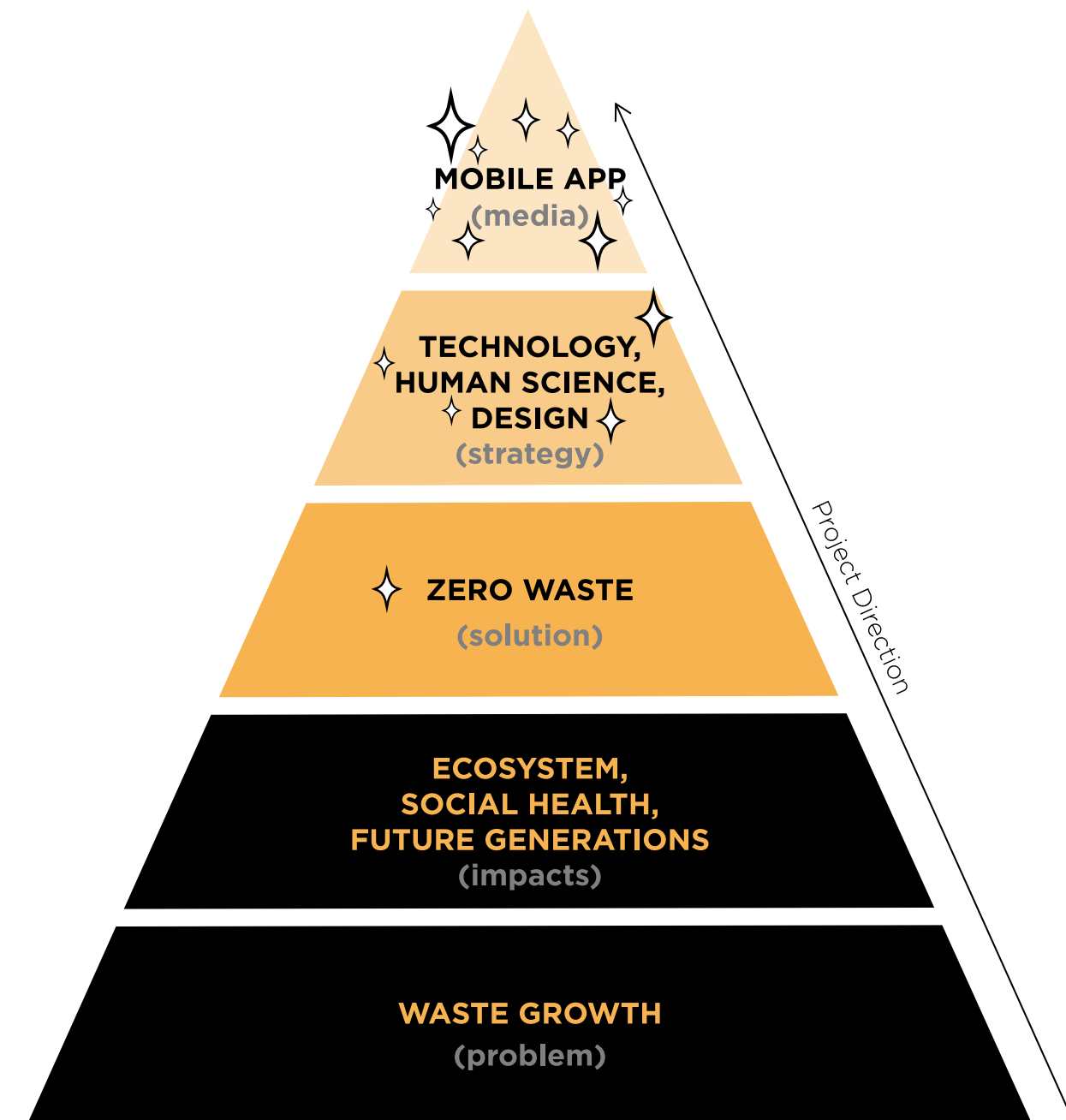
Project Direction

*Figure 2*6. Project direction. Copyright 2018 by Wennie Lun.

4

4. Research & Design Methodologies

A setup methodology created a systematic research and design strategy. At the same time, the design thinking principles framed an exclusive thinking cycle that guided me through the entire research and design process.

4.1 Design Thinking: A Human Centred Design Approach for a Thoughtful App Design

Design thinking principles were used in this project. It is a strategic way of approach to produce innovative ideas to solve complex problems (Muratovski, 2016), in this case, municipal solid waste. The entire process involves five stages: definition, discovery, ideation, prototype, and testing. I started by defining the problem, the goal, the target market and the audience. Next, I ideated concepts by brainstorming and sketching, then I prototyped viable UX and UI concepts, and lastly I tested its feasibility and functionality for modification and improvement. By going through each stage, it led me to another keyword or knowledge field for further investigation. The process also indicated the association between rational research and heuristic design that involves both scientific and design aspects. This kind of iterative and circular practice sent me back and forth to integrate satisfying outcomes.

DEFINE

DISCOVER

THEORETICAL

TESTING

DESIGN THINKING
(Human Centred Design)

PRACTICAL

PROTOTYPE

IDEATION

Problem Framing
Waste > Environmental Problem
(Harming ecosystem, human health
 & threatening future generations)

Casue of Waste
Hedonic Consumption
Waste Management

Target Audience
Who is this design for?
Aucklanders

Zero Waste (Sustainability)
Refuse > Reduce > Reuse > Recycle > Rot

Human Factors
Fogg Behavior Model
4 Pleasures

Gap in the Market

Brainstorm for creative solution
Diagrams, Sketches, Bullet Points

Zero Waste Zip (Mobile App)
Fun, Rewardable, Delightful & Meaningful

Gamification & Edutainment
Rewarding, Challenging, Online Community

User Experience Journey

Funtionality
Page Navigation & Transition

Gamification Elements

Digital Prototype
Wireframe & Interfaces

UX & UI
Interfaces & Navigation

Visual Elements for App Content

Figure 27. Design thinking. Copyright 2018 by Wennie Lun.
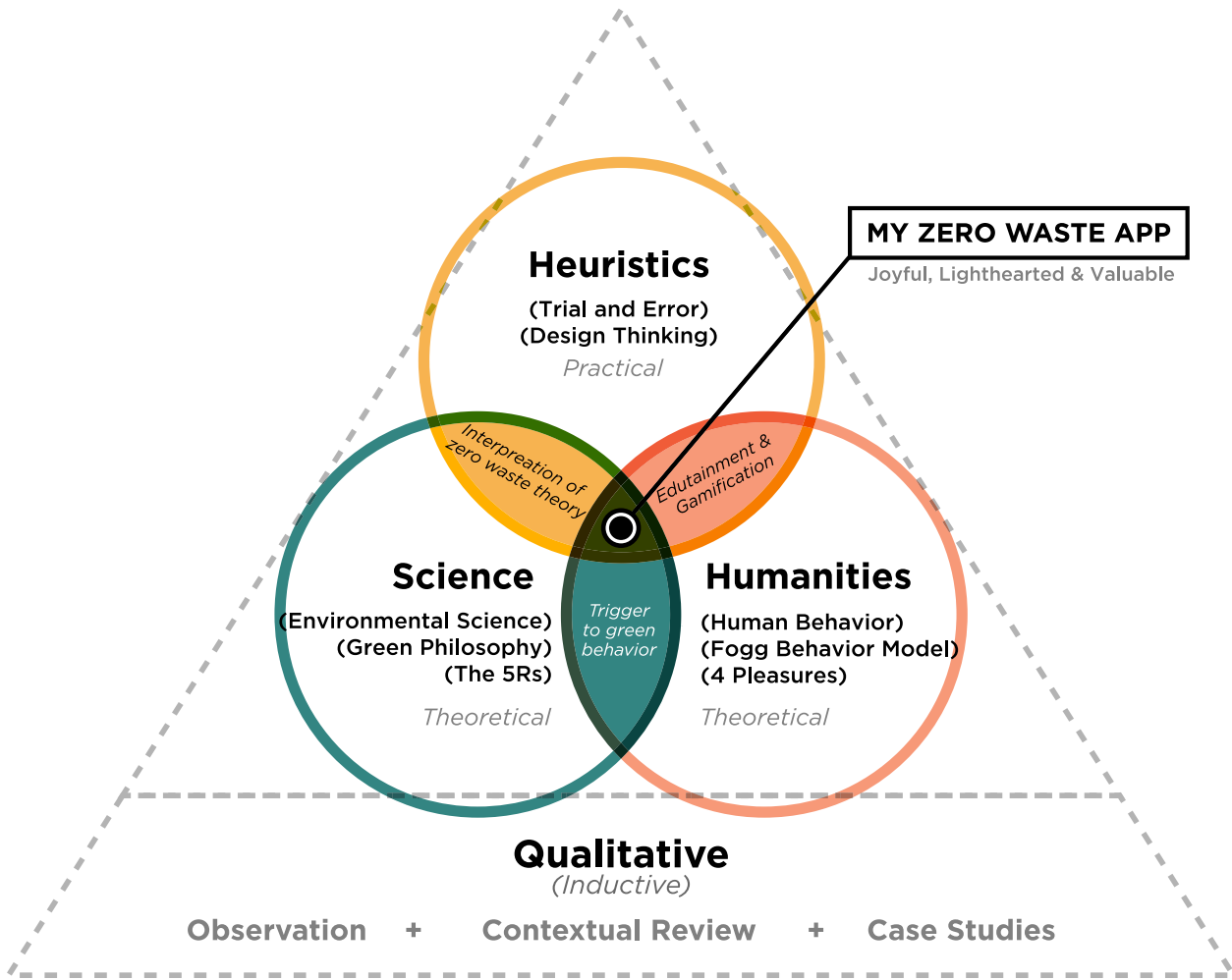
Figure 28. Triangulation methodology. Copyright 2018 by Wennie Lun.

4.2 Methodological Triangulation

Methodological triangulation was conducted to establish a valid and reliable research framework based on mixed perspectives. According to Muratovski (2016), "research triangulation is a way of working can help you establish credible, valid, and reliable research practice" (p. 92). The studies included problem identification, contextual analysis, interpretation and design practice to support the final design outcome. This means it was based on both theoretical and practical interpretation. Qualitative research was fundamentally conducted to establish a cohesive theoretical analysis based on observation, contextual review and case studies. Besides that, design thinking was applied to achieve a performance-based practical interpretation.

The aim of my research design was to analyse whether human factors can adapt to an edutainment app, in order to trigger a long-term behaviour change towards a zero waste mindset. The phases, zero waste mindset, human factors, and the edutainment app, indicate the three major ingredients to construct the entire project. More specifically, it was divided into three disciplines: science, humanities and heuristics.

4.2.1 Science: Connection Between Waste Theory and The Green Philosophy

The first analysis was the connection between waste theory and the relevant green philosophy from the scientific discipline. Waste problems and green theory were both identified in this section. From this discipline, it is scientifically explained how each sustainable performance from the green philosophy can reduce the environmental and social impacts causing the linear waste stream. It indicates the values and the urgent need to achieve this project.

4.2.2 Humanities: Principles That Will Trigger Behaviour Change

Regarding the cause of waste, humans are a part of the problem, so humans need to be the change. Human behaviour is the key sector to be investigated, in order to find the key ingredients to design a valid trigger. From a behavioural scientific field, human psychology, referring to the contextual review and online resources like, What We Think About When We Try Not to Think About Global Warming (Stoknes, 2015), it states barriers that make people avoid to think about environmental issues. In this case, Fogg's behaviour model theory (Fogg, n.d.), an the four pleasures and gamification can be adapted to stimulate our thinking about waste and also encourage us to gently take an action to promote it. Specifically, a humanities perspective provides the key ingredients for the design interpretation of a zero waste mindset.

4.2.3 Heuristics: Trial and Error Process in My App Design & Development

Heuristics is a trial and error approach which allows me to create different interfaces and categories which form an acceptable gamified app.

Heuristics is frequently used to make efficient and applicable solution guesses based on past experiences, and may often cause excused failure. From Feigenbaum and Feldman's studies (as cited in Romanycia & Pelletier, 1985, p.49), "heuristic is a method that helps in discovering a problem's solution by making plausible but fallible guesses as to what is the best thing to do next." By performing and experiencing the guessed hypothesis, each result would either be accepted or rejected. Each of them strengthens the most applicable decision for the next step.

At the same time, trial and error occurs to test and prove my heuristic guesses. From that, it helped me to improve the system of problem-solving that is specifically set up for this project. I made all UX and UI concept sketches into digital vectors and arranged them into various user flow mappings. By repeating the modifying process, I narrowed down a coherent and reliable user flow. While I was adopting the trial and error process, it also heuristically led me to align an emotional change in the user journey. Each prototype was modified and based on the previous one until it moves closer and closer to the ideal gamification theory. With the collaboration of heuristics and trial and error, it created suitable selections and evaluations to run the project.

4.3 Methods

Qualitative research and visual research were both used to gain contextual and visual understanding between the connection waste and human behaviour. Qualitative research requires vast comprehension and analysation of relevant reading materials. To achieve this project, I did in-depth research on the characteristics and environmental impact of municipal solid refuse, waste management and minimisation policy, modern consumerism, zero waste movement and similar design case studies. Methods like observation, contextual review and case studies were used to collect knowledge and insights to enhance the project.

4.3.1 Observation: What Are People Doing With Their Waste?

This project started with my observation of my surroundings. I am like other people who think rubbish is nasty and useless. I always feel exhausted when my home rubbish bin fills up so quickly, and I need to dump it every other day. There was a moment when I was staring at an overflowing garbage bin, and thinking about the existence of trash. Where did that rubbish come from? Why does it exist? What kind of rubbish is it? How to define rubbish? Will it affect my life or the environment?

Firstly, those questions are significant milestones guiding me through the research journey. One of the goals of the contextual review is to answer those questions.

On the other hand, I took closer observations on the bin contents that sits on the city streets, restaurants and AUT campus. A range of observations led me to rethink the reason why it had ended up in the rubbish bin. Generally, waste can be sorted into three types: recycling, composting and actual waste. The results can be summarised into three findings: rubbish is being sorted into the wrong bin, some rubbish can be avoided, and discarded items can be replaced with more environmentally friendly items. People who handle the waste are obviously the major factor that affects those three findings. I intend to create a contribution to the problem by designing a media to educate people and trigger behaviour change.

Sorting to the wrong bin

PLASTIC RECYCLE
cups, utensils

PAPER RECYCLE
office paper.

PLASTIC RECYCLE
food containers

PLASTIC RECYCLE
bottles, utensils
PAPER RECYCLE
paper notes

PLASTIC RECYCLE
lids

PAPER RECYCLE
envelopes
PLASTIC RECYCLE
cup
ALUMINIUM RECYCLE
soft drink cans

PLASTIC RECYCLE
sushi containers, lids, bottles
PAPER RECYCLE
pizza box

PLASTIC RECYCLE
sushi containers,
bottles, lid

Figure 29. Rubbish content analysis 1. © 2018 by Wennie Lun.

It is an analysis showing the most significant rubbish content that usually is sorted into the wrong bin. The observed bins are all located in different city areas in Auckland. In fact, most of the waste can be replaced with reusable alternatives, like stainless steel straws, lunch boxes, bottles, glass coffee cups or wooden utensils. With those sustainable alternatives, it will eliminate a huge amount of waste and even then we do not need to worry about sorting them into the wrong bin. The means and benefits of that should be included in my app design.

PLASTIC RECYCLE
cups, utensils

PAPER RECYCLE
office paper.

PAPER RECYCLE
envelopes

PLASTIC RECYCLE
cup

ALUMINIUM RECYCLE
soft drink cans

PLASTIC RECYCLE
sushi containers, lids, bottles

PAPER RECYCLE
pizza box

PLASTIC RECYCLE
food containers

PLASTIC RECYCLE
bottles, utensils

PAPER RECYCLE
paper notes

PLASTIC RECYCLE
lids
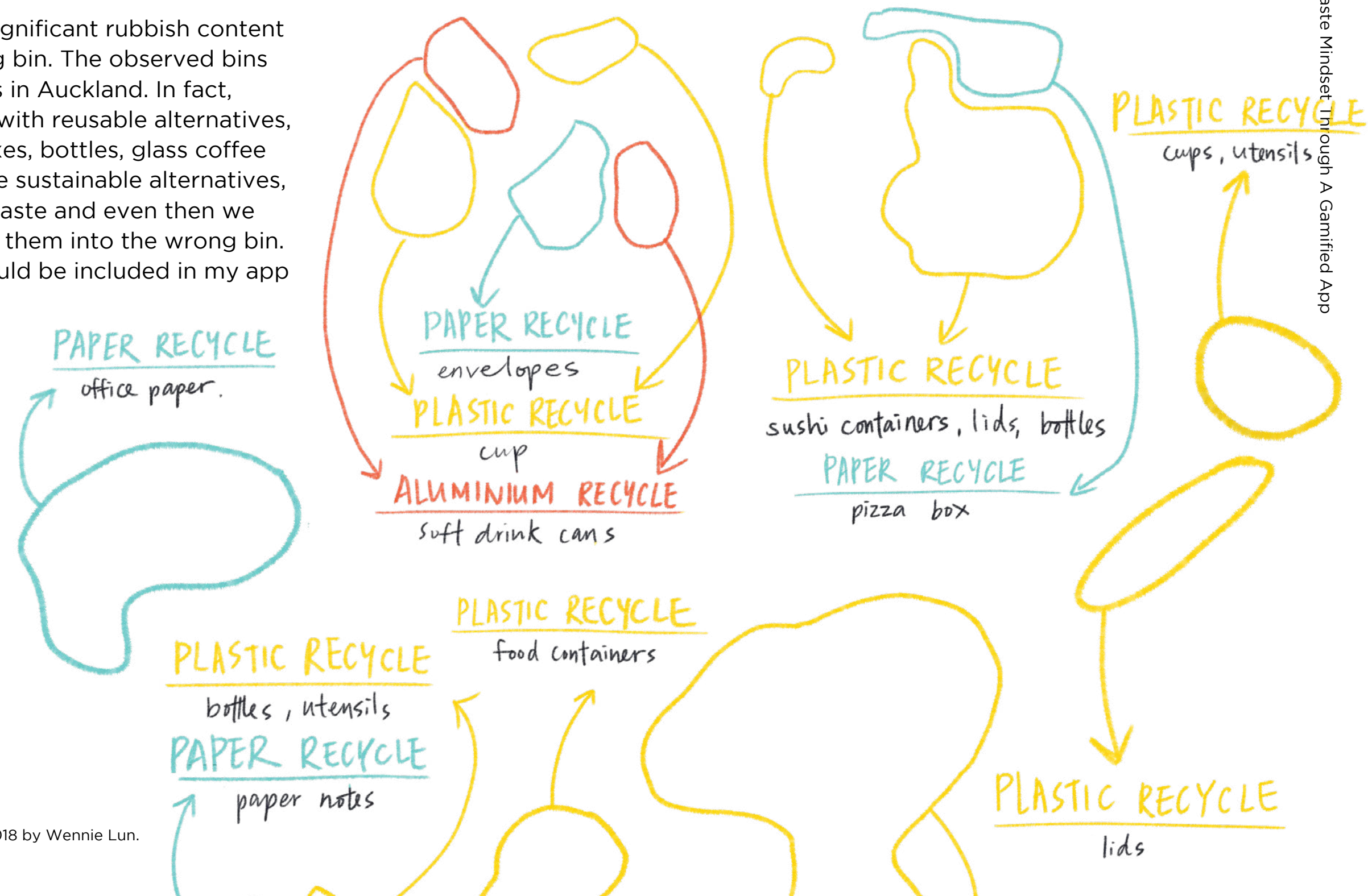
Figure 30. Rubbish content analysis 2. Copyright 2018 by Wennie Lun.

Rubbish And The Environment

dirty environment

bird accidentally eat part of the waste

seagulls ate part of the plastic bag, it might stay at their stomach forever!   nasty as well!

messy environment

nasty environment & birds might accidentally eat part of it

nasty environment

Figure 31. Rubbish and the environment analysis. © 2018 by Wennie Lun.

Overflowing Garbage Bins

Figure 32. Overflowing garbage bins collage. © 2018 by Wennie Lun.

Figure 33. Ridiculous amount of dumpings. © 2018 by Wennie Lun.
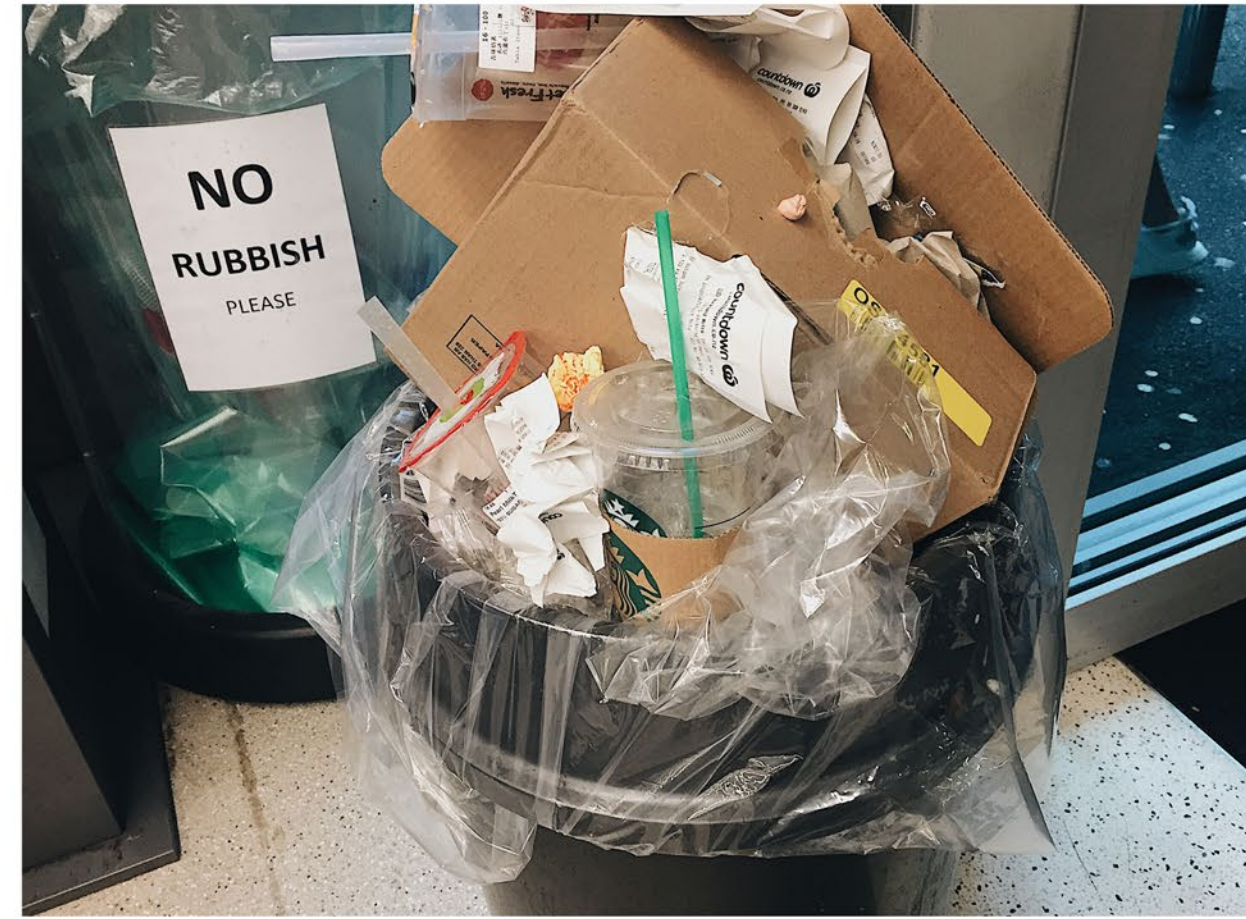
Figure 36. Overflowing garbage bin in Countdown supermarket. © 2017 by Wennie Lun.

Figure 34. Auckland recycling truck. © 2017 by Wennie Lun.

Figure 35. Bin collection. © 2017 by Wennie Lun.

Figure 37. Recycling bags for business. © 2018 by Wennie Lun.

4.3.2 Contextual Review

Apart from the above observation, I then reviewed relevant literature where I could search for deep knowledge with theoretical perspectives that were analysed by experts in the field. Fink (as cited in Booth, Papaioannou & Sutton, 2012) defines contextual review as 'a systematic, explicit, and reproducible method for identifying, evaluating, and synthesising the existing body of completed and recorded work produced by researchers, scholars, and practitioners'. It helped me to establish a theoretical understanding of the subject.

By reviewing the literature of experts, I gained specific insights into waste and human factors. Those two keywords were the criteria for selecting relevant reading materials. For waste, I theoretically studied the characteristics of household waste and its environmental impact, waste management and minimisation policy, and the philosophy of zero waste. Then for the human factors, I studied psychological science and philosophies on how human behavioural change can affect society and change the world. After understanding the theory, the methods of interpretation became the focus to be discovered and tested through the project.

Figure 38. Seagulls are eating rubbish left on city street. Copyright 2017 by Wennie Lun.

Figure 39. Seagulls rummage through rubbish left on city street. Copyright 2017 by Wennie Lun.

4.3.3 Case Studies: Three Different Directions for Sustainability Waste Management

By doing various design case studies, I recognised their advantages which could be implemented or advanced in my design concept, whereas their disadvantages would be something to be aware of, avoided and improve on. In addition, there is a gap to be considered from the disadvantages. In the past few months, I reviewed a zero waste expert and a recycling information mobile application. The following case studies were selected based on their success in different fields and aspects: Zero Waste Daniel from a fashion field; Package Free Shop from daily supplies and grocery aspect; and Love Food Hate Waste from a food and cookery aspect. Although all those case studies belong to different industries, they still share a similar goal: creating social and environmental impacts to minimise or eliminate waste in their discipline.
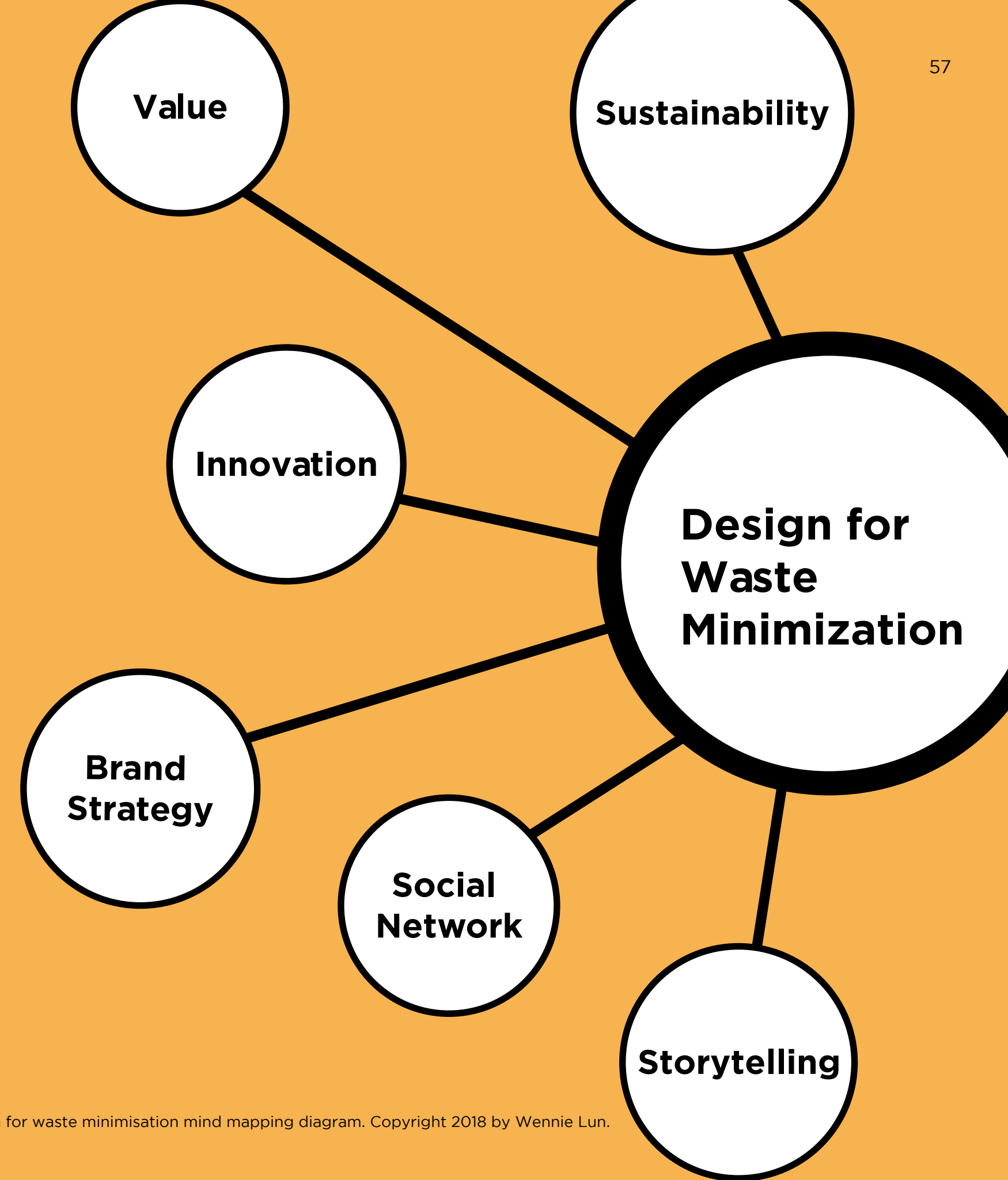
Figure 40. Design for waste minimisation mind mapping diagram. Copyright 2018 by Wennie Lun.

Figure 41. Rerolled fabric. From Instagram. Retrieved from https://www.instagram.com/p/BXFuqPUnt_R/?taken-by=zerowastedaniel. Copyright 2017 by Zero Waste Daniel.

zero waste daniel

Figure 42. Zero Waste Daniel Instagram. From Instagram. Retrieved from https://www.instagram.com/zerowastedaniel. Copyright 2018 by Zero Waste Daniel.

Figure 43. Daniel is introducing the sustainable fashion of ZWD. From Zero Waste Daniel. Retrieved from http://zerowastedaniel.com/blog/2016/4/17/getting-things-sorted-literally. Copyright 2016 by Zero Waste Daniel.

Figure 44. Daniel sits on a mountain of fabric. From Zero Waste Daniel. Retrieved from http://zerowastedaniel.com/blog. Copyright by Zero Waste Daniel.

Zero Waste Daniel

As stated on their official website, "ZWD is the first company in New York making 100% zero waste clothes." Zero Waste Daniel is a role model for turning trash into cash, where they reuse fashion scraps and ReRoll them into new goods. They have been proving that fashion can be recreated sustainably and innovatively. On the site, customers can review the 100% zero waste sewing process. Using leftover fabric scraps to create a new garment and start a sustainable clothing line, which Daniel called the sewing process as ReRolling.

Zero Waste Daniel has a well-planned brand strategy. They directly informed their zero-waste goal within their brand name. Besides that, they have close communication and high transparency in their making process which is showed on Instagram and their website. Their value and aim have both been proven behind the scenes, and shown on social media.

Due to copyright issues image cannot be displayed.

Figure 45. Bowie portrait mosaic t-shirt. From Zero Waste Daniel. Retrieved from http://zerowastedaniel.com/blog/2017/8/15/got-scraps-heres-what-to-do-with-them. Copyright 2017 by Zero Waste Daniel.

> **" the first line of zero waste clothing, made from reroll, the fabric of the future. zwd is composed of 100% scrap material.**
>
> **— zero waste daninel "**

(Zero Waste Daniel, 2018)

Due to copyright issues image cannot be displayed.

Figure 46. Rerolled sweater tops and bottom from Zero Waste Daniel. From Zero Waste Daniel. Retrieved from http://zerowastedaniel.com/blog/2016/6/30/does-it-really-matter. Copyright 2016 by Zero Waste Daniel.

Due to copyright issues image cannot be displayed.

Figure 47. Daniel on a pile of scraps. From Zero Waste Daniel. Retrieved from http://zerowastedaniel.com/blog/2016/6/30/does-it-really-matter. Copyright 2015 by Zero Waste Daniel.

UPCYCLE

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Figure 48. Rerolling process diagrams. From Zero Waste Daniel. Retrieved from http://zerowastedaniel.com/blog. Copyright by Zero Waste Daniel.

Due to copyright issues image cannot be displayed.

The pockect was decorated with a floral fabric scraps.

Figure 49. Zero waste rerolled black shorts with floral back pocket. From Zero Waste Daniel. Retrieved from http://zerowastedaniel.com/blog. Copyright by Zero Waste Daniel.

Figure 50. Sustainable alternatives. From Package Free Shop. Retrieved from https://packagefreeshop.com/pages/about. Copyright 2018 by Package Free Shop.

PACKAGE FREE

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Due to copyright issues image cannot be displayed.

Figure 51. Package Free Shop logo. From Package Free Shop. Retrieved from https://packagefreeshop.com/pages/about. Copyright 2017 by Package Free Shop.

Package Free Shop
Package Free is a shop that sells all the sustainable tools people need to live a zero or low waste life. It is a brand that helps people make the shift to a more sustainable and healthier life.

Again, they mention their services and value directly in their brand name: selling package-free products. They effectively promote and manage their business with social network technology by updating the latest package-free product information and user tips.

Furthermore, the founder, Lauren Singer is a public figure to popularise the zero waste lifestyle on her *Trash Is For Tossers* YouTube channel, and low key promotion of the Package Free Shop business at the same time.

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Due to copyright issues image cannot be displayed.

Figure 53. Package Free Shop Instagram. From Instagram. Retrieved from https://www.instagram.com/packagefreeshop. Copyright 2018 by Package Free Shop.

Figure 52. Founder of Package Free Shop & the Simply Co.- Lauren Singer. From Medium. Retrieved from https://medium.com/re-generation/how-do-you-make-trash-trashy-and-zero-waste-sexy-lauren-singer-certainly-knows-how-d2b9bfeb3711. Copyright 2017 by Calian.

Problem
(Waste & Environment)

Solution
(One-Stop-Shop for Zero Waste)

Short-term Goal
(Encourage the simple
first steps of sustainable life)

Long-term Goal
(Zero Waste Lifestyle As Habit)

Save the
Environment

Due to copyright issues image cannot be displayed.

Figure 55. Package Free Shop in Brooklyn New York. From Asuka.M.Style. Retrieved from http://www.asukamstyle.com/package-free-shop-zero-waste-lifestyle-shop. Copyright 2017 by Asuka Ohkuma.

Due to copyright issues image cannot be displayed.

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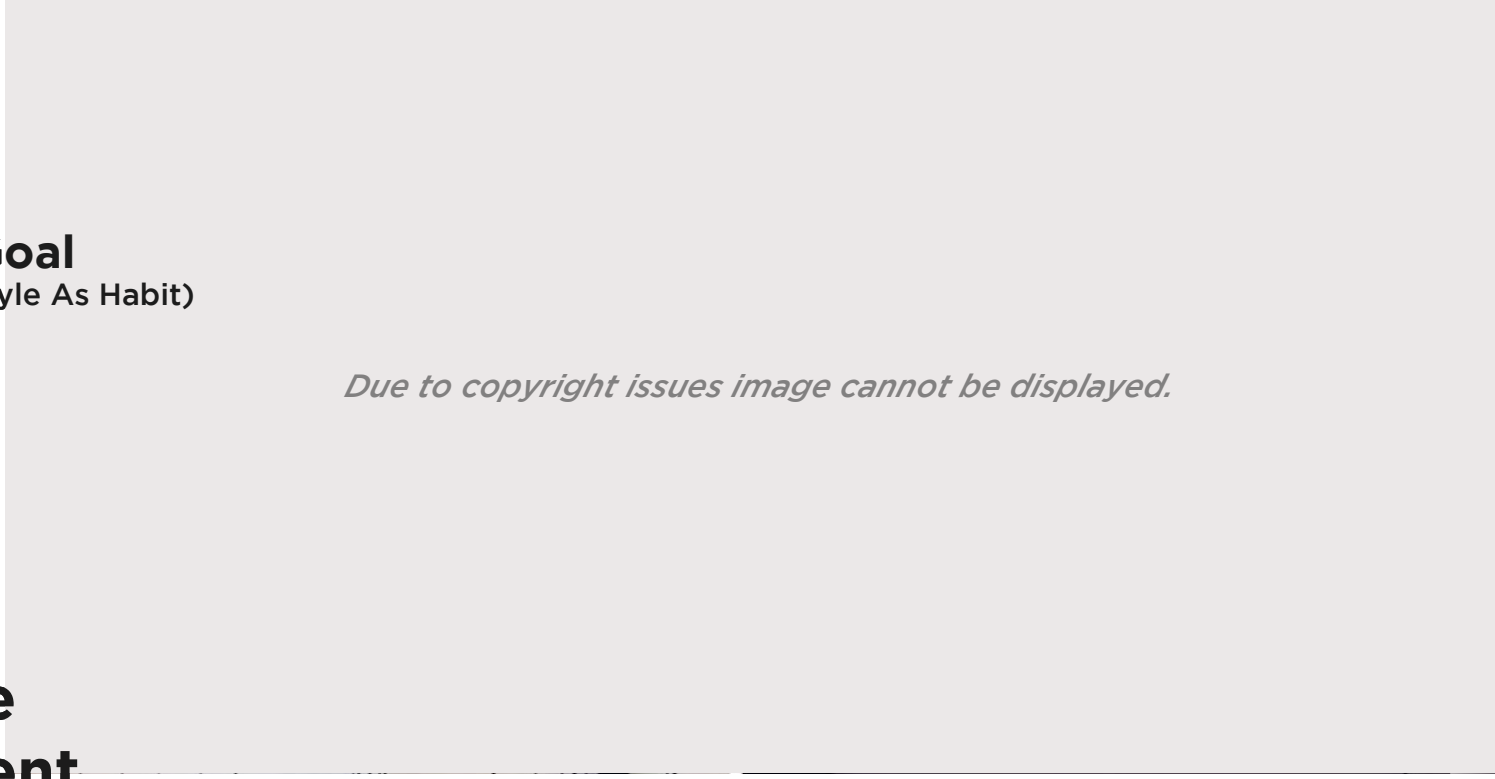
Figure 56. Package Free Shop: Think outside the box sign. From Apartment Therapy. Retrieved from https://www.apartmenttherapy.com/a-zero-waste-package-free-shop-opens-in-brooklyn-245324. Copyright 2017 by Vixon John.

Figure 54. Package Free Shop's aim & goals & objectives diagram. Copyright 2017 by Wennie Lun.

Figure 57. Package Free Shop web page. From Package Free Shop. Retrieved from https://packagefreeshop.com. Copyright 2018 by Package Free Shop.

> **Package free, a Zero Waste pop up shop in NYC, offers everything that individuals need to transition to a low waste lifestyle in ONE PLACE**
>
> **— Package Free Shop**

(Package Free Shop, 2018)

Figure 58. Love Food Hate Waste logo. From Love Food Hate Waste. Retrieved from https://lovefoodhatewaste.co.nz/wp-content/uploads/2017/05/LFHW-Vegetables-Storage-Guide.pdf. Copyright 2017 by Love Food Hate Waste.

Due to copyright issue image cannot be displayed.

Figure 59. Love Food Hate Waste app. From POPSUGAR. Retrieved from https://www.popsugar.com/smart-living/photo-gallery/13358326/image/13358988/Love-Food-Hate-Waste. Copyright 2016 by Emily Co.

Due to copyright issues image cannot be displayed.

Figure 60. How to make your vegetables last longer. From Love Food Hate Waste. Retrieved from https://lovefoodhatewaste.co.nz/wp-content/uploads/2017/05/LFHW-Vegetables-Storage-Guide.pdf. Copyright 2017 by Love Food Hate Waste.

Love Food Hate Waste

This is a New Zealand based campaign that provides effective online resources of techniques, life hacks, recipes, events and news. Resources are demonstrated through blogs and videos, which explain the causes, impacts, benefits and step-by-step tips to reduce the amount of food waste. The national campaign is associated with WasteMINZ and local city councils. As food waste is one of the household wastes, this becomes a great example to build an online campaign with meaningful brand values and propositions. To cook with leftover food, with the linked relevant recipes from other websites, shows the power of user-generated content ideas.

After several case studies on sustainable businesses and organisations, it shows that anyone can come up innovative zero-waste ideas. There is a need to create a meaningful and valuable platform for those voices to talk trash. The platform should be attractive and comfortable for user-generated content.
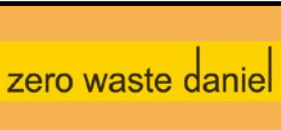
Brand ╲ Elements	zero waste daniel	PACKAGE FREE	LOVE FOOD hate waste
Value Proposition	100% zero waste clothes	Plastic-free alternatives	tips and recipes to help reduce food waste
Aim	Reduce waste in fashion industry	Reduce plastic usage, packaging and waste	Reduce food waste to save money and environment
Technology	Instagram	Instagram Youtube	Mobile App Instagram

Figure 61. Case studies analysis. Copyright 2018 by Wennie Lun.
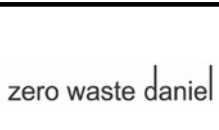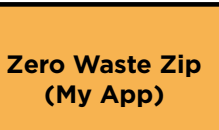
Brand ╲ Elements	zero waste daniel	PACKAGE FREE	LOVE FOOD hate waste	**Zero Waste Zip (My App)**
Value	●	●	●	●
Aim	●	●	●	●
Social	●	●	●	●
Interactive App			●	●
Gamification				●
Edutainment				●

Figure 62. Essential elements interpretation. Copyright 2018 by Wennie Lun.

4.4 Essential Elements of Innovation Needed for a Waste Reduction App Design

From the case studies, it can be summarised into three essential elements which further inspires my concept development. Value as software and technology as hardware are the keys to frame a waste reduction design.

The clarity of a strong value proposition makes their business stand out from their competitors' market. Each of the values provides a strong impression of their audience by communicating their brand insights, promising the quality of their product or service, and messaging benefits to choose their brand. Those brands and my project share the same ultimate goal and value: minimising waste for the environment and social goods. More significant value and insights can add to my app design.

Using technology as hardware is like a powerful media to promote the brand and communicate closely with users. Meanwhile, my project also uses technology: mobile app & Web 2.0 to launch the design solution and connect with our users. It will hold the design solution permanently for any new users to involve them in the zero waste journey.

5

5. Design Theories That Inform The Zero Waste Zip App

Taking further steps from the research stage, it inspired me to design a practical concept: "Zero Waste Zip". This is an online hub that will provide an effective tool to strategically analyse zero-waste information for our users within a mobile application. The app focuses on disseminating the zero-waste mindset with gamification and edutainment theory.

It aims to communicate the zero-waste lifestyle to reduce household waste by providing tools that will trigger people's behaviour, attitude and motivations to sustainable consumption and waste management.

In order to build a cohesive concept, I used a brand strategy theory to advance the user experience and user interface design. The values which were taken into consideration stand at the core of Zero Waste Zip, and show what is the app passionate about and what it stands for. Thus, it adds the deep meaning of sustainability and makes the app more valuable.

Concept Design & Development

BRAND STRATEGY

5.1 Brand Strategy for Creating Meaningful Value in the App

Vision

To create impacts on the sustainable environment for healthier living and future generations.

Mission

To organise broad zero-waste information and provide an engaging online platform to motivate sustainable lifestyle.

Core Values

There are four brand values:

Sustainable Responsibility

Take the responsibility of recognising the social environmental problem, raise green awareness and encourage people to embrace a sustainable lifestyle.

Deliver

Organise the green information and effectively interpret them for our users.

Innovation

Seek for innovative ideas and methods with technology application to facilitate the zero waste mindset.

Community

Gathering a New Zealand based green community and give them the power to share sustainable ideas and experiences among their peers.

Figure 63. Photograph of Tashi Rodriguez for a persona's profile picture. From Instagram. Retrieved from https://www.instagram.com/p/BSZz4hdF5IX. Copyright 2017 by Brian Terada.

Krisanne Brown ♀

Age: 25 years old
Nationality: NZ born Kiwis
Job: Housewife and stay home freelance writer
Family Status: Live with her husband and a big dog in Howick
Education: Bachelor of Linguistic
Diet: Vegetarian
Connectivity: Phone, iPad and Laptop
Personality: Passion, Positive, High Curiosity

5.2 Persona:
Mapping the User's Journey

Meet Krisanne, who lives in Howick with her husband and a big dog; she is a sweet housewife and works as a freelance writer from home. She has a regular workout routine and has been vegetarian for two years, which she believes is a healthy green life, avoiding toxic chemicals and saving animals from being slaughtered. She enjoys buying foods at the supermarket and sometimes in local markets.

She recycles what she can, and at the same time, she knows there is more she could do for the environment, but she is not sure what can be improved. Recently, she saw photos of marine animals' remains with loads of plastic waste in their stomachs. Krisanne is willing to do more to reduce her waste, especially plastic, but she is not sure where to start.

This persona's point of view helped to summarise the user needs in a sentence: "Local Kiwis need a simple tool to motivate their transition to ZERO WASTE lifestyle, because it is hard to take the first step when everyone is unfamiliar with the term, ZERO WASTE." Regarding this persona folder, it inspired me to design effective tools for this specific target audience, which could be an educational mobile app.

Creating & Mapping the Emotional Journey to Zero Waste

	1 **Awareness**	**2** **Research & Consideration to download**	**3** **Learning in the app**
Elements	Advertising Search Engine Social Networks Friends	Official Page Promotion World of mouth App Store	Tips Page (Individual) Event Page (Group) Live Stream Tutorial (Group)
Emotion & Thinking	**D P** Oh! The animals are tangled by plastic waste. Their stomach are remained loads of plastic which looks so painful and poor. **P** What can I do to save those pity animals?	**D** • Searching solution online. • Search for keywords: waste, environment, sustainability, zero waste, waste free etc... • Recommending helpful app- "Zero Waste Zip" • Attracted with the value & visuals. • Curious about the actual app content so I downloads the app and give it a try.	**D** • The app visual seems stylish, joyful and easy to use. (UX & UI) • Seems easy to follow the step-by-step tips. • I can look at it anywhere and anytime I want to.

D Digital Touchpoints
P Physical Touchpoints

Figure 64. Emotional user journey mapping to zero waste 1-3. Copyright 2018 by Wennie Lun.

4
Performing in real life

5
Gaining & Sharing Experience

Elements

Mission Page
FAQs Page
Posting Page

Profile Page   Posting Page
Social Networks   Community
Interaction Buttons

Emotion & Thinking

P

• Where should I start?

• Am I doing it right?

• Why do I feel awkward?

• Where to buy package free products?

• How to connect the green measurements to my app?

D

• Oh someone had a same difficulties as mine too!

• How others deal with awkwardness.

• The FAQs page answering general questions that people commonly asked about the app and implements in real word.

• Mission page are helping me where to start and giving detail instructions, like package free partner shops - bulk.

D

• I can find my zero waste peers.

• Sharing my waste free coffee spot with text and photographs.

• Discussion on similar experience & difficulties to improve together.

• Receiving feebacks and better suggestion on my waste free sharing.

P

• I've completed two mission: waste-free coffee time & shopping bulk.

D Digital Touchpoints

P Physical Touchpoints

Figure 65. Emotional user journey mapping to zero waste 4-5. Copyright 2018 by Wennie Lun.

	6 **Tanglible Results & Competition**	**7** **Rewarding & Accomplishment**	**8** **Triggering Long-term Behavioral Chnage**
Elements	Points Page Leaderboards Feedbacks	Points Page Rewarding Page Mission Page	Zero Waste Zip App Sustainable Mindset Zero Waste Community
Emotion & Thinking	**D** • Some feedbacks can be harsh / negative, like others don't agree to my waste free spots, thinking that it is not truly waste free. • Although I complete two missions, I'm still ranking at the bottom of the leaderboards • Should I do more to raise my ranking?	**D** • However, I still get rewards - disscount for next waste free purchase • My points is growing a little bit, I can visualise my waste free impacts (measurable) • With the measurement & rewards I would like to keep on doing more zero waste missions	**D P** • Self-esteem & self-fufillment • Long-term Zero Waste Lifestyle which makes me externally and internally feel good. • I'm saving the animals and behing healthy to my body at the same time. • I'm part of the nature goods.

D Digital Touchpoints
P Physical Touchpoints

Figure 66. Emotional user journey mapping to zero waste 6-8. Copyright 2018 by Wennie Lun.

5.3 Interdisciplinary Model

By combining the three aspects – human science, technology and design – it creates the Zero Waste Zip app. It contains fun, rewards, and delightful and educational sparks to provide a valuable experience towards users' zero waste journey. Every aspect represents different aspects of this design; science is a human strategy; design is a systematic visual tool; and technology is the media to showcase the concept. If the zero waste philosophy is the key ingredient, then the three aspects are the seasoning that make the food more presentable.

ZERO WASTE APP

Fun, Rewardable, Delightful & Educational

SCIENCE
Human Factors
4 Pleasures
Fogg behavior

TECHNOLOGY
Mobile Application
Web 2.0
Social Media

DESIGN
Human-Centred Design
Design Thinking
UX & UI
Brand Strategy
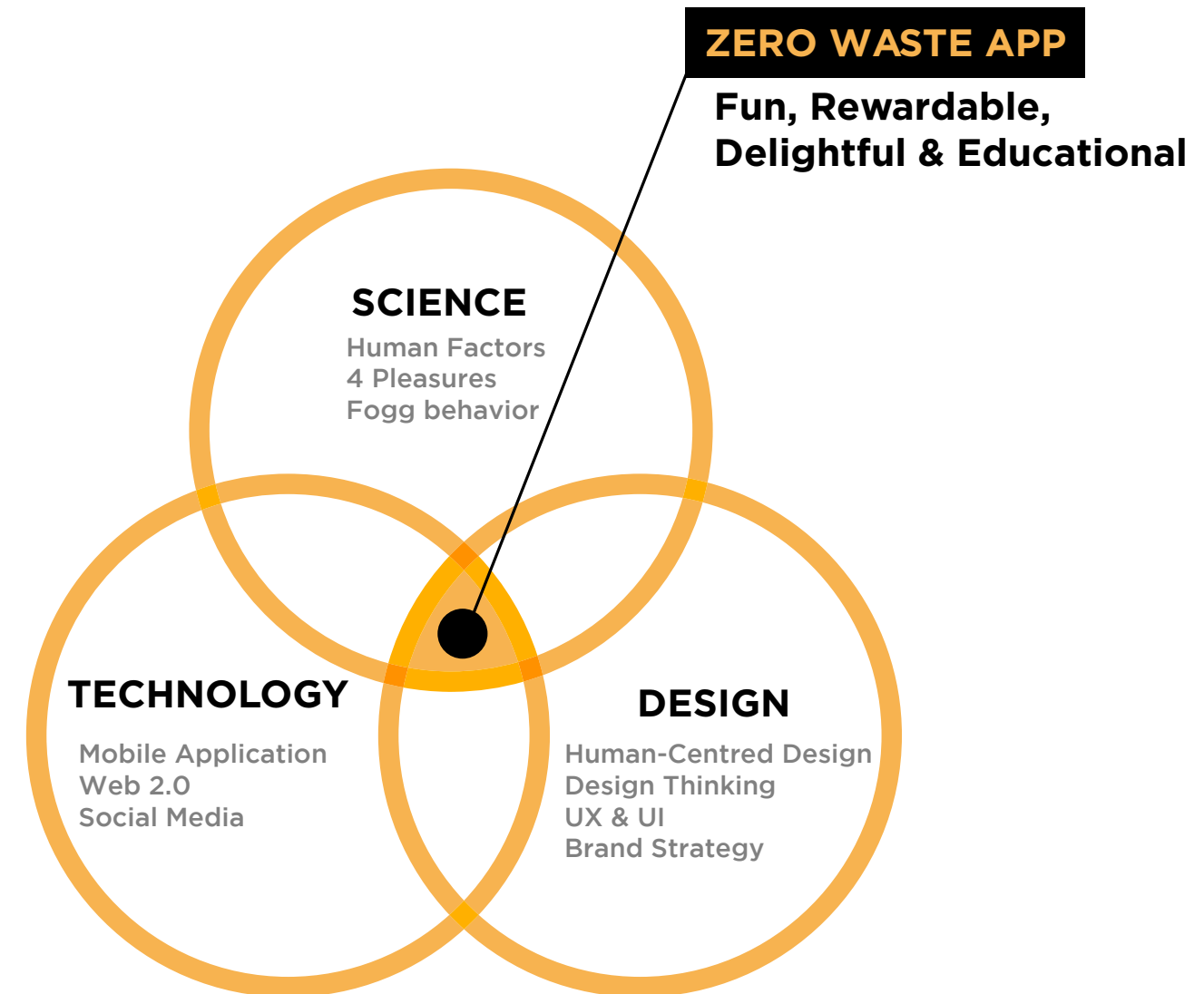
Figure 67. Interdisciplinary model: Science, technology & design. Copyright 2018 by Wennie Lun.

5.4 Gamified Mobile Application to Motivate Sustainable Zero Waste Lifestyle

Inside the application, it involves weekly missions, earning points, rewarding levels and leaderboards. Gamification techniques are adapted to the app to motivate and engage users to accomplish the trigger of a sustainable behaviour change (Bunchball, n.d.). Weekly missions are about recycling a certain amount of aluminium cans, purchasing plastic free, and composting organic waste. Users can earn points by completing the weekly missions or being actively using the application to upload online posts. About the measurements, recycling can be measured with bottle deposit machines, whereas bringing your own grocery bags can be verified by the corporate bulk shops. Although the measurements can be challenging, it can be more deeply developed in the future. Once it has been verified, users will receive virtual points for their application. With specific amounts of points, they can trade for coupons, with which they can save money by purchasing in our partner stores.

Furthermore, the points are the tangible evidence of achievements and motivations, so that users can easily visualise and track their zero waste achievements. There are leaderboards to identify their ranking among their zero waste buddies leading to motivation and competition.
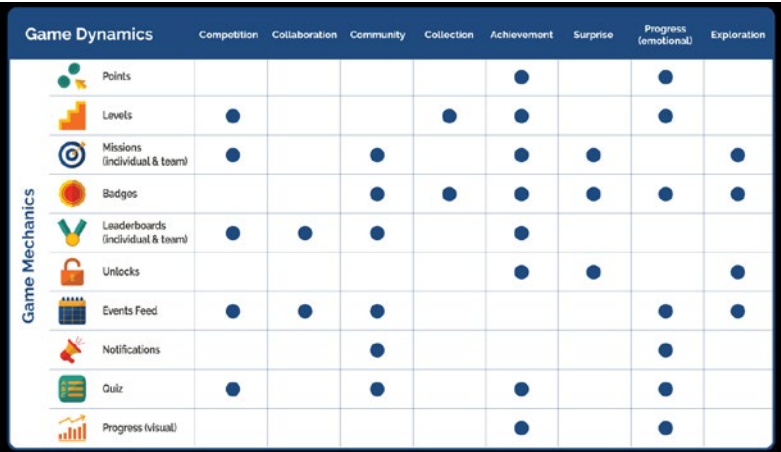
Fig. 68: Gamification built upon 10 primary game mechanics. From Bunchball. Retrieved from http://www.bunchball.com/gamification/game-mechanics. Copyright by Bunchball.

Game Mechanics \ Game Dynamics	Competition	Community	Achievement	Rewards	Progress (emotional)
Missions (Individual)			●		●
Goals			●		●
Points			●	●	●
Badges (Real word benefits)			●	●	●
Leaderboards (Individual)	●	●	●		●
Progress (Visual)			●		●
Feedback		●			●
Notifications	●	●		●	

Figure 69. Game mechanics & game dynamics adapted from Bunchball game mechanics. Copyright 2018 by Wennie Lun.

5.5 User-Generated Content (UGC)

The advance of Web 2.0 and digital devices enable possibilities of user-generated content in online communities (Daugherty, Eastin & Bright, 2008). This kind of system can lead Zero Waste Zip to a long-life advanced development, which means the posts that are uploaded by users are crucially important, because they are supporting the active usage of the application. In order to stimulate the numbers of the usage and experience sharing, users will be rewarded with likes and points for shopping coupons and increasing the account levels. Users can give feedback with likes, comments and share their post to their social media, like Facebook or Twitter. This kind of interaction will encourage participation and motivation.

I considered the brand itself to organise, analyse and interpret posts that are useful and creative into a summarised post. Post titles can be: Ultimate Guide to Zero Waste; 5 Steps to Avoid Plastic; 3 Tips to Become A Recycling Master; Zero Waste Traveling Checklist; New Zealand's Package Free Shops; Top 10 Sustainable Kiwi Brands and so on. Limited edition strategy will also be involved to celebrate the four seasons and festivals with users, as it will carry an extra sense of immediacy and uniqueness to the content.

5.6 The Flow of the User Journey

Apart from the app, a consistent system is also required to get people involved in the positive behaviour change towards global waste problems.

As shown in the figure below, the journey starts with raising environmental awareness, introduces a convenient solution, and pushes the sustainable steps to make the behaviour change permanent.

At first, there is a set of storytelling advertisements to grab attention and raise awareness. Once the waste problem is being informed, Zero Waste Zip, a supportive guideline app is then introduced.

The journey is planned to be straightforward: inform, introduce, learn and involve.

How does this work?

INFORM

Curious
Grab attention
Raise awareness
(Waste & Environment)

INTRODUCE

Suggested reaction
Download the app

1st
CALL TO ACTION

EDUTAINMENT

LEARN

Step-by-step guidelines
Being trigger & motivate
through edutainment

TRIGGERING CHANGE!
BEHAVIOR & ATTITUDE

Long-term behavior change
Zero waste lifestyle

COMMUNITY

SPREAD & SHARE

Experience share
Discussion
(Communication)

REWARD

INVOLVE

Start the green mission
Follow the tips & guide
(Gamification)

2nd
CALL TO ACTION

∞

*Sustainable consumption
Plastic-free & Package-free
Biodegradable
Cradel-to-cradle
5Rs*

Figure 70. Approach to a permanent zero waste behaviour change with gamification app. Copyright 2018 by Wennie Lun.

6

6. Heuristics: Design & Development of the App

The overall testing process involved brainstorms, sketches and digital prototypes to build a Zero Waste Zip app. Over the past six months, I produced two prototypes to explore its functionality and durability. Each experiment led to a valuable reflection and improvement for the next step. Brainstorming, sketching and digital prototyping were highly involved in this practical stage based on the heuristic, and the trial and error methodology.

6.1 Design Sketches: User Flow and Wireframes

Everything started with a user flow diagram which helped me to list down a complete navigation for the app. User flow was used to plan the major flows inside the app, the interface and the interaction with the user. Apart from that, it also helped me to figure out the functionality before moving forward to the interface design. It also indicated the adaption of gamification through the user flow.

On the other hand, wireframe sketches with text blocks, image blocks, interactive buttons, menu and navigation bars were created based on the listed user flow. Low-fidelity wireframe sketches is a starting point that enables me to structure the potential layout and hierarchy for another high-fidelity app in future development.

User Flow Diagrams
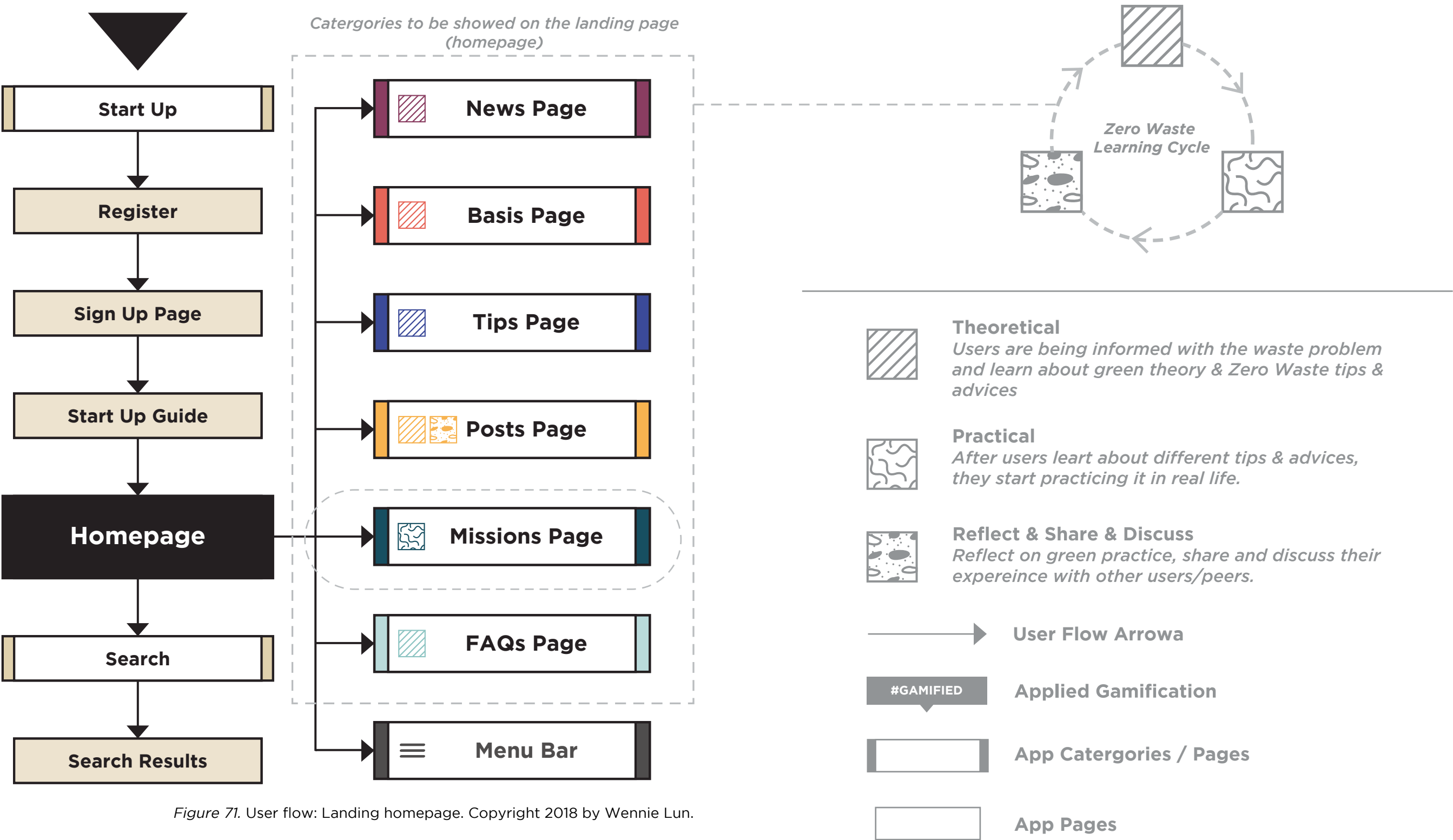
Figure 71. User flow: Landing homepage. Copyright 2018 by Wennie Lun.

News Page

Event 01

News 01

Latest Tips/Posts

Live Stream

Join

Recieve Notifications

Ignore

The Lastest Tip Page

The Lastest Post Page

Basis Page

What do we waste?

The Global Issue

Green Theory

Waste Management Plan

Zero Waste - 5Rs

Refuse

Reduce

Reuse

Recycle

Rot
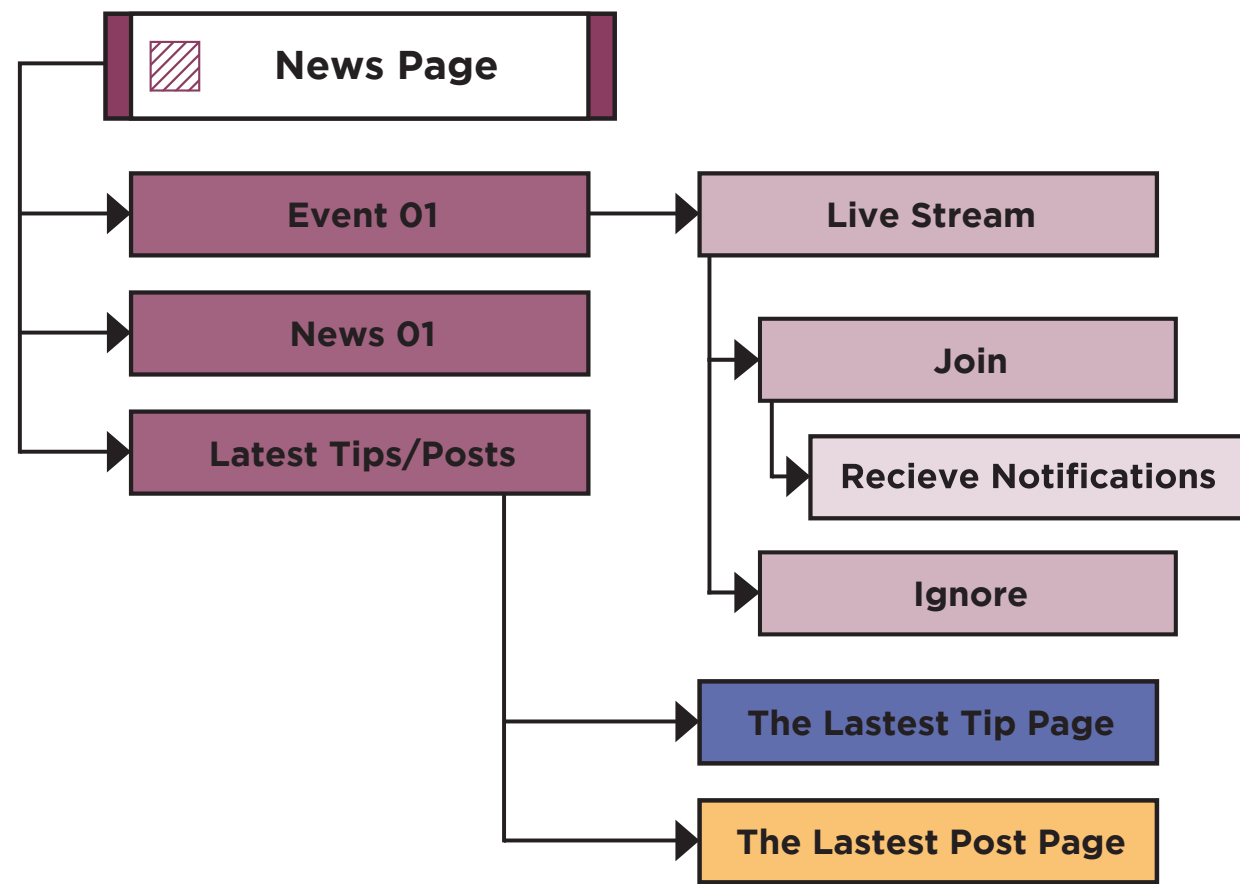
News Page
Updated features or information, special events or recommended posts will be announced in the news pages showing on the landing homepage.

Event Page
Events like green talk or workshop or gathering are held by Zero Waste Zip where users can learn from zero waste experts or meet their peers. Events will either be operated on-site or live stream. With the live stream, users only need to schedule their time and watch it anywhere. The live stream will also allow users to ask questions through comments for immediate feedback.
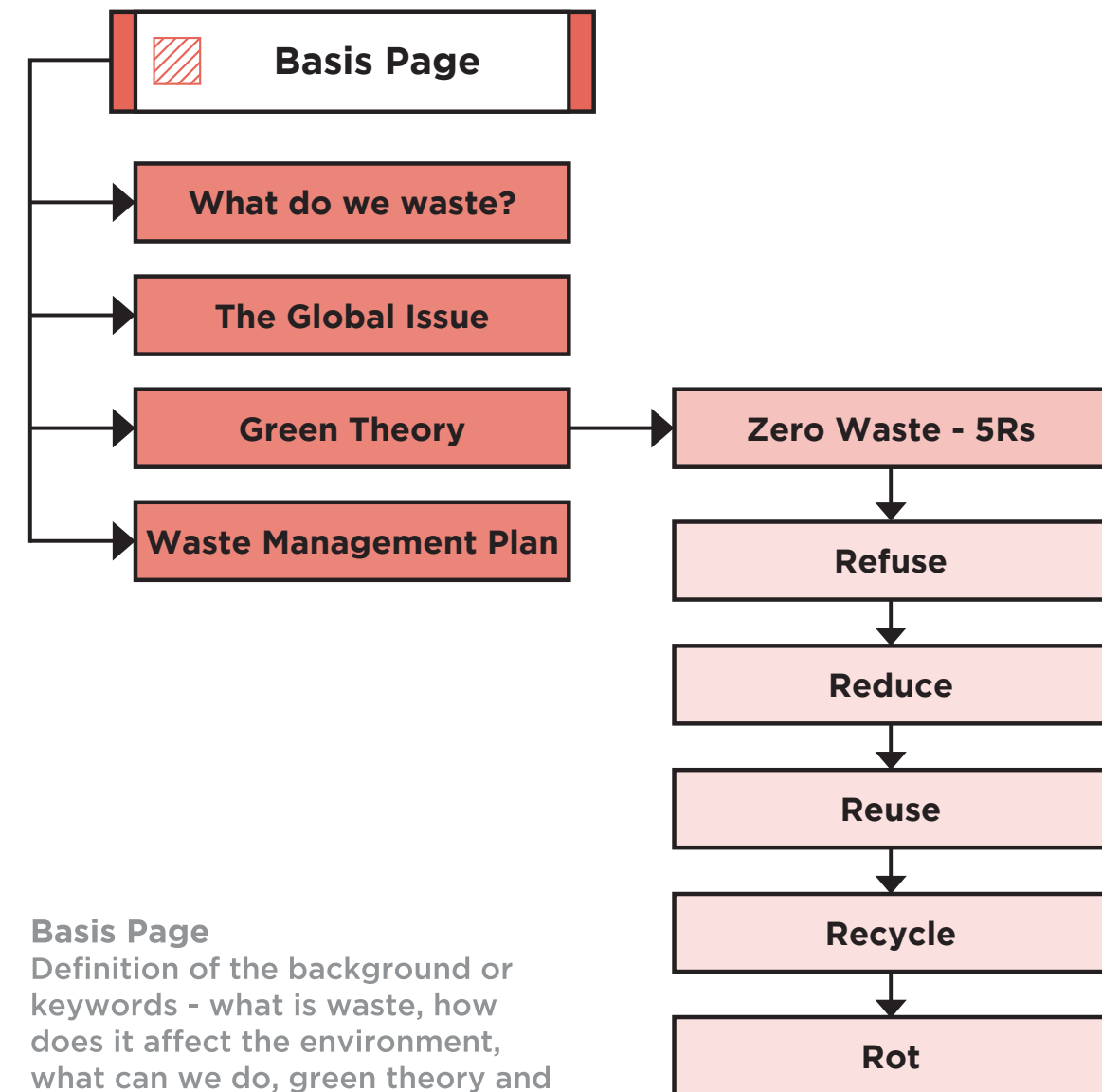
Basis Page
Definition of the background or keywords - what is waste, how does it affect the environment, what can we do, green theory and the realated policy.

Figure 72. User flow: News page & basis page. Copyright 2018 by Wennie Lun.
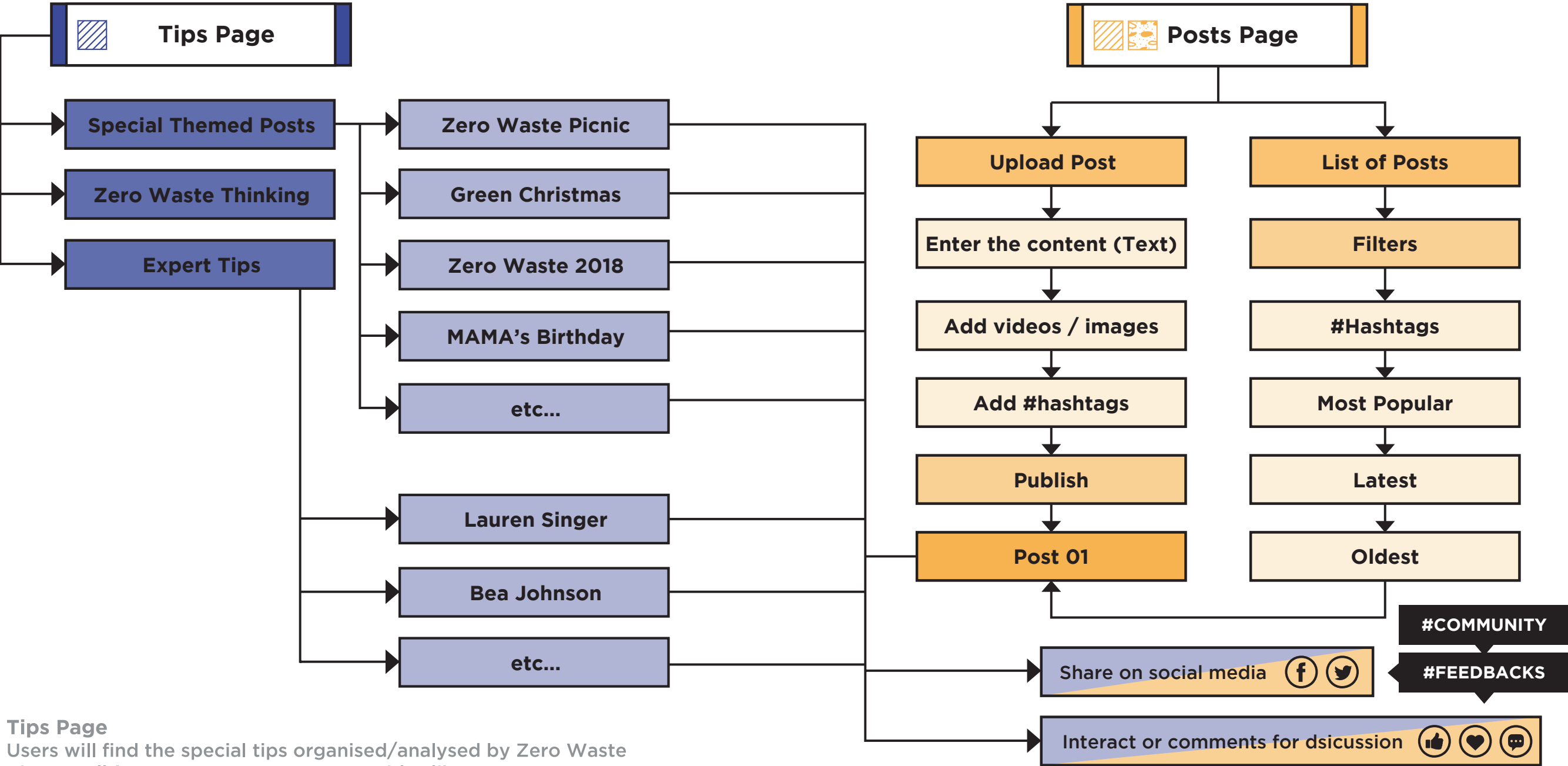
Tips Page
Users will find the special tips organised/analysed by Zero Waste Zip or well-known zero waste experts. Titles like - 3 Steps to Recycle, Birthday Gifts for Nature MAMA or Essentials Tips for Zero Waste Picnic will be found under this page.

Posts Page
Users shared hacks and experiences based on their own zero waste journey. They can interact or discuss the post with their online zero waste peers in Zero Waste Zip.

Figure 73. User flow: Tips page & posts page. Copyright 2018 by Wennie Lun.

#ACHIEVEMENTS

#PROGRESS

#CHALLENGES

Missions Page

#COMPETITION

#GOALS

Points Page

#POINTS

#BADGES

Mission Time (List)

Leaderboard

Summary of Points

Trade for discount

Trading Records

#REWARDS

Mission 01

Kiwi Peers Ranking

Mission 01 Details

Friends Ranking

Free Coffee x 1

Mission 01 Process

10% off for Next Purcase

Scan Barcode / QR Code

Bring Your Reusable Bag

Exhibition Ticket x 2

Complete a mission

Recycling Glass Bottles

etc...

etc...

Mission Page
A list of green missions are recommended by Zero Waste Zip, either easy or challenging will trigger users to practice what they learnt from tips and posts page. Missions are milestones that users can track on their zero waste journey.

Leaderboards
Ranking boards will allow users to visualise their results among other green peers. Competitions will stimulate continuous green practices and improvements.

Points Page
Users will be rewarded/received with virtual points by accomplishing green missions. Users can visualise the results and measure their zero waste impacts on this page. With several amounts of points, users can trade for special deal for real-life goods. (Rewarded in both digital and physical.)

Figure 74. User flow: Missions page, leaderboards & points page. Copyright 2018 by Wennie Lun.

Menu Bar

Theoretical   Reflect & Share & Discuss

Profile Page

Messenger Page

About Page

Settings Page

Profile Page

Profile Pictures & Info

My Points → (Mission) Points Page

My Posts → Upload / Edit Post

My Favourites → Post 01

Follwers / Following → Tips 03
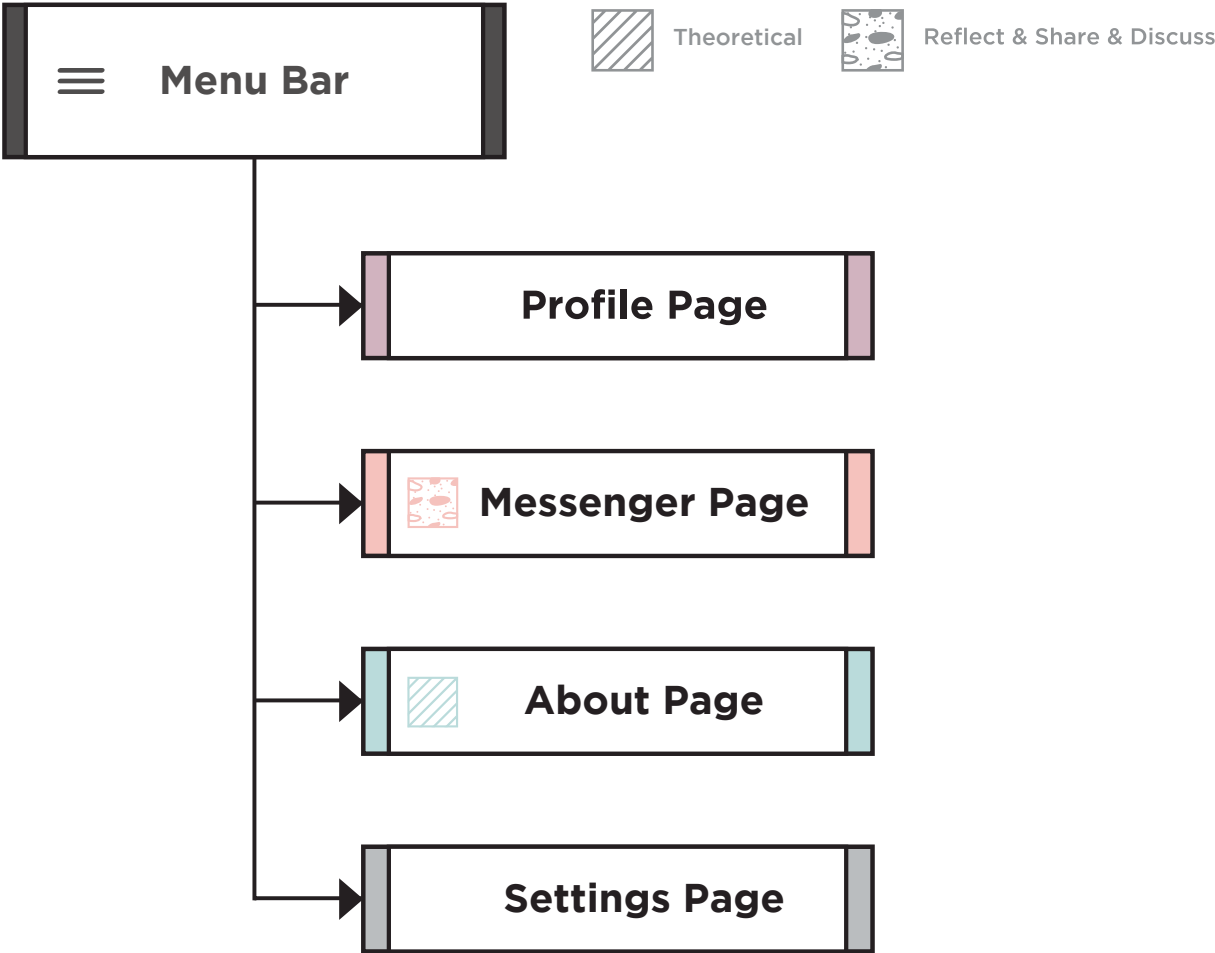
Menu Bar
Another navigation shows on the top left corner to access to profile, messenger, about the app and settings.

Settings Page
General settings can be controll in this page.
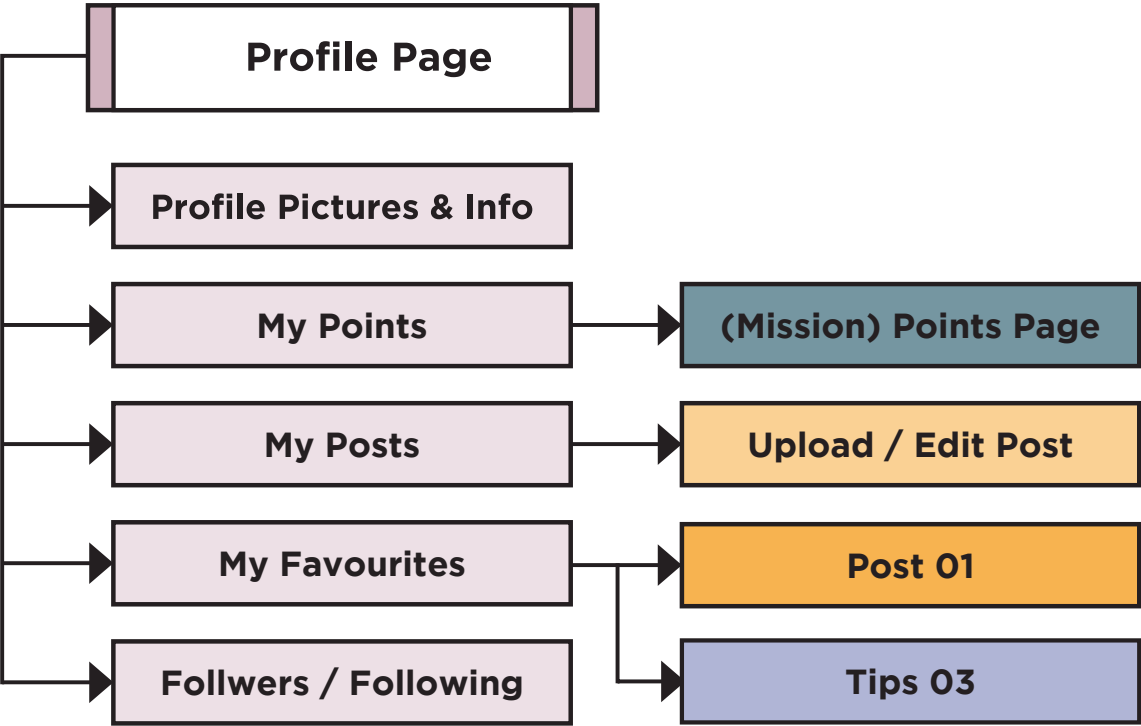
Profile Page
It shows a sum up information of users' activities on the app. Users can also organise their account data via this page.

Figure 75. User flow: Menu bar & profile page. Copyright 2018 by Wennie Lun.

FAQs Page

```
FAQs Page ──────► Ask Questions
   │
   ├──► Why do I need this app?    Receiving Answers
   │                                   │
   ├──► How to earn points?            ├──► Zero Waste Zip
   │                                   │
   ├──► How to do missions?            └──► Other users
   │
   ├──► What are the points for?      #COMMUNITY
   │
   ├──► How to scan code?
   │
   └──► etc…
```

About Page

```
About Page
   │
   ├──► About Zero Waste Zip ──► Suggest Your Favorites
   │
   └──► Our Partnership ────────► Join Us
           │
           ├──► Auckland Council
           │
           ├──► GoodFor
           │
           ├──► Ethique
           │
           └──► etc…
```
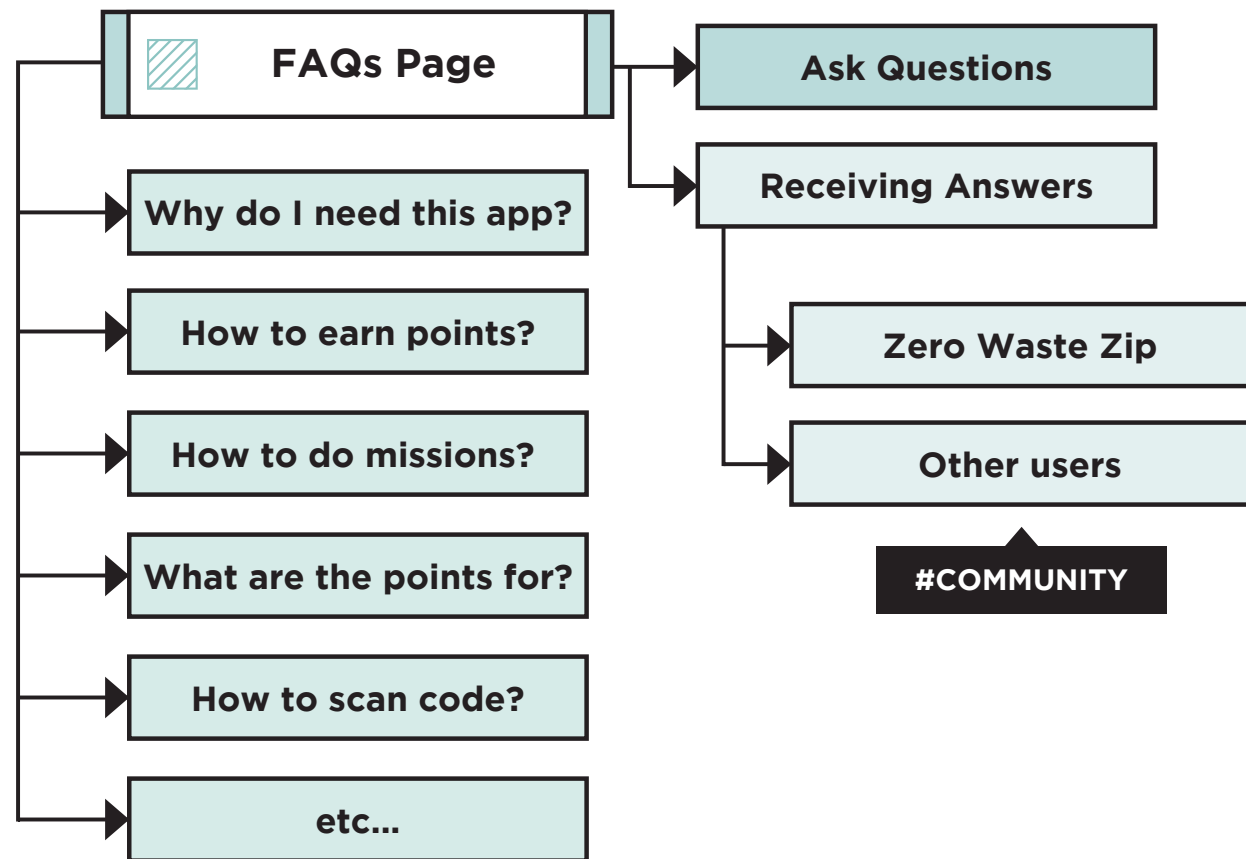
FAQs Page
Frequently asked questions are recorded in FAQs page. Apart from that, users can also ask additional questions or difficulties on this page too.

About Page
Users can know more about the story of Zero Waste Zip like it's aim, vision, missions and values. We are partnered with sustainable stores and supported by the city council and other green organisations. Those partnered stores are also recommended to users where they can buy waste-free or environmentally friendly products.

Figure 76. User flow: FAQs page & about page. Copyright 2018 by Wennie Lun.

Messenger Page

Chat Room 1

Chat Room 2

Send text

Send photos

Send videos

Share posts/tips

Settings Page

Notification

Privacy

Acknowledgements

Logout
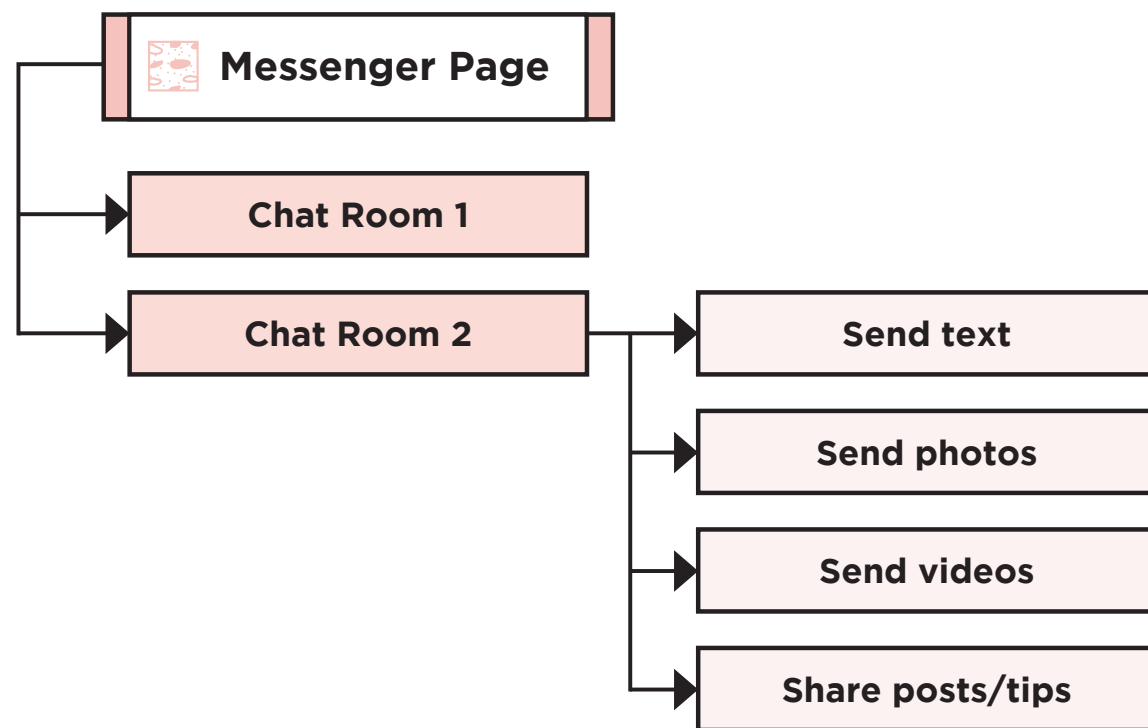
Messenger Page
Users can also communite and discuss with specific friends through messenger page.
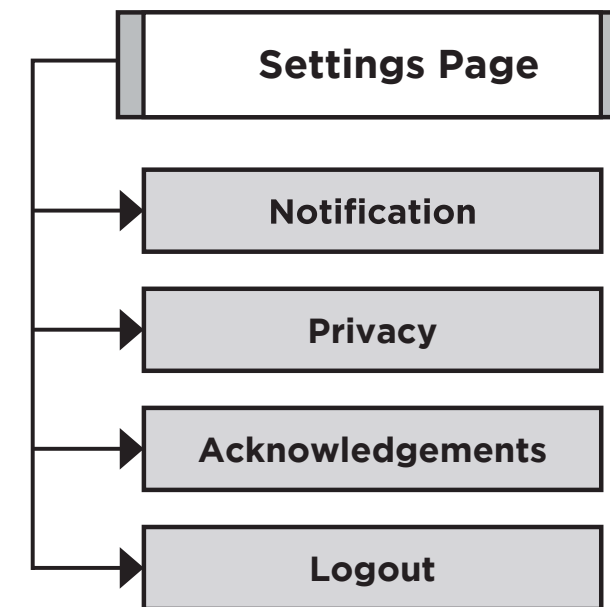
Settings Page
General settings can be controll in this page.

Figure 77. User flow: Messenger page & settings page. Copyright 2018 by Wennie Lun.

Wireframe Sketches -
Login Page, Homepage & Event Page
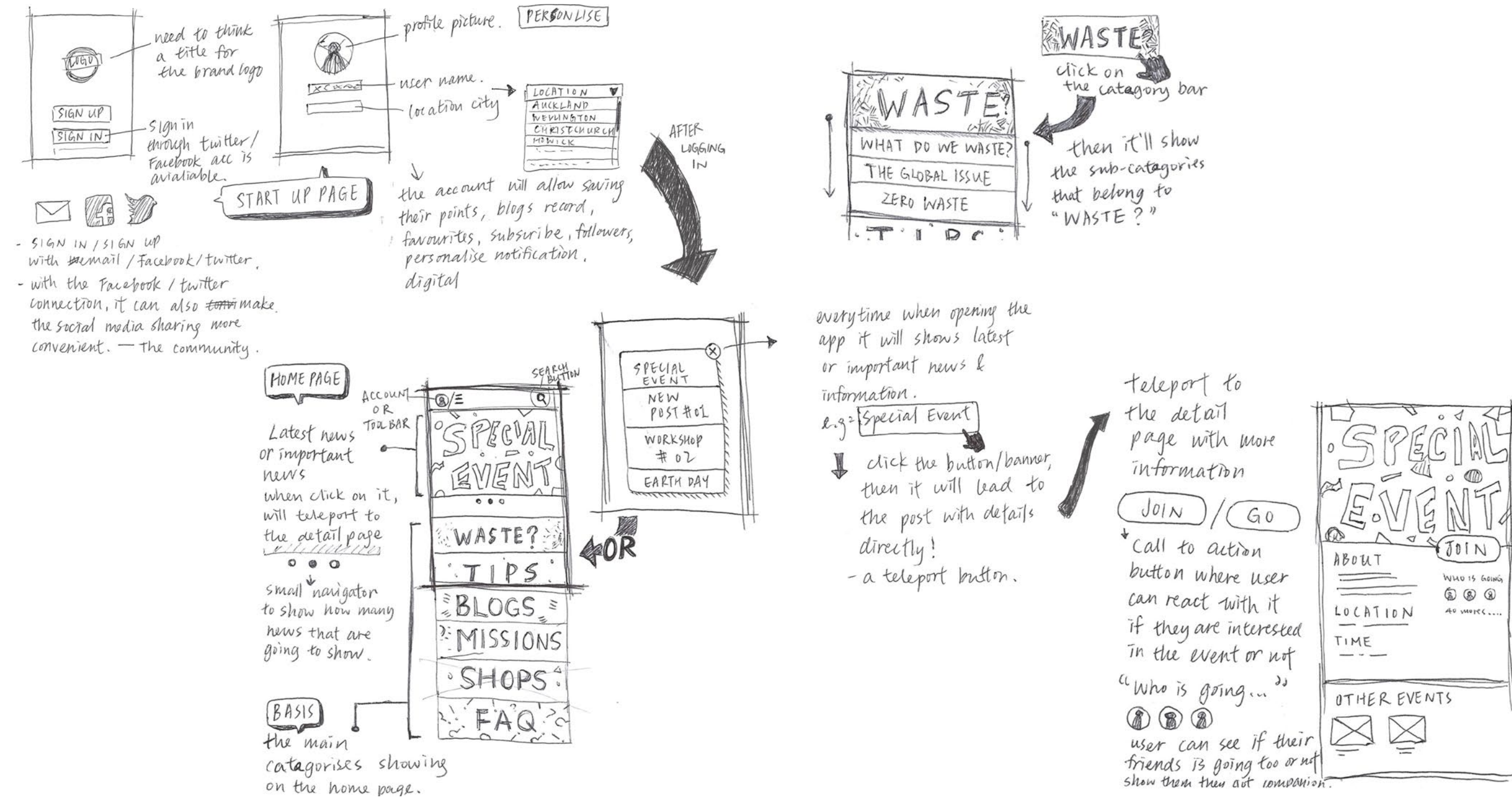
Figure 78. Login page, homepage & event page wireframes sketches. Copyright 2018 by Wennie Lun.

Wireframe Sketches -
Posting Page & Rewarding System
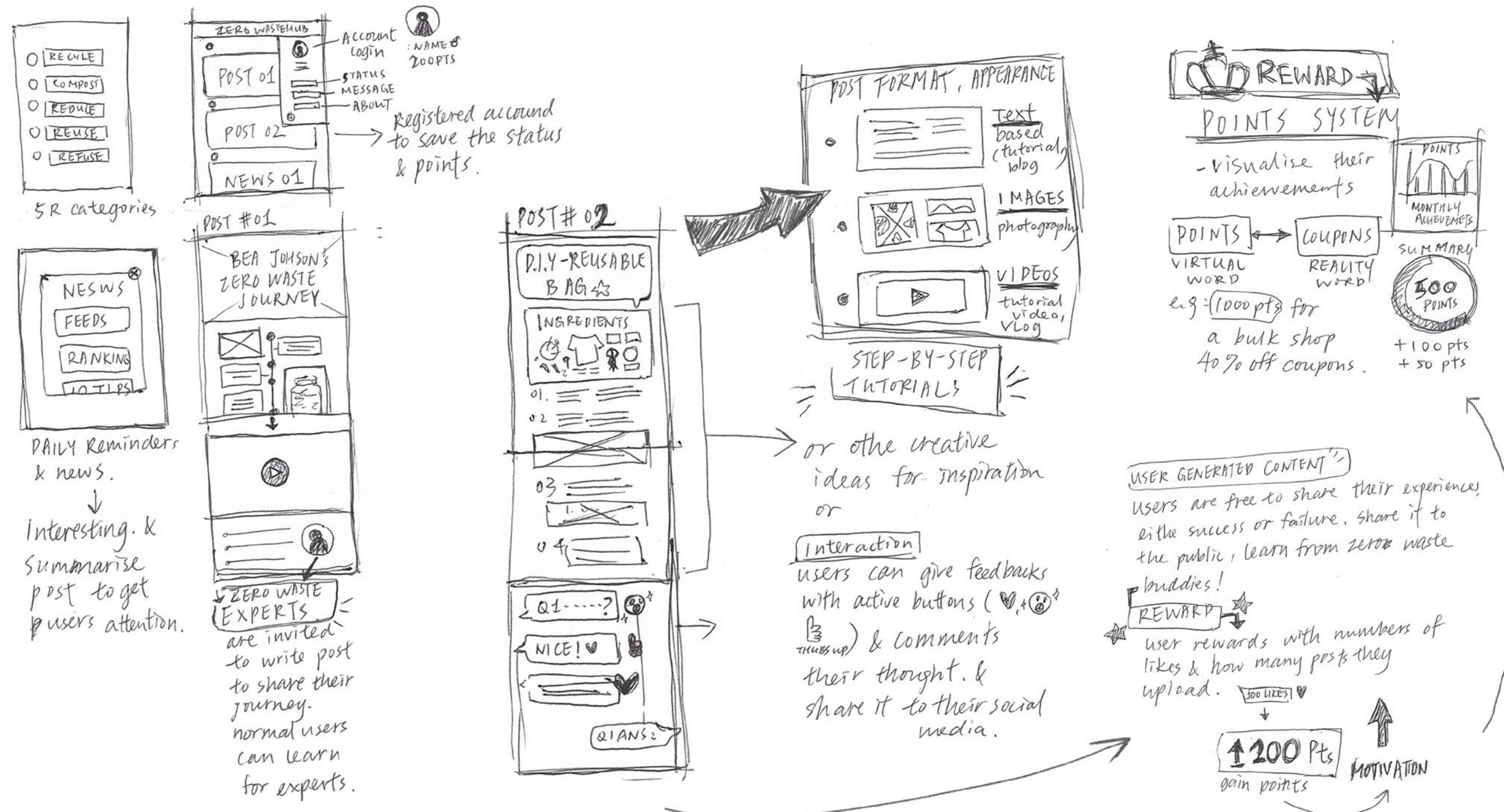
Figure 79. Posting page & rewarding system wireframes sketches. Copyright 2017 by Wennie Lun.

Wireframe Sketches -
Posting Page, Account Page & Point System
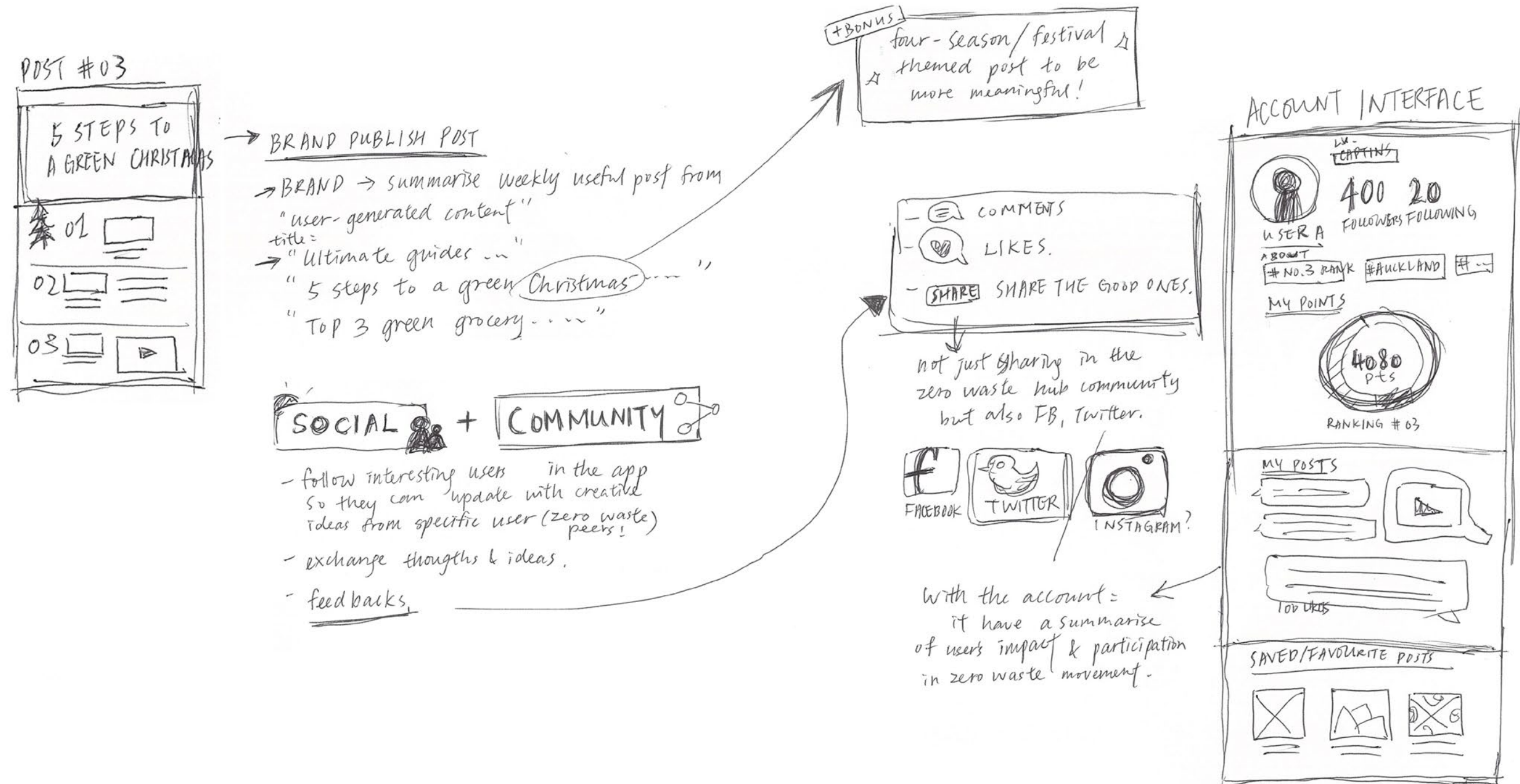
Figure 80. Posting page, account page & point system wireframes sketches. Copyright 2017 by Wennie Lun.

Wireframe Sketches -
Basis Page & Mission Page
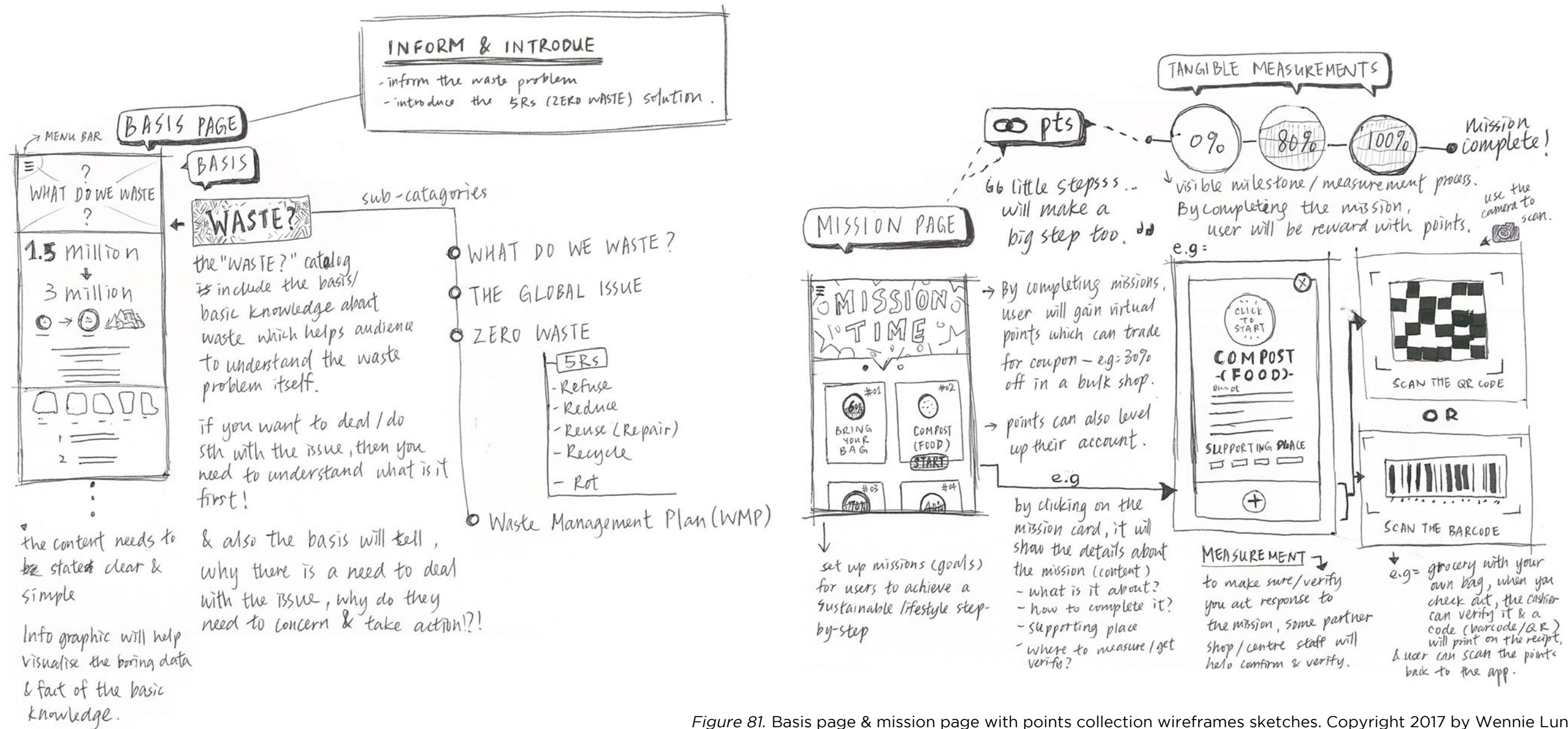
Figure 81. Basis page & mission page with points collection wireframes sketches. Copyright 2017 by Wennie Lun.

Wireframe Sketches -
Challenges, Competitions & Leaderboards
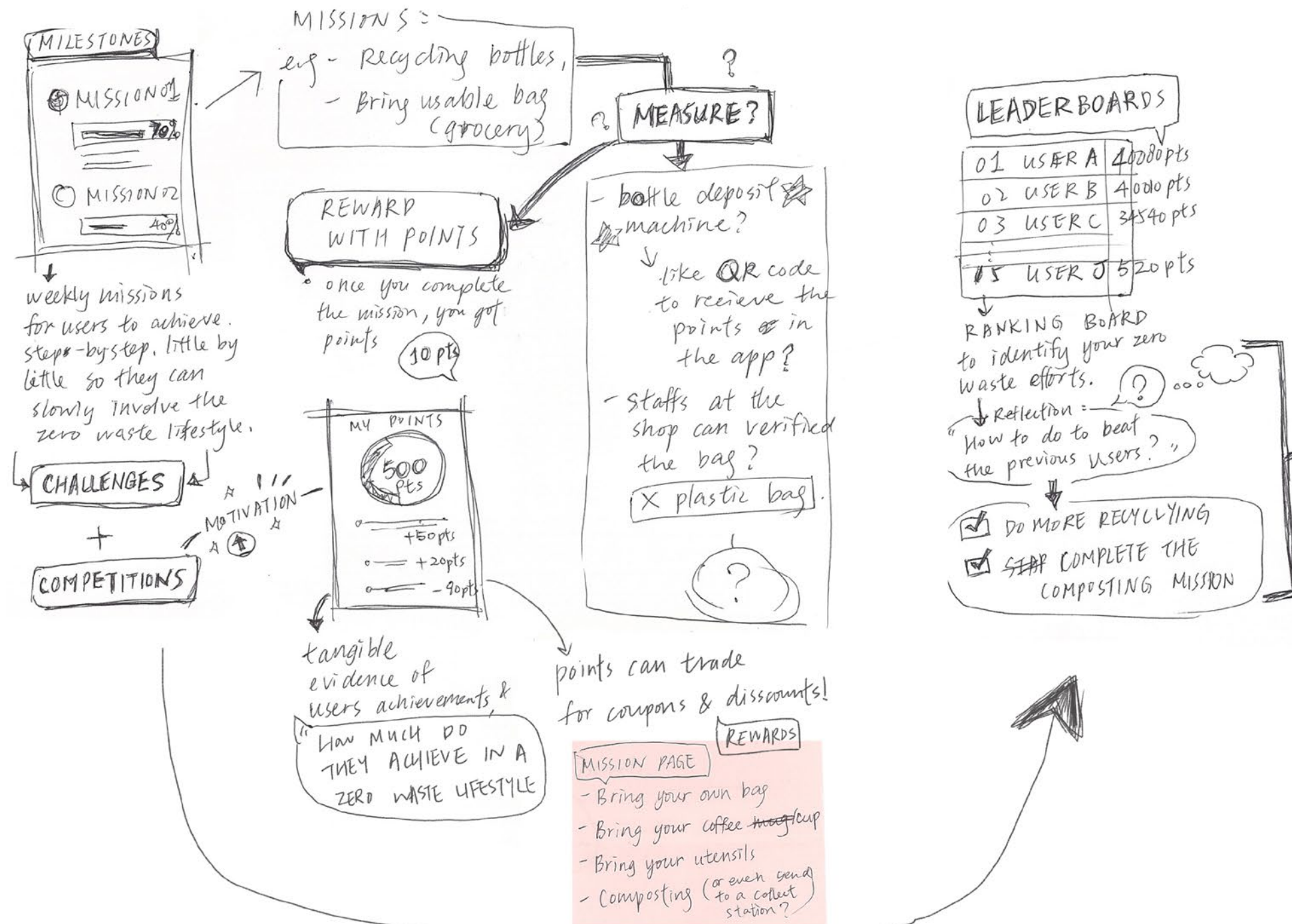
Figure 82. Challenges, competitions & leaderboards wireframes sketches. Copyright 2017 by Wennie Lun.

Wireframe Sketches -
Leaderboards & Posting Page
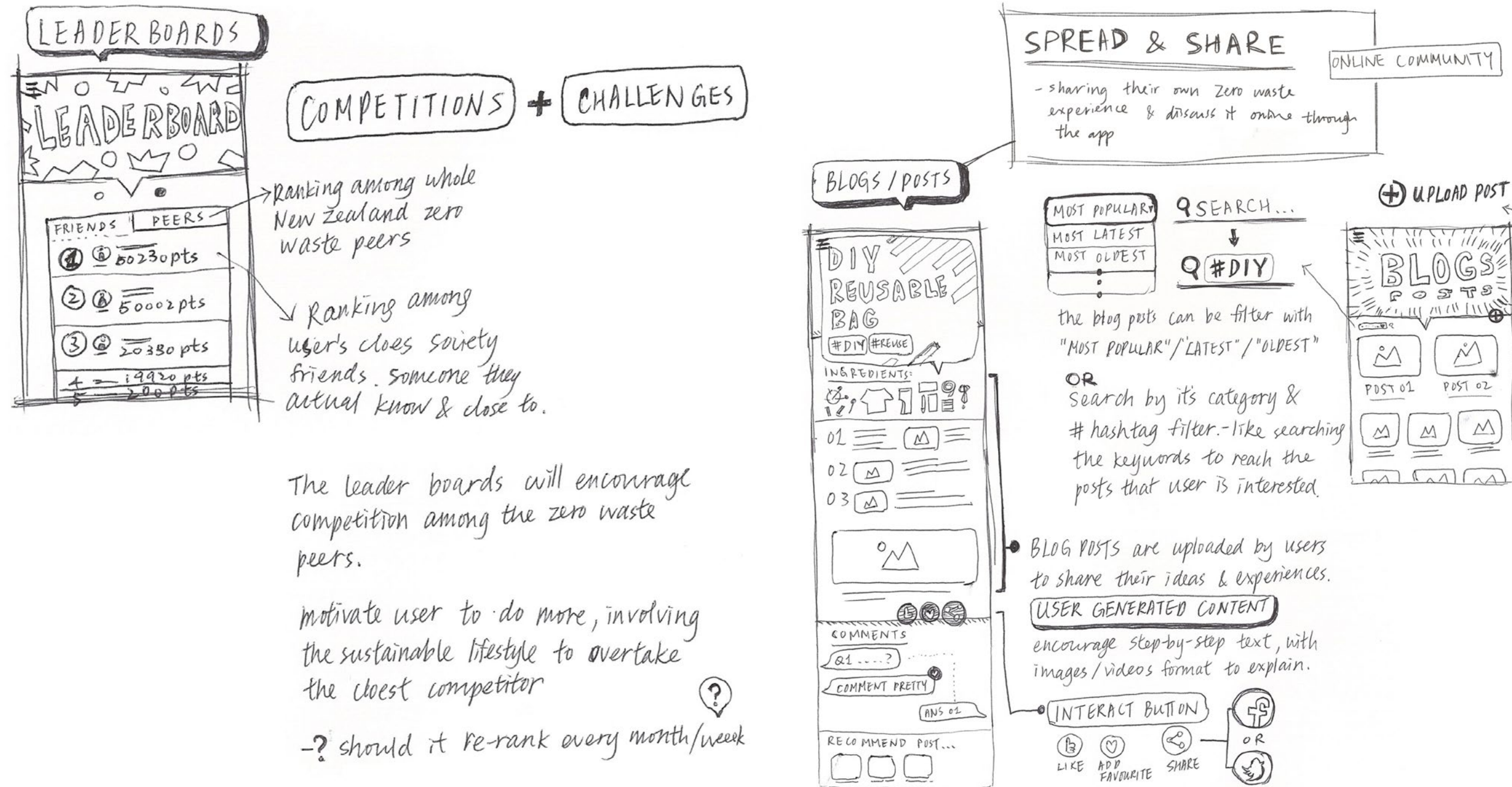
Figure 83. Leaderboards & posting page with sharing system wireframes sketches. Copyright 2017 by Wennie Lun.

Wireframe Sketches -
Menu Navigation & Message Box Page
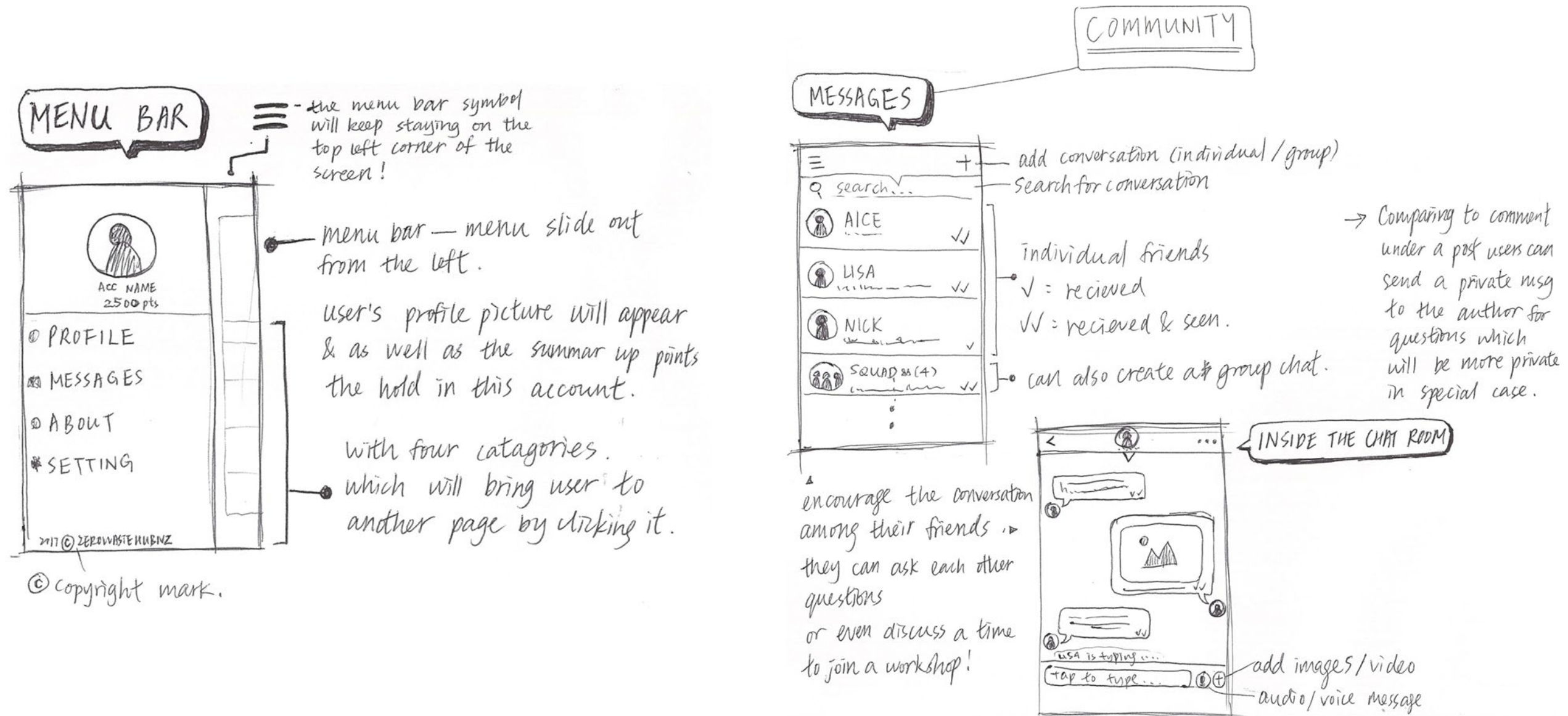
Figure 84. Menu navigation & message box page wireframes sketches. Copyright 2017 by Wennie Lun.

**Wireframe Sketches -
About Page & Team Page**

ABOUT PAGE

- Background of the Brand/app
  —ZERO WASTE HUB NZ
- Aim & goal
- Value

- CONTACT for question (call to action)

TEAM PAGE

OUR TEAM

PARTNERSHIP

JOIN US

Partnership=
Councils= Auckland Council, Wellington Council, Christchurch ....
Sustainable = Bulk shop
Business
Organizations = Waste MINZ, WeCompost, RecycleNZ

Other new group (sustainable) are welcome to join.
(Call to action?)
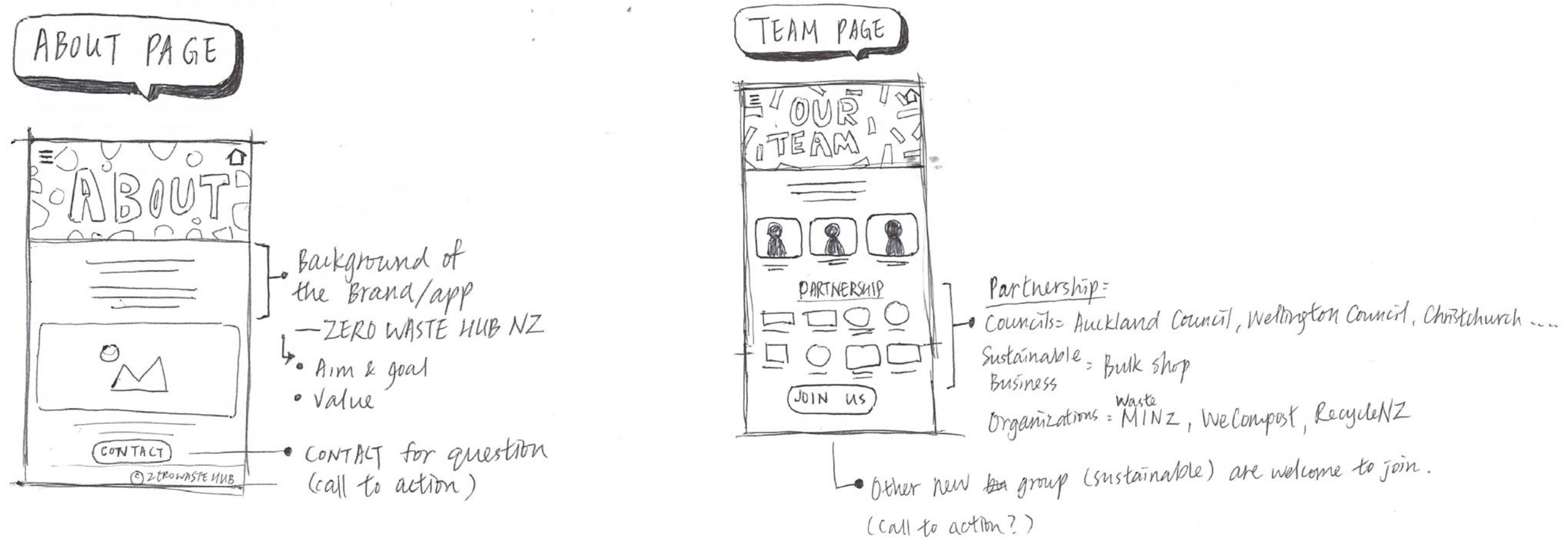
Figure 85. About page & team page wireframes sketches. Copyright 2017 by Wennie Lun.

User Experience Journey
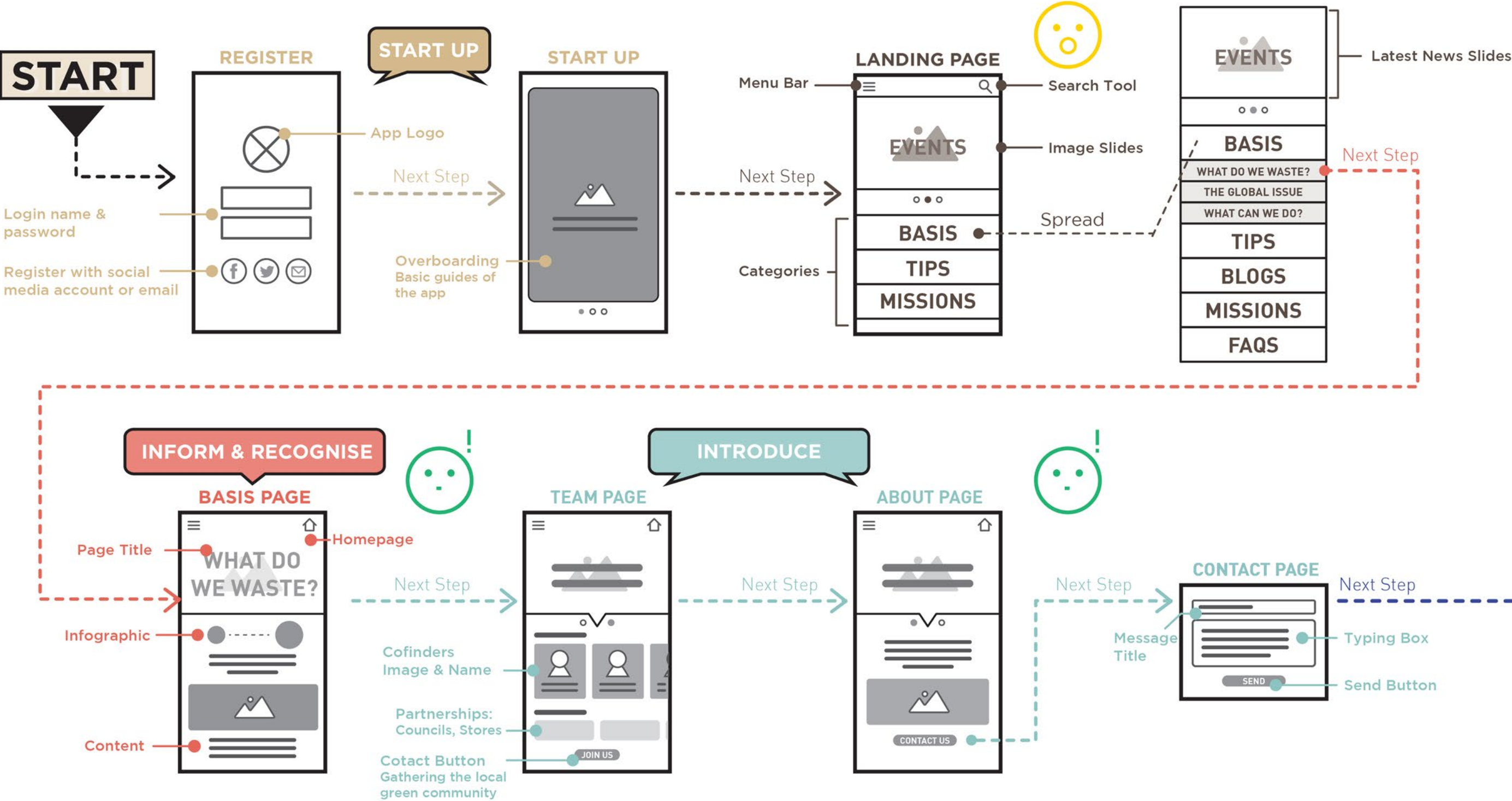
Figure 86. User experience journey I. Copyright 2018 by Wennie Lun.
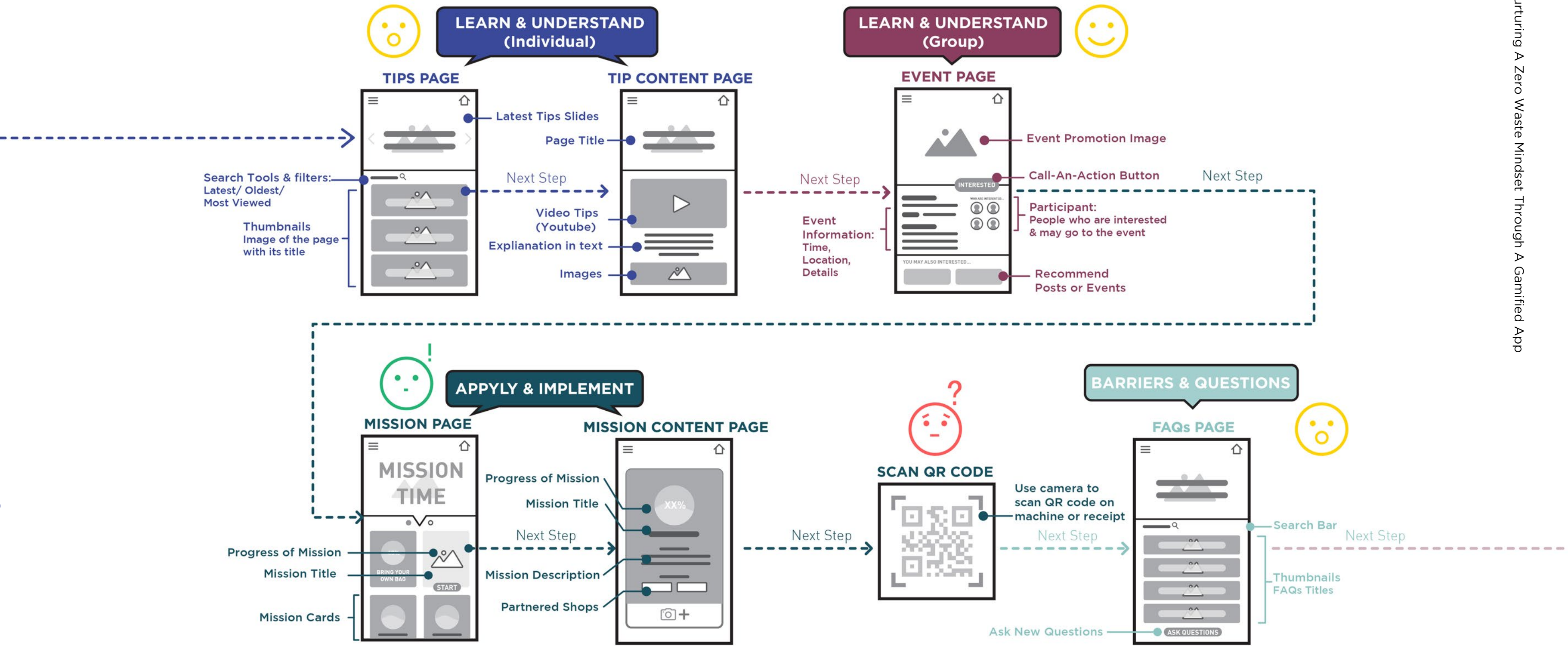
Figure 87. User experience journey II. Copyright 2018 by Wennie Lun.

PROFILE PAGE

- Menu Bar
- Profolio Picture
- Username
- Hastag Location & Gender
- Summary Points
- Saved Posts/Tips

POINTS SUMMARY PAGE

- Summary Points
- 470 points
- Points Record Details
- pts

SPECIAL DEALS PAGE

- Summary Points
- 470 points
- Coupons Deals

REWARD

COMPETITION
LEADERBOARDS PAGE

- Leaderboards
- Rankings
- Usernames & Total Points

Next Step

ANALYZE & SHARE
POST PAGE

- Latest Post Slides
- Thumbnails Image of the page with its title

POST CONTENT PAGE

Next Step

FEEDBACKS
COMMENTS

INTERACT

- Favourite Button
- Comment Button
- Like Button

SHARE

Next Step

COMMUNITY
MESSAGE PAGE

- Menu Bar
- Friend's Icon & Username
- Message Process Tickes

CHAT ROOM PAGE

- Return Button
- Chatroom Settings
- Text Bubble
- Share images / videos
- Profile's Icon

Next Step

Figure 88. User experience journey III. Copyright 2018 by Wennie Lun.

6.2 Prototype 1

For the first prototype, I used Adobe Xd to build black and white wireframes. This is a low-fidelity mock-up and the aesthetic was not taken into consideration in this testing because the goal here was building a basic wireframe and digitally testing its functionality. Errors like page transitions and button placements were spotted here.

The navigation in this prototype is complex to use, because it takes three steps to see the actual content of a post. Regarding this, I intended to categorise the different content with a set of colour palette which would improve the app navigation for better user experience and user-friendly purpose. More detail and reflection of Prototype 2 are shown in Figures 89 - 94.
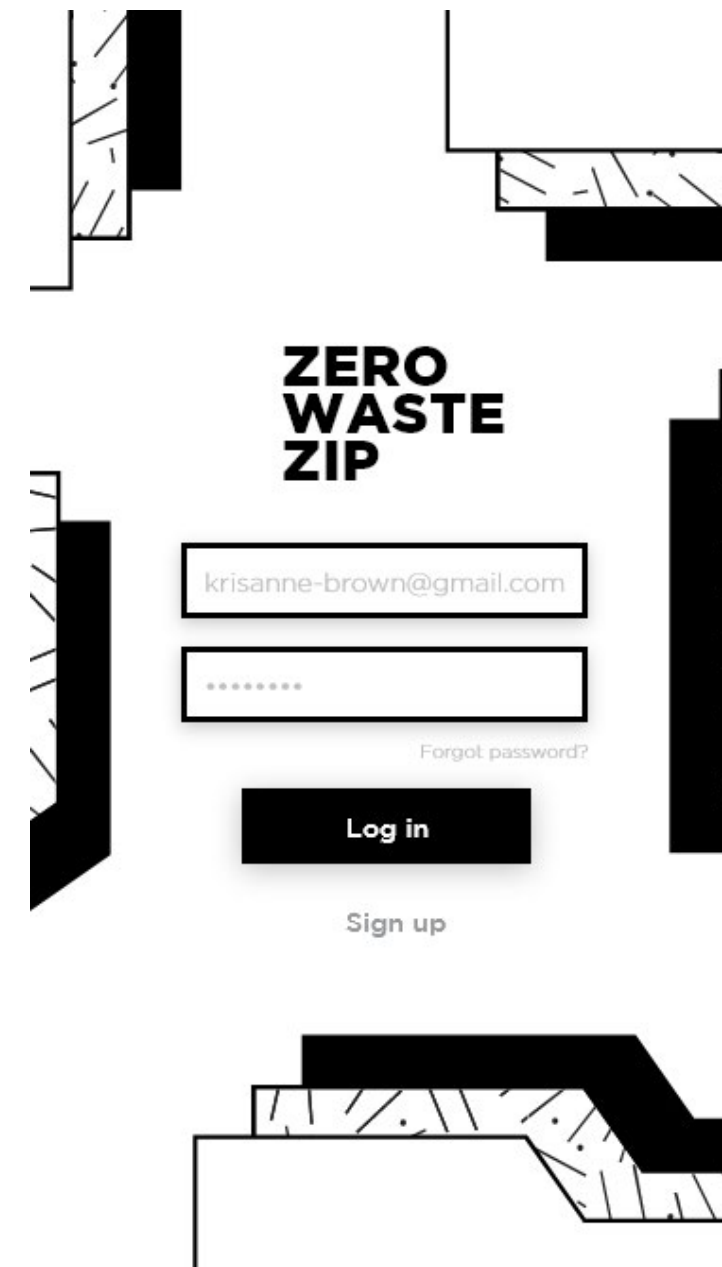
Figure 89. Prototype 1 sign in interface. Copyright 2018 by Wennie Lun.

Interactive Prototype 1 In Adobe Xd

This is a preview of the interactive prototpye 1 and those blue lines are linking interactive elements to target screens.

Prototype 1
Landing Page, Menu Page & Profile Page

● UX & UI Analysis   ● Aesthetic Analysis

text box

ZERO WASTE ZIP

krisanne-brown@gmail.com

Forgot password?

Log in

action button

Sign up

black & white is too plain, it need a set of colour palette! solid/gradient?

krisbrown@m-d.wre

Log In

rounded-corner will give a contrast between text boxs and action button.

ZERO WASTE ZIP

EVENTS

BASIS ①

TIPS ②

POSTS ③

MISSIONS ④

FAQs

↑ (landing page / home page) 🏠

INCONVENIENT CATAGORIES

a landing page should contains important or interesting content to get user to keep exploring the app for more interesting content

✓ CONTENT   ✗ NOT BORING CATAGORIES

ZERO WASTE ZIP

Kris Brown
840 points

HOMEPAGE

PROFILE

INBOX

ABOUT

SETTINGS

LOGOUT

click through

ZWZ

LATEST NEWS/ EVENT

① ② ③ ④ → the 4 categorise

TITLE OF THE POST
author (user)
20 LIKES

TITLE OF THE TIP
30 LIKES!
→ thumbnail image & title to indicates what is the post about.

ZERO WASTE ZIP

Kris Brown
840 points

46 Followers   32 Following   28 Saved

1   2
BULK FOR MOTHERS   POST TITLE

3   4
POST TITLE   POST TITLE

THUMBNAIL SIZE

maybe the thumbnail of the post should be bigger for better review

fill up the screen
POST 1
POST 2

Figure 91. Prototype 1 UX & UI analysis - Landing page, menu page & profile page. Copyright 2018 by Wennie Lun.

Prototype 1
Basis Page & FAQs Page

WHAT WASTE?

WASTE WHAT?

GLOBAL ISSUES

ZERO WASTE, WASTE ZERO!

ZERO WASTE ZIP

WASTE WHAT?

28 JUN 2020

Using step-by-step format to introduce the easy tips to move to zero waste. Using step-by-step format to introduce the easy tips to move to zero waste. Using step-by-step format to introduce the easy tips to move to zero waste.

1.5 MILLIONS — 3 MILLIONS

Waste like plastic bags, packaging, left over foods, utensils, coffee cups, office papers and so on............

LIKE   SAVE   COMMENTS

INTERPRETATION OF THE INFORMATION

– infographic   – images
– bullet point   – videos
– diagram   – words

TEXTUALLY + VISUALLY + ACOUSTICALLY

interpreting the waste information & green theory
↳ provide an enjoyable learning/reading experience
UX

INTERACTIVE BUTTONS

interactive icon:
LIKE   SAVE   COMMENT   + share:
100   43   3   FACEBOOK TWITTER

FAQs

WHAT DO I NEED THIS APP?

HOW TO EARN POINTS?

HOW TO UPLOAD POST?

HOW TO ADD FRIENDS?

WHAT DO I NEED THIS APP?

Are you looking forward to reduce the waste? Are you worrying about to much plastics? Do you need "someone" to guide you through a plastic free journey?

If you are answerin yes, then this is the app that will help you understand everything about waste and how to against it step-by-step.

Green Community / Green Missions / Rewards / Essential tips and trick are here for you.

Now let's get to the zero waste journey together! :)

if there are no specific FAQs that users are looking for? they can ask one!

add a new question

CAN'T FIND YOUR QUESTION? ASK YOUR ONE HERE.

ask something....   type in

action button

POST

LACK OF INTERACTION WITH USERS

– get feedback from users by asking them if this FAQs are helpful to them

↳ ☺ useful   ☹ not helpful

ADD INTERACTION BUTTON

WHO IS ANSWERING THE FAQs?

① Zero Waste Zip (offical answer)
② Other Users   COMMUNITY

– when users are welcome to ask new questions, they can also help each other too!

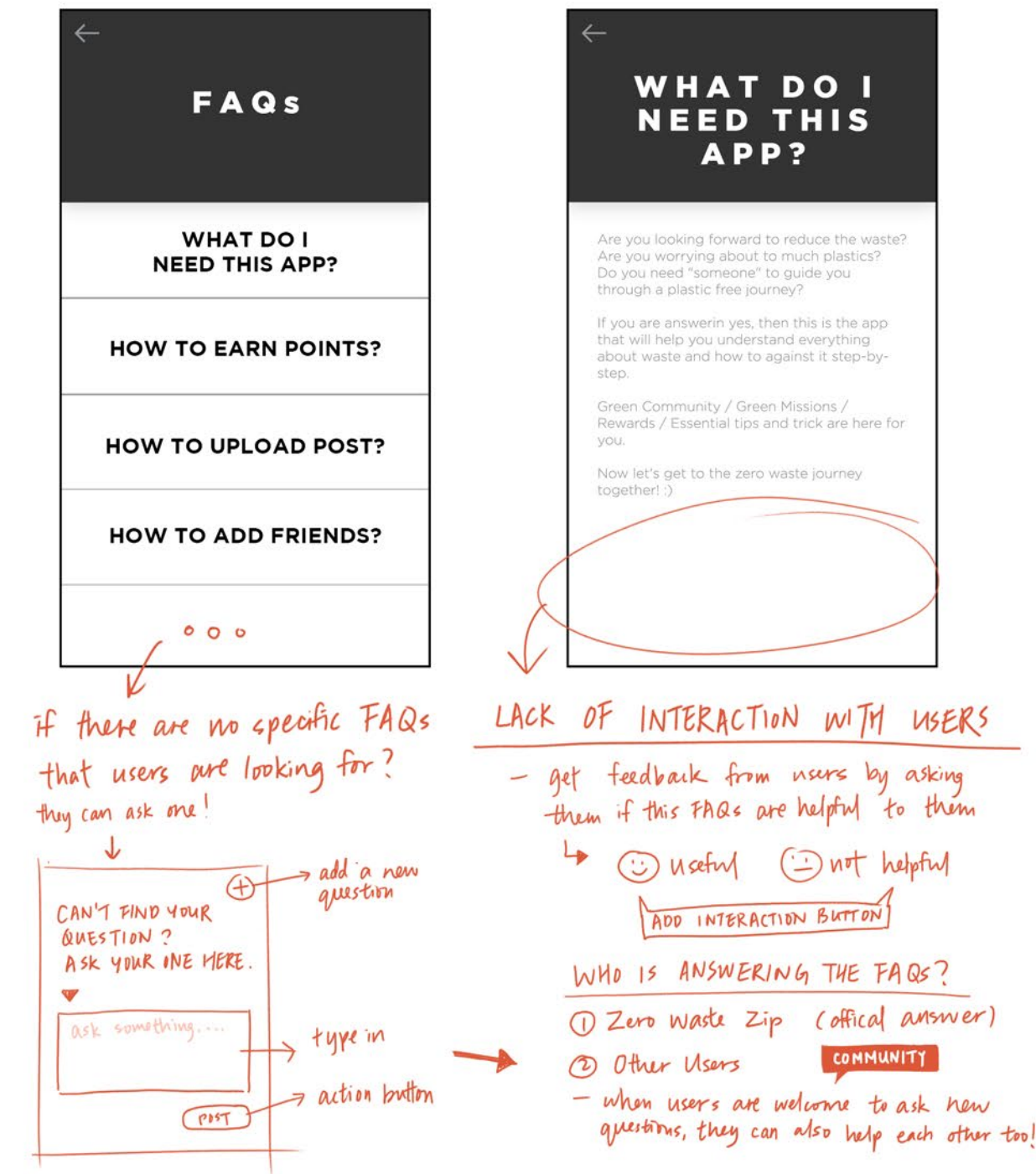*Figure 92.* Prototype 1 UX & UI analysis - Basis page & FAQs page. Copyright 2018 by Wennie Lun.

Prototype 1
Missions & Leaderboards

ZERO WASTE ZIP

840 points

MISSION ONE

MISSION ONE

MISSION ONE

MISSION TITLE
including too much mission title on the same page

MISSION ONE

MISSION ONE
Discription: Bring your own bag to grocery. Any kind of fabric bags are the ideal option in this case. Grab it and start you plastic free grocery.

BUSINESS PARTNER

START THIS MISSION

PROCESS MEASUREMENT
tangible process that will keep user practicing the green mission to accumulate points and complete the mission.
e.g=
STAY MOTIVATED
45% / 35% / 50%
- a "ZERO WASTE" goal might sounds far and big. but a 100% process bar will make green practices seems easier to achieve.
- practising & completing numbers of missions (short-term goal) may end up reaching the "zero waste" goal (Long-term goal).

CONNECTION BETWEEN MISSIONS
make an effective green routine that user can follow it daily.

+ LEVEL TO LEVEL + POINT TO POINT
timeline like ← MISSION 1
MISSION 2 OR
MISSION 3

< Return

ZERO WASTE ZIP

840 points

monthly/weekly rank?

1. Username Lv.12   1500pt
2. Username Lv.11   1000pt
3. Kris Brown Lv.9   840pt
4. Username Lv.9   800pt
1. Username Lv.2   350pt
1. Username Lv.1   100pt

summary of points

missing a rewarding page

this icon doesn't symbolise the meaning of "REWARD"

REWARDS (TRADE)

(LEADERBOARDS) RANKING

MISSIONS

navigation buttons that connects the entire points system.

this is where the user of the account rank and he/she needs to think how to overtake the closest competitor or how to defend the current place
COMPETITION

Figure 93. Prototype 1 UX & UI analysis - Mission & leaderboards. Copyright 2018 by Wennie Lun.
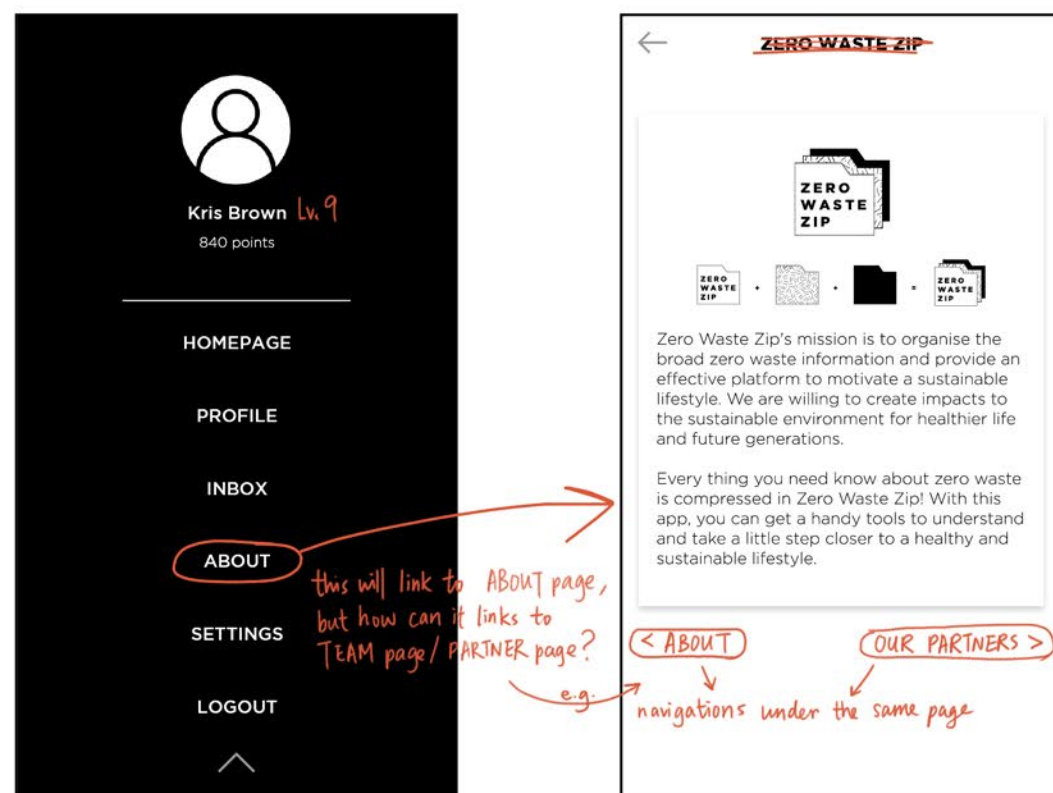
Prototype 1
## About Page & Team Page

Figure 94. Prototype 1 UX & UI analysis - About page & team page. Copyright 2018 by Wennie Lun.

6.3 Prototype 2

Prototype 2 was created based on the wireframes from Prototype 1. In Prototype 2, the complicated page transitions, aesthetics, navigation and interactive interface are improved. Apart from that, high-fidelity prototypes consist of actual content and information to fill up the pages, which is easier to visualise, and how the future outcomes would look and function.

I revised the in-app navigation with colour coding categories and separated the pages into three different categories. The primary navigation is shown at the top of the screen; this was easier to filter different categorised posts and find the pages.

At the same time, the comment interface is added at the bottom of each post which makes it easier to communicate with other users. More modifications and reflections on Prototype 2 are explained in Figures 95 - 110.
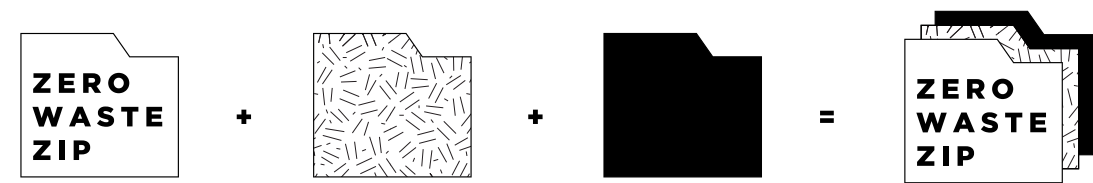
BASIS

TIPS

BLOGS

FAQs
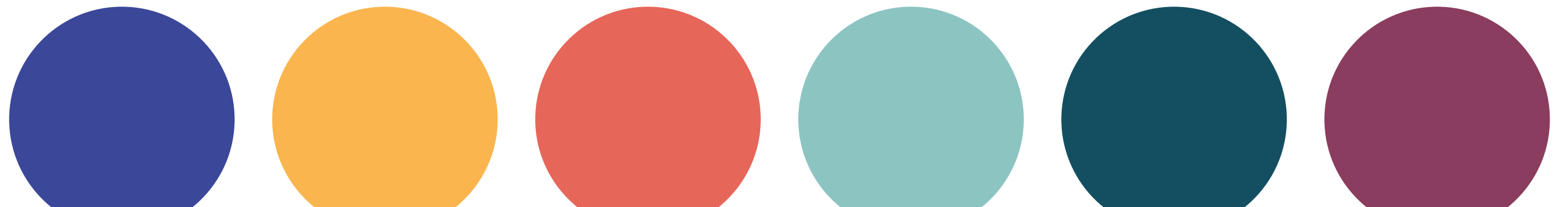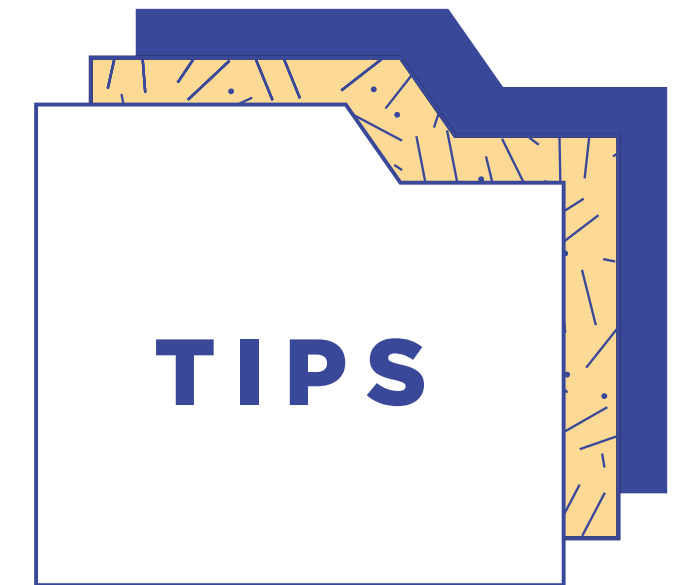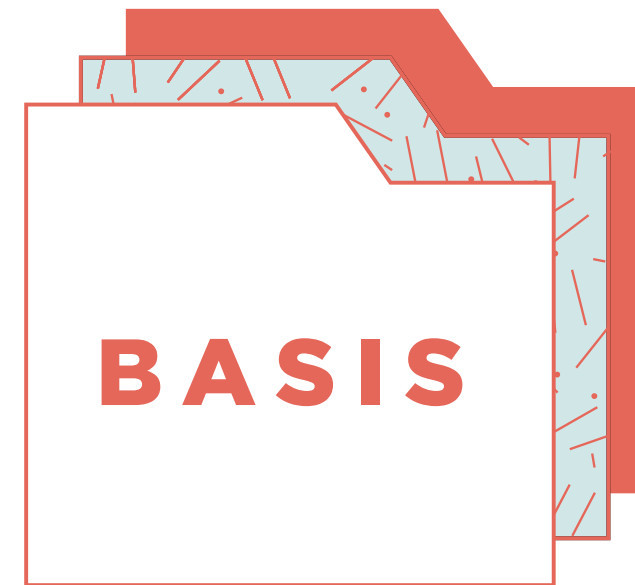
Figure 95. Zero Waste Zip logo. Copyright 2018 by Wennie Lun.

Visual Elements

Three layers of folders represent the brand, the waste contents and the digital platform. Thus everything green and sustainable is well compressed into "Zero Waste Zip". Users can find all the essential waste-free information and guide in one app. It can be playful with different colours for various contents.
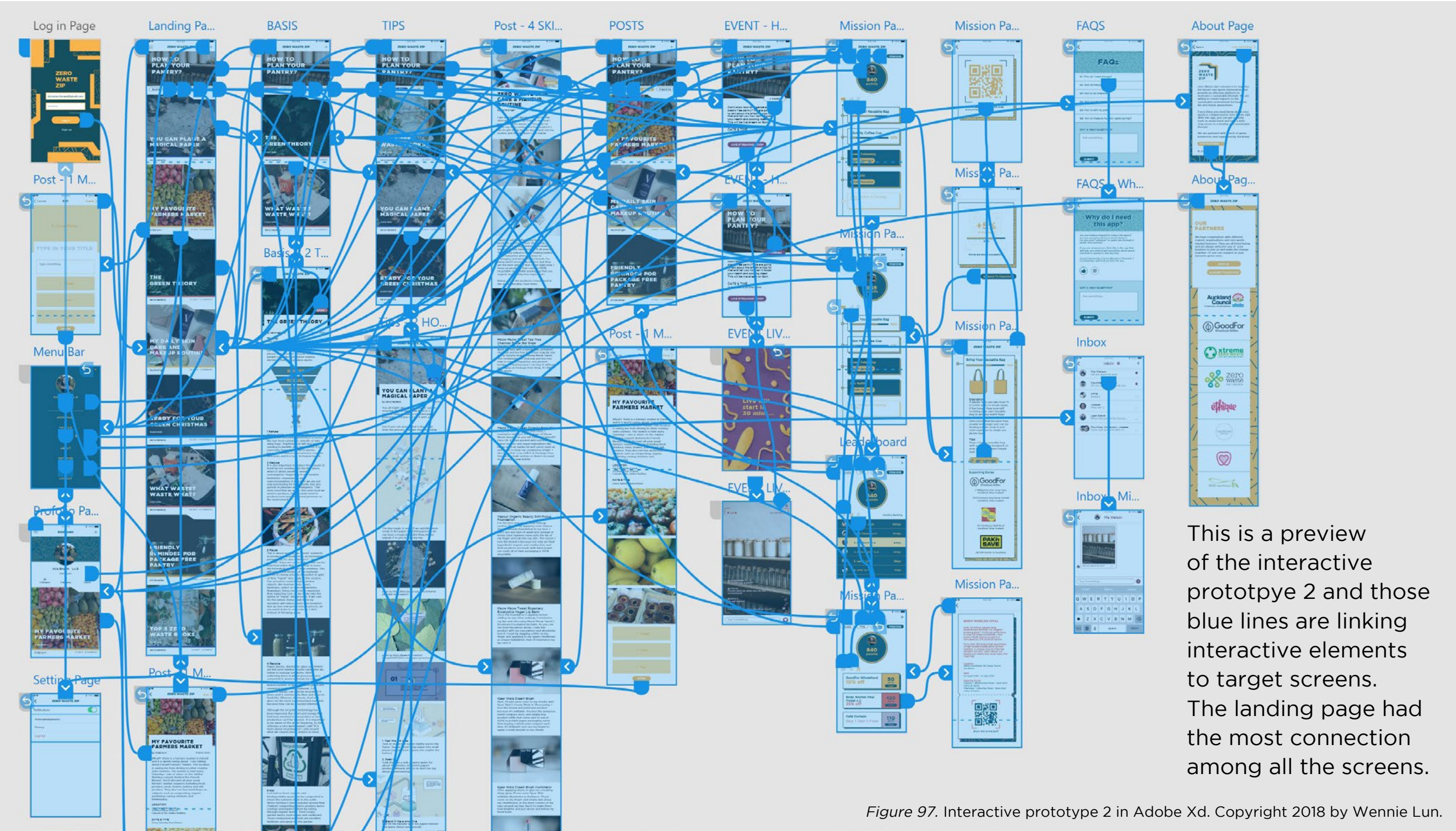
Colour Palette For Categories

The set of colours provides various options for different situations and categories' use. The colour palette is natural but playful at the same time, which will give a peaceful but joyful aesthetics to the user interface.

Figure 96. Zero Waste Zip brand elements & colour palette. Copyright 2018 by Wennie Lun.

Interactive Prototype 2 In Adobe Xd

This is a preview of the interactive prototpye 2 and those blue lines are linking interactive elements to target screens. The landing page had the most connection among all the screens.

Figure 97. Interactive prototype 2 in Adobe Xd. Copyright 2018 by Wennie Lun.

Prototype 2
Main Catergories & Navigations

NAVIGATION ①

NAVIGATION ②

NAVIGATION ③

USER - GENERATED CONTENT
- thumbnails from different categories are showed on the landing page.
- posts are either generated by users or Zero Waste Zip
- User can filter to find posts with 3 categories (1: BASIS , 2: TIPS / 3: POSTS)

ZERO WASTE ZIP   users

COMMUNITY
SHARE
DISCUSS

Figure 98. Prototype 2 UX & UI analysis: Main categories & navigations. Copyright 2018 by Wennie Lun.

Prototype 2
Colour Coding

BASIS – by ZERO WASTE ZIP

TIPS – by ZERO WASTE ZIP

POSTS – by users

MISSIONS – recommend by ZERO WASTE ZIP – practice by user

- a colour tag at the bottom of the thumbnail can inform user what category is it belong to.

TITLE
brief introduction of the post

THUMBNAIL COVER
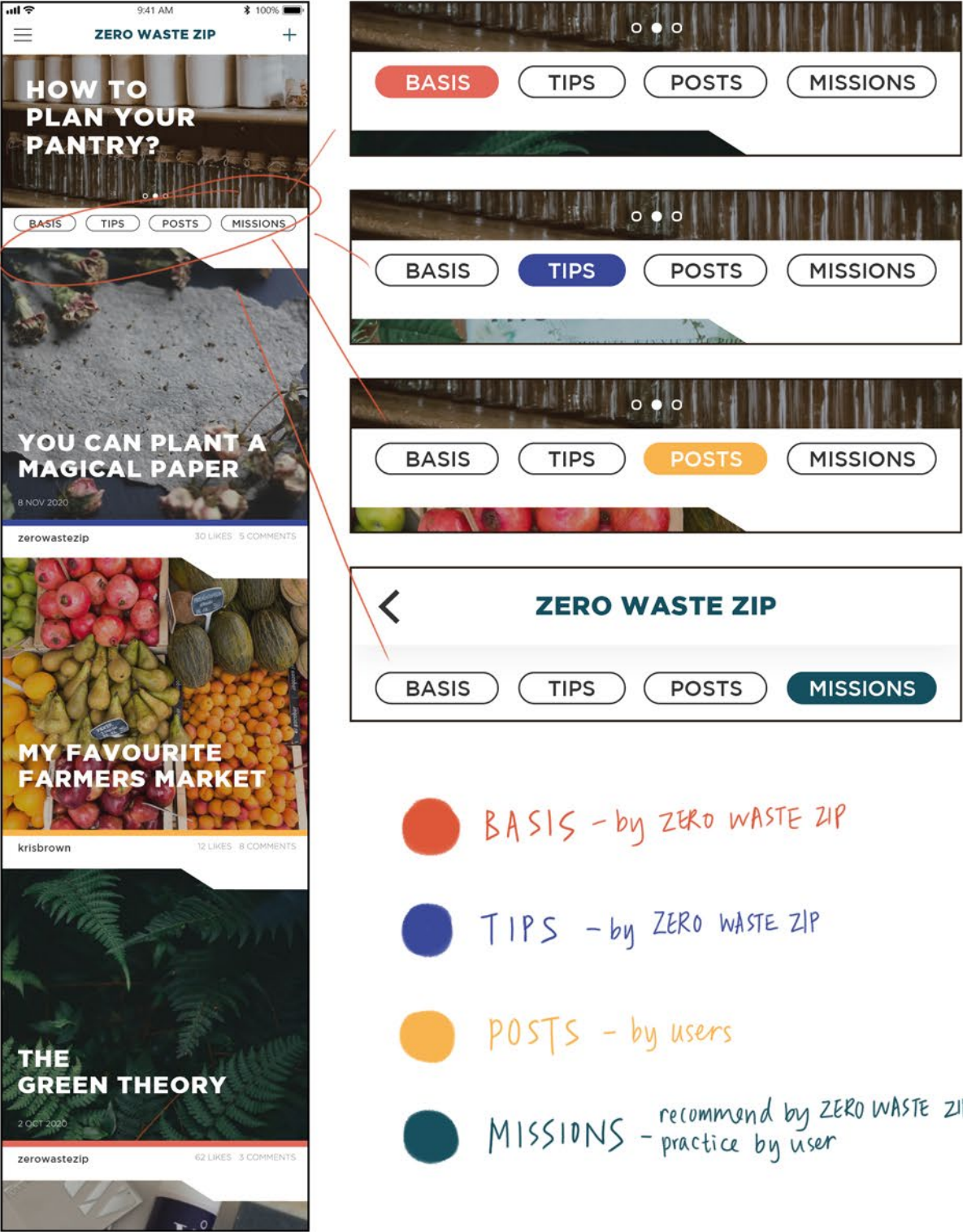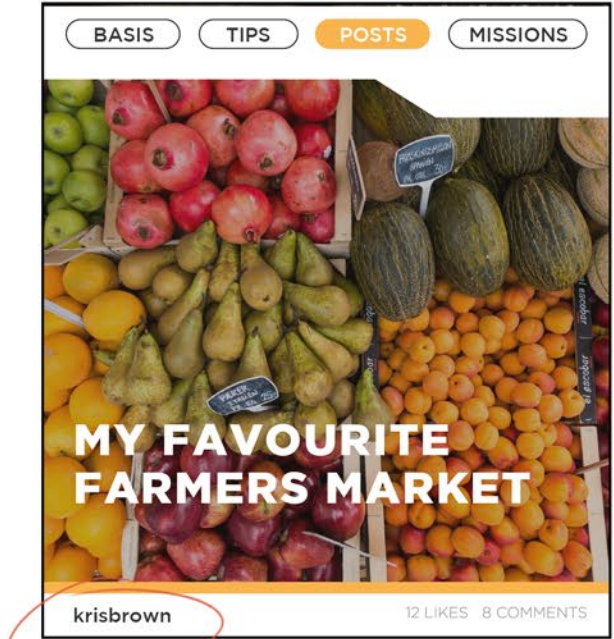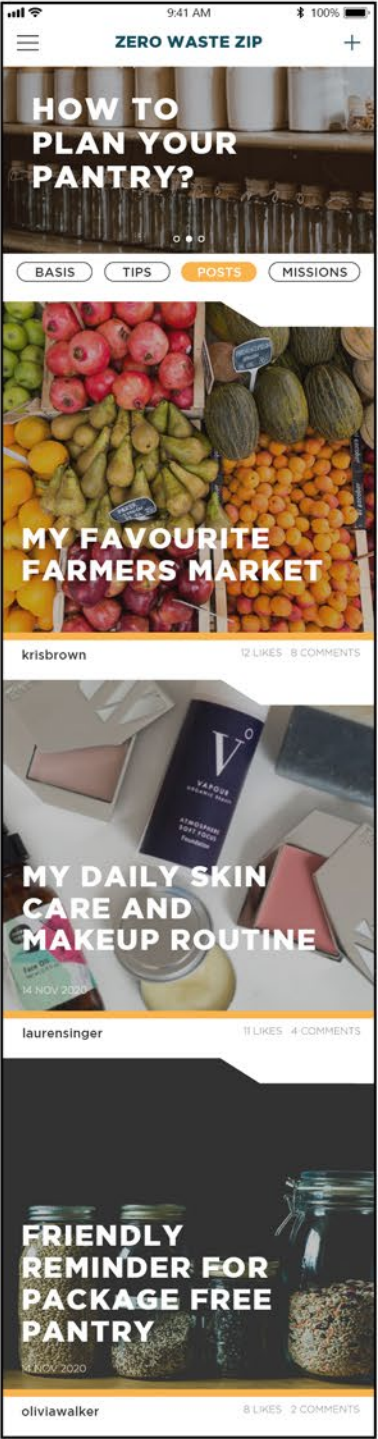visually engaging

informing interactive numbers
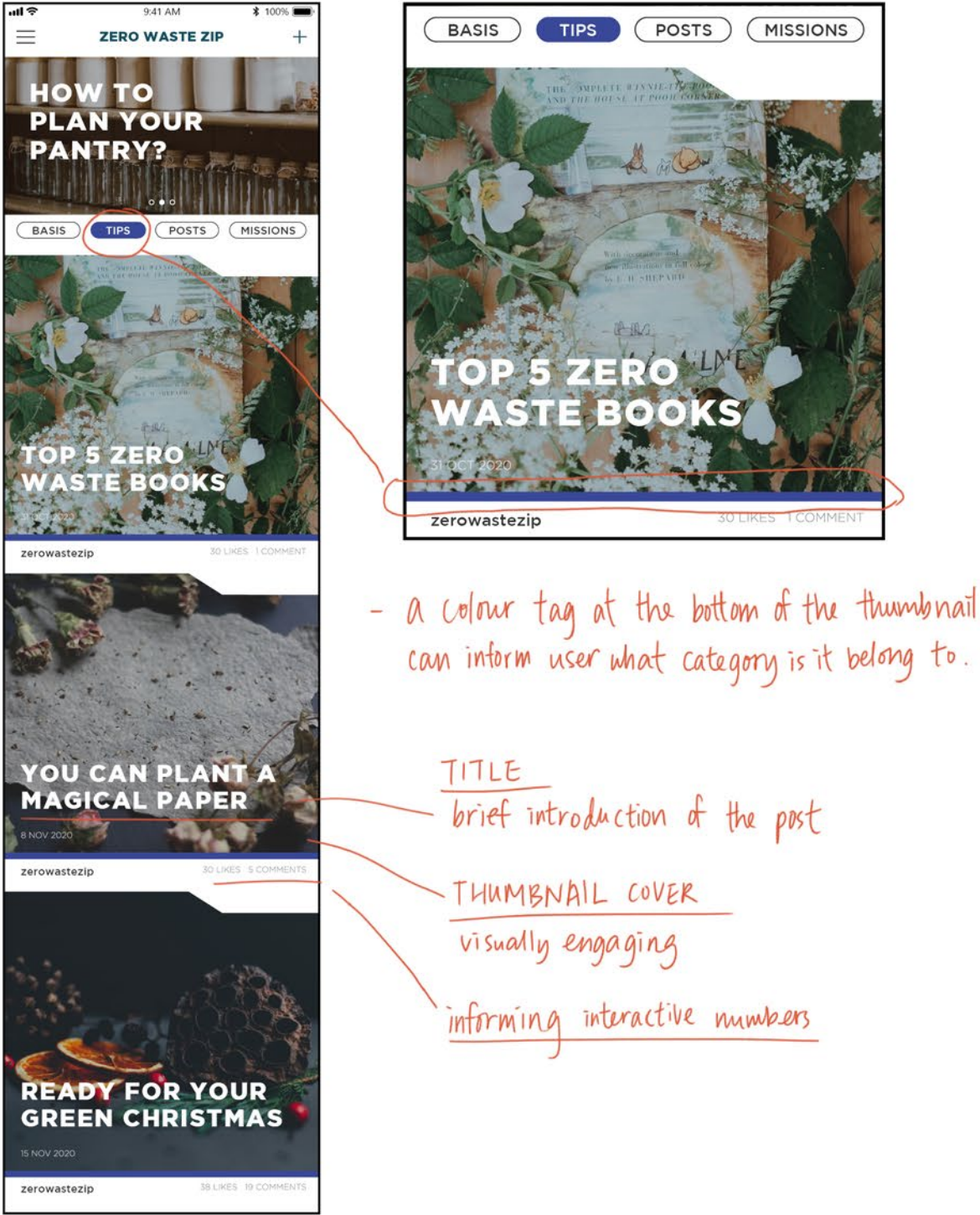
Figure 99. Prototype 2 UX & UI analysis: Colour coding. Copyright 2018 by Wennie Lun.

**Prototype 2
Posts Interface**

Bold title

LINK TO THE AUTHOR

COVER IMAGE
Same image from the thumbnail

TAG
this tag button will link back to the "POST PAGE"

PUBLISHED DATE

PROTFOLIO PAGE

this will link to the user's protfolio.

THUMBNAIL TEMPLATE

POST TITLE
DATE
AUTHOR NAME   LIKES COMMENTS

- The folder shape comes from the ZERO WASTE ZIP logo.
- each post is worth to share & discuss because they can learn from each other and improve together.
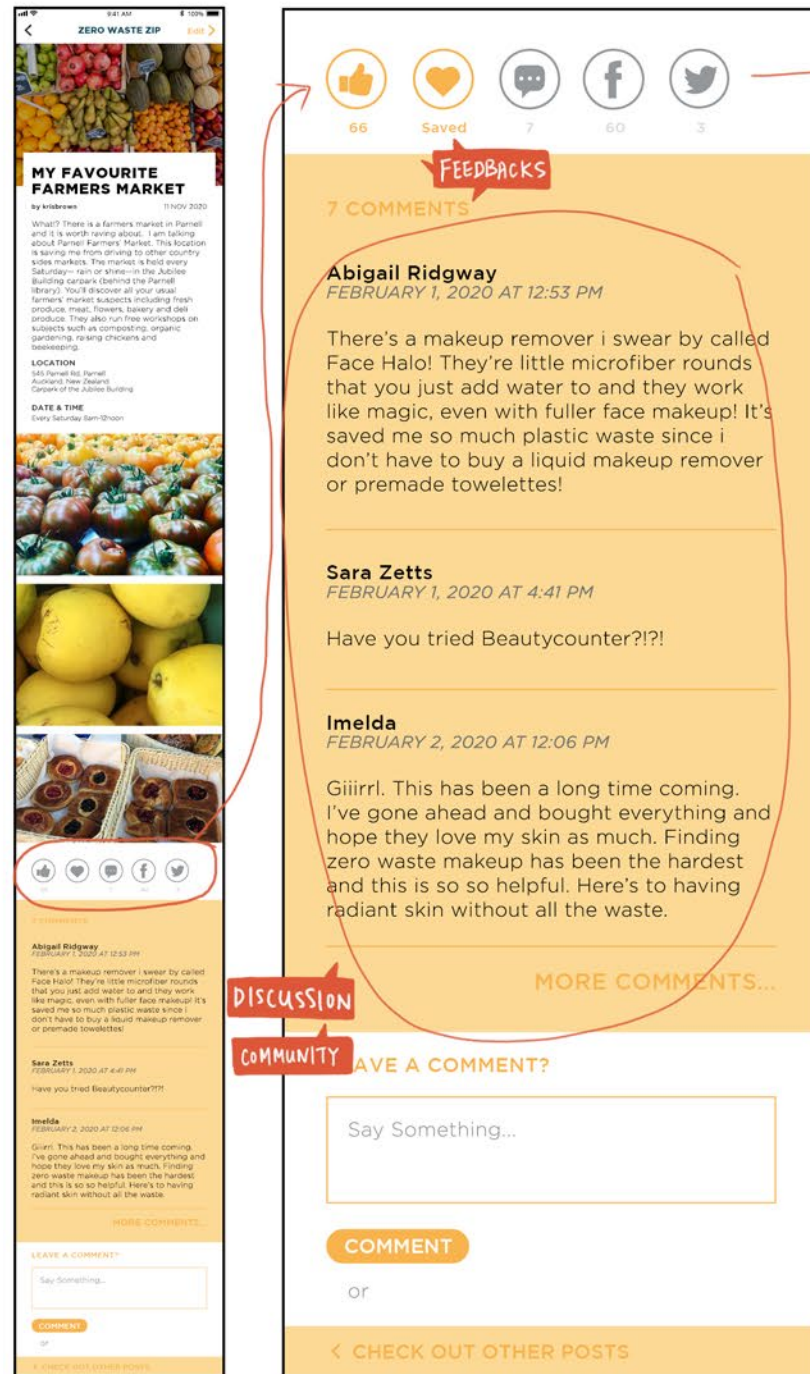- This template can be applied to:
BASIS / TIPS / POSTS
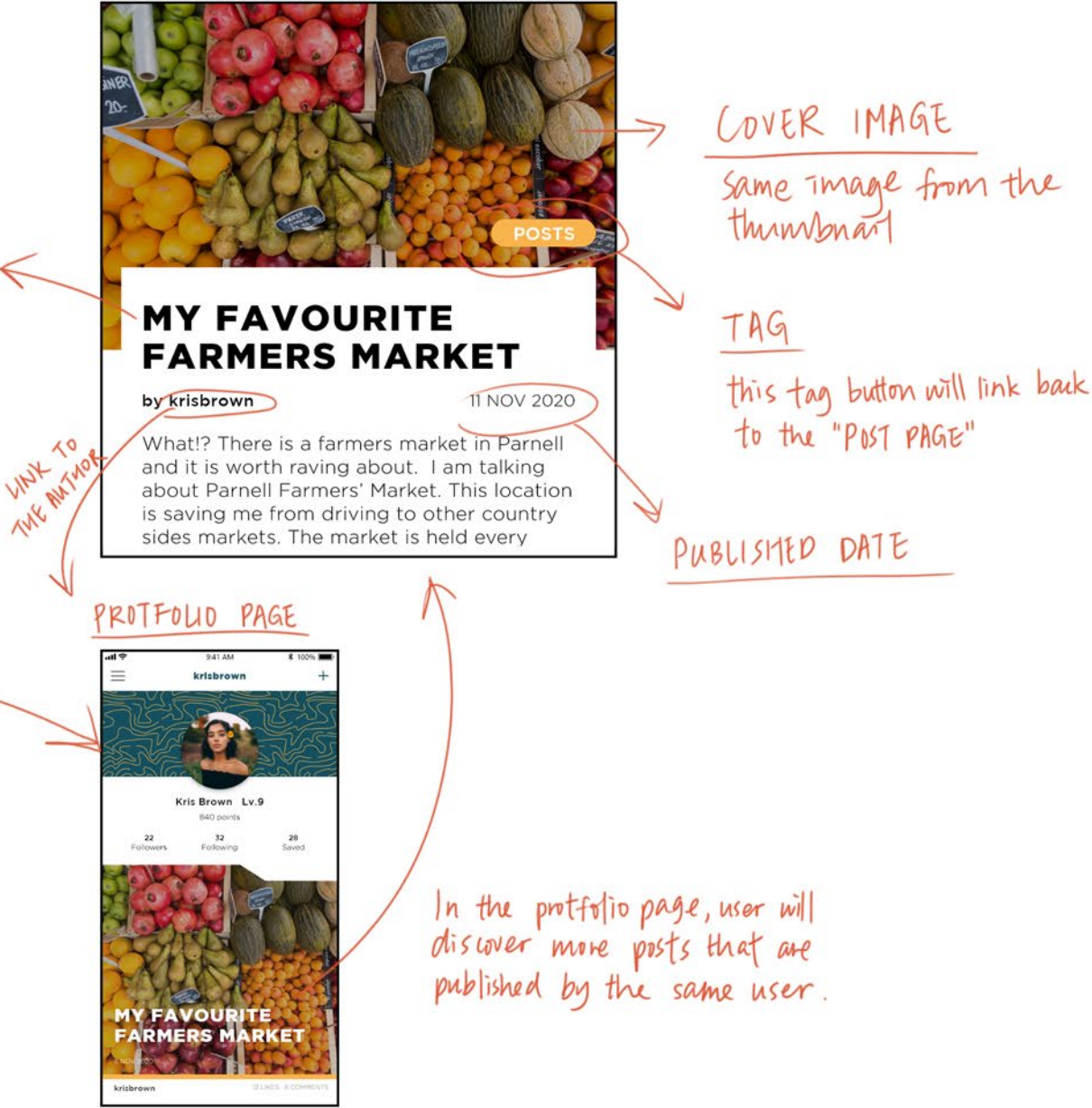
In the protfolio page, user will discover more posts that are published by the same user.

Figure. 100: Prototype 2 UX & UI analysis: Posts interface. Copyright 2018 by Wennie Lun.

Prototype 2
Community & Feedbacks

CONTENT SHARES

Sharing the interesting / mindful post on other social media will introduce the green theory & the app to others who may become a new user & be involved to the green journey with the community.

SOCIAL INTERACTION

- emotional involvement that user can connect to others who agree on the same thing.

- author are motivated by numbers of likes, shares & comments.
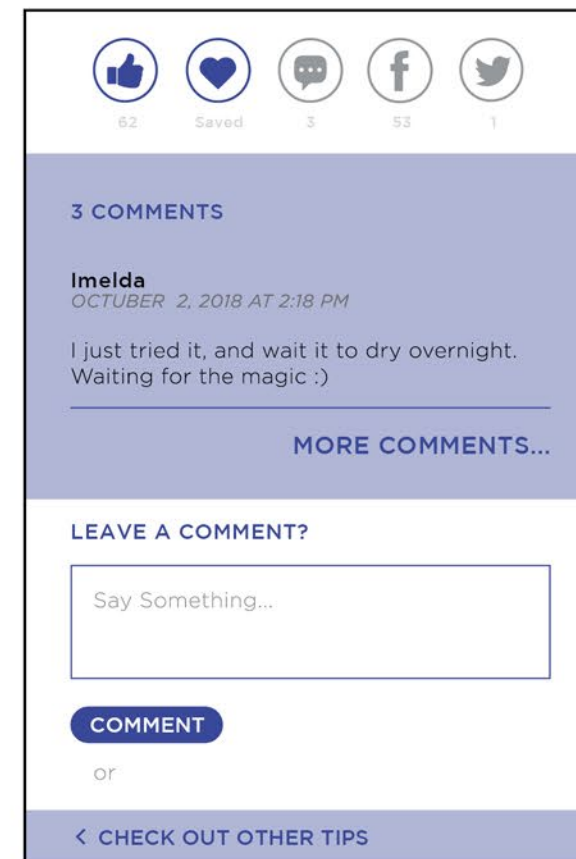
INTERACTION BUTTONS

LIKE =

comparing both, the heart one is representing a more emotional expression

SAVE / BOOKMARK:

the heart only symbolise "love"/ "like" not "save"/"bookmark", so this should be replace with a bookmark icon or a flag icon.
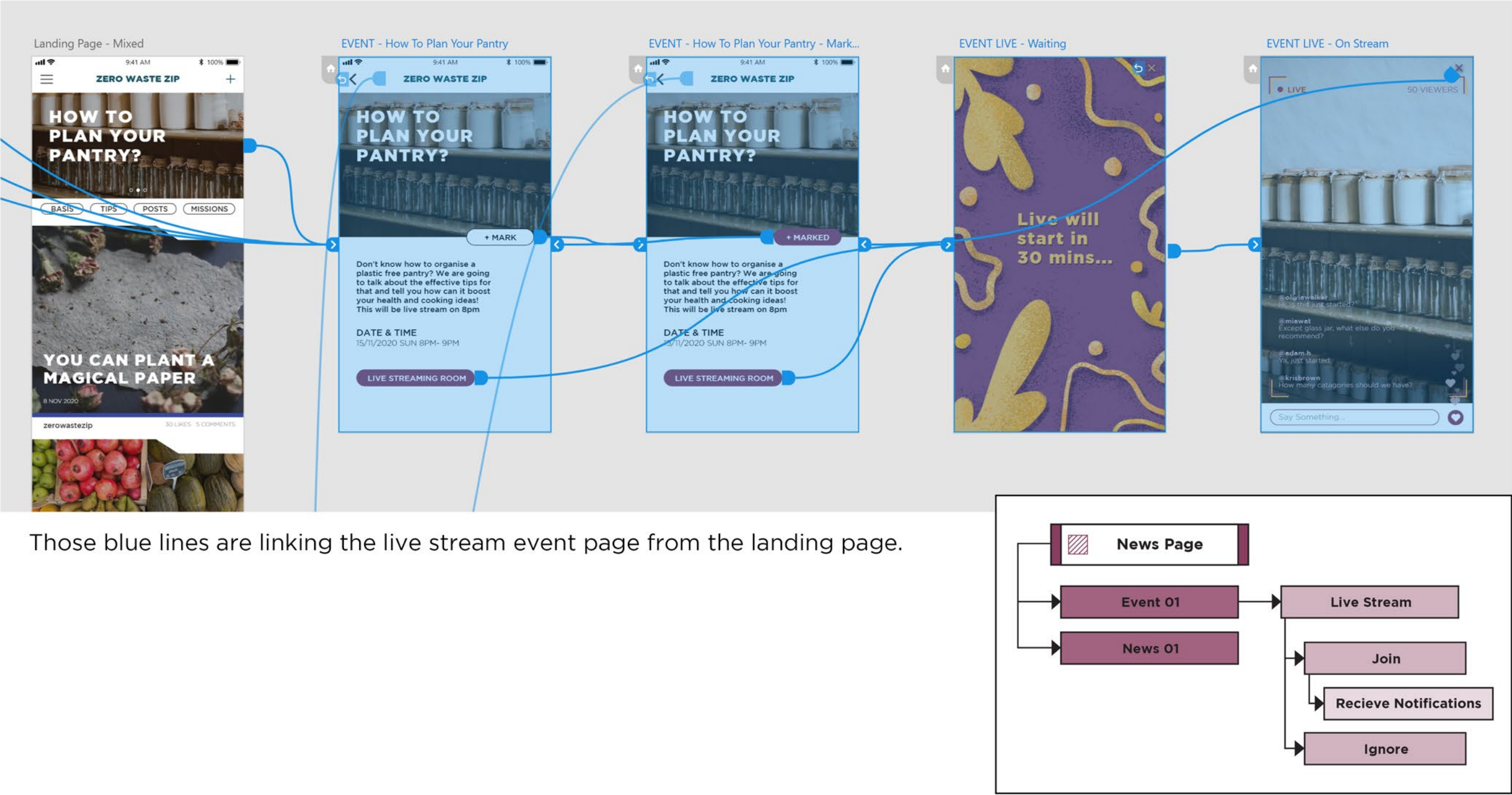
→ marking the favourite one & review it in the future.

FEEDBACKS

DISCUSSION

COMMUNITY

COLOUR CODIND

relating colours are applied to interaction buttons & the comment sections

CALL-TO-ACTION BUTTON.
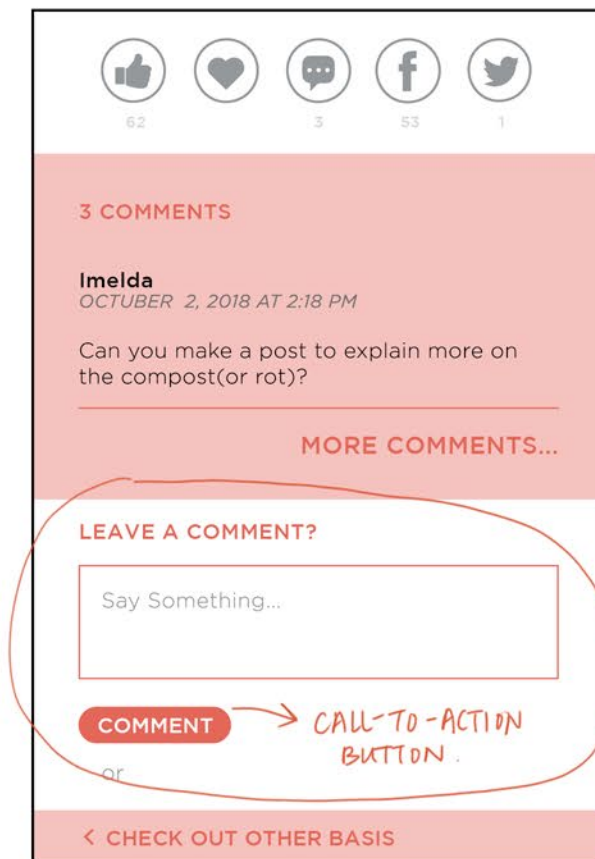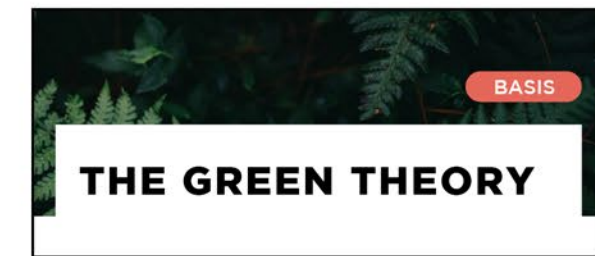
EASY-TO-COMMENT

Figure 101. Prototype 2 UX & UI analysis: Community & feedbacks. Copyright 2018 by Wennie Lun.

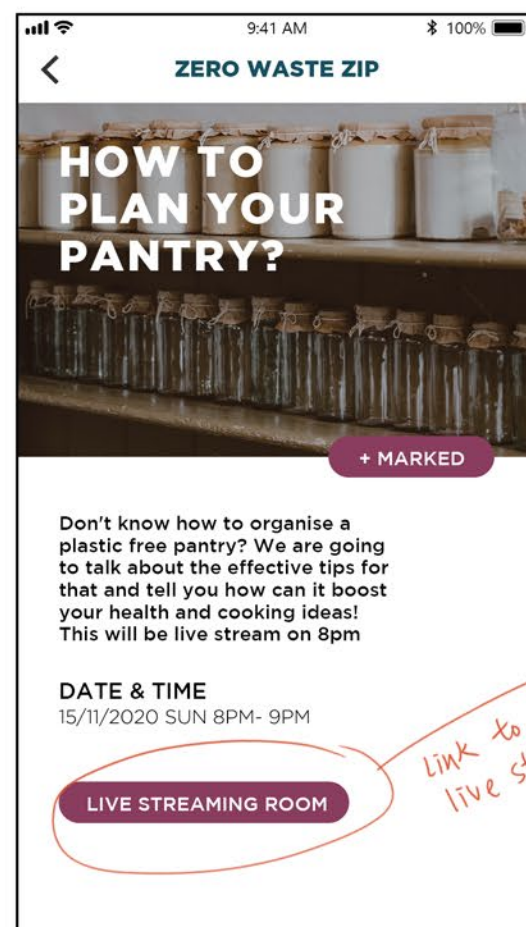## Prototype 2
Live Stream Event Interaction

Those blue lines are linking the live stream event page from the landing page.

Figure 102. Prototype 2 UX & UI analysis: Live stream event interaction in Adobe Xd. Copyright 2018 by Wennie Lun.

Prototype 2
Live Stream Event Interface

exit from the live

Transparency on viewers numbers.

FAST & IMMEDIATE FEEDBACKS
- ask questions & recieve immediate answer
- discuss with other viewers at the same time.

INTERACTION BUTTON

link to the live stream

if users are interested & marked the live event, they will recieve notification as a reminder:
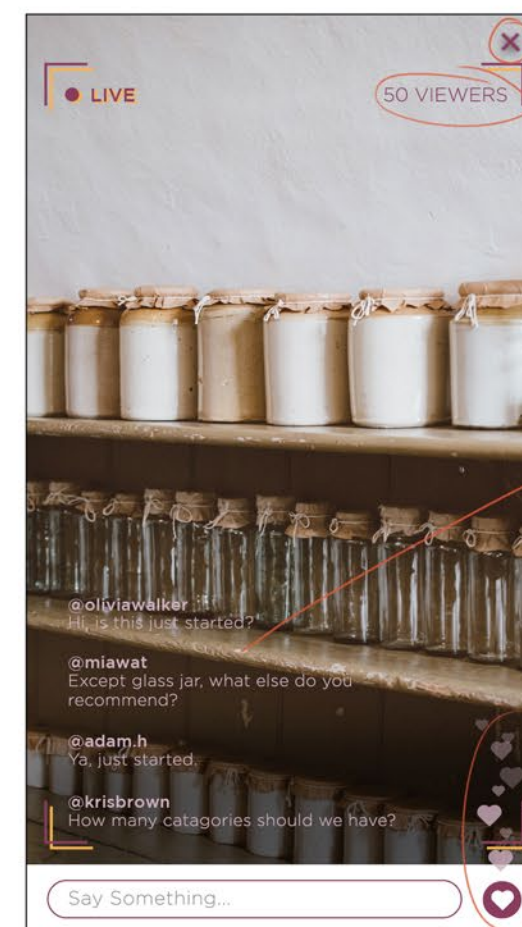10 mins before &
on the time of the event

WAITING SCREEN

This will be showed when user is waiting for the live stream.

① + ② = delightful waiting time

1) Middle of the screen will show
- countdown for the live
- short abstract
- tips of the app

2) Small Animated illustration
- moving leaves or petals
- fading dots
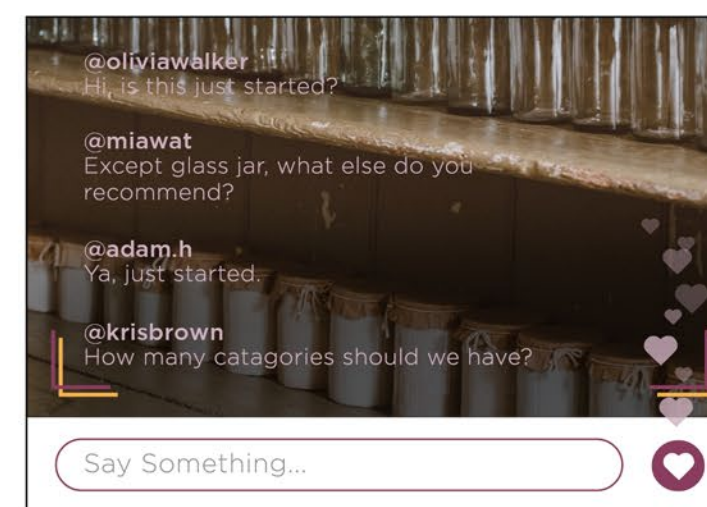
Figure 103. Prototype 2 UX & UI analysis: Live stream event interface. Copyright 2018 by Wennie Lun.

Prototype 2
Point System, Rewards & Leaderbaords
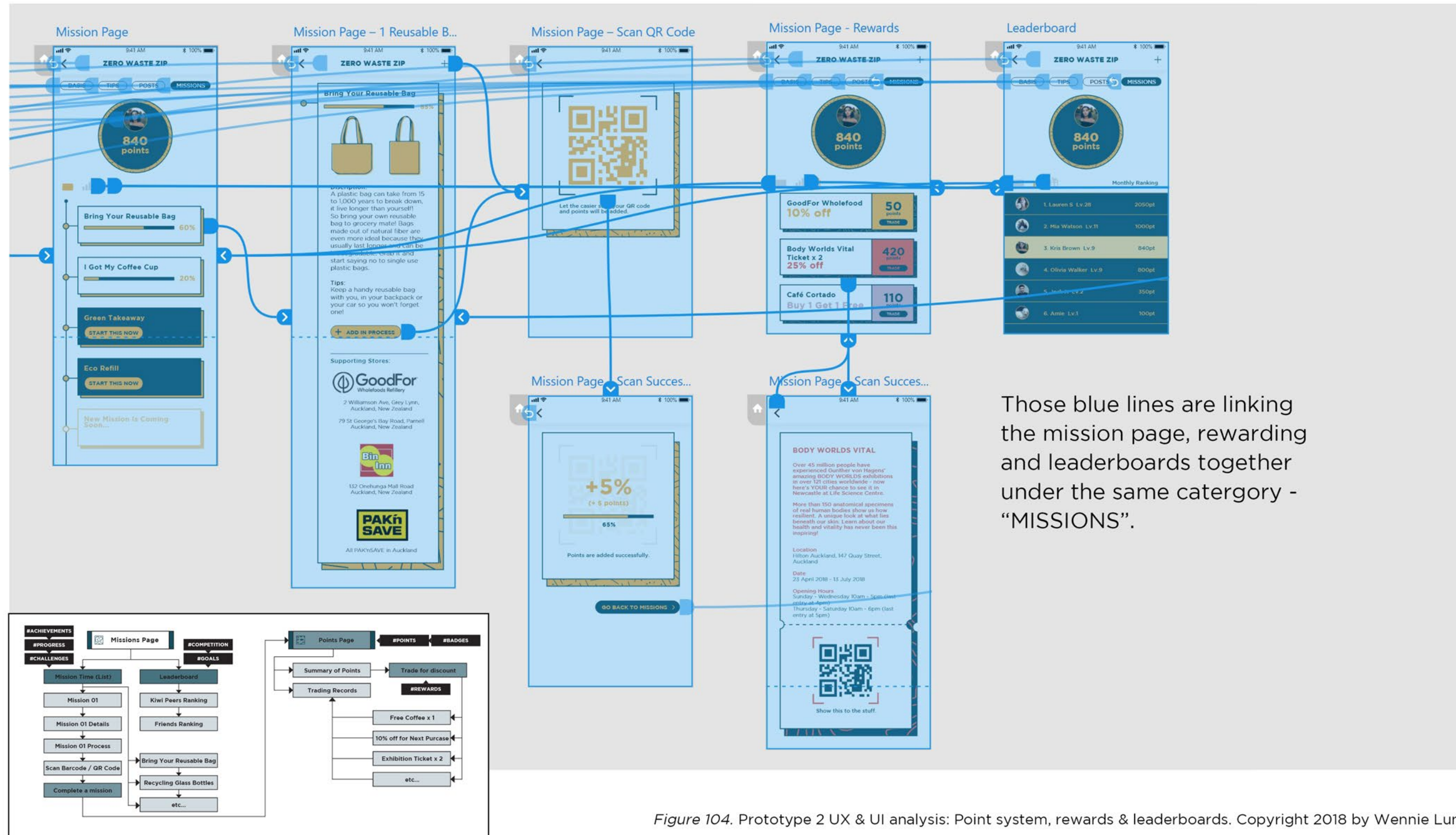

Those blue lines are linking the mission page, rewarding and leaderboards together under the same catergory - "MISSIONS".

Figure 104. Prototype 2 UX & UI analysis: Point system, rewards & leaderboards. Copyright 2018 by Wennie Lun.

Prototype 2
Green Measurements On The Missions Page

click to see the details of the mission

new mission will only appear when the user had complete numbers of other mission.

what is the mission about?

Practice & measure it!

providing the address that will convience users to do the mission.

instruction on how to use the QR code.

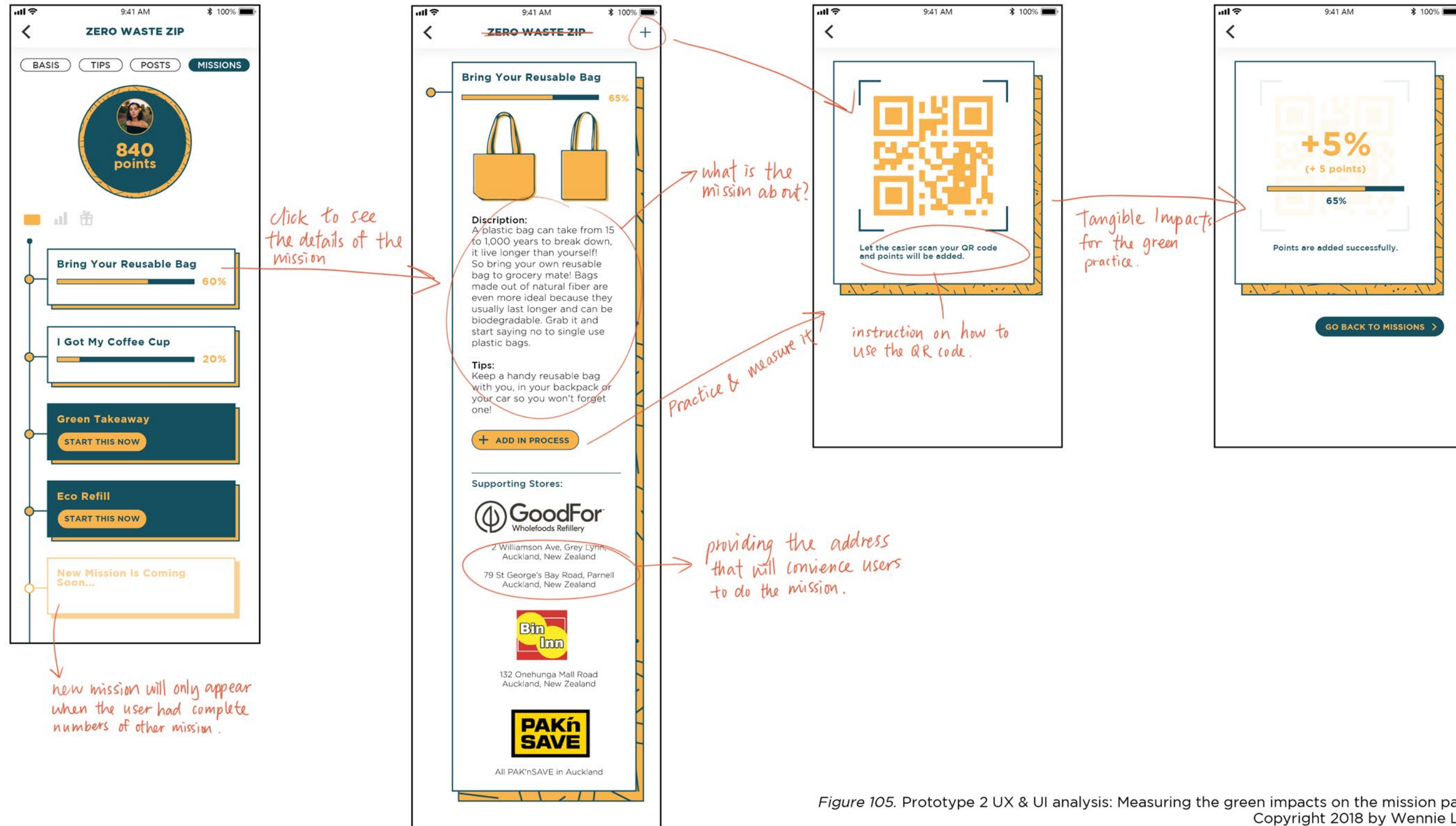Tangible Impacts for the green practice.

Figure 105. Prototype 2 UX & UI analysis: Measuring the green impacts on the mission page.
Copyright 2018 by Wennie Lun.
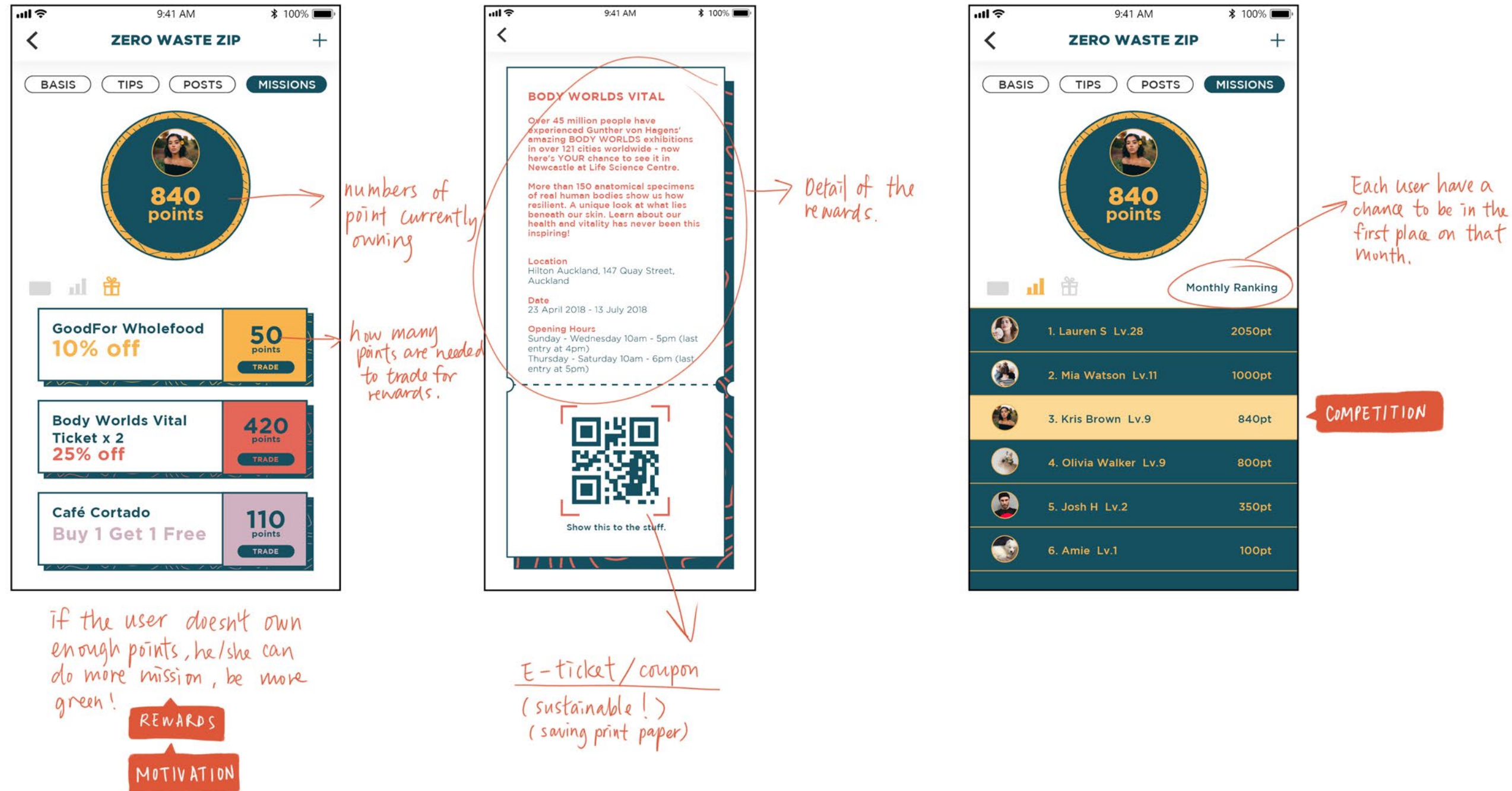
Prototype 2
Rewards & Leaderboards

numbers of point currently owning

how many points are needed to trade for rewards.

Detail of the rewards.

Each user have a chance to be in the first place on that month.

COMPETITION

if the user doesn't own enough points, he/she can do more mission, be more green!

REWARDS

MOTIVATION

E-ticket/coupon
(sustainable!)
(saving print paper)

Figure 106. Prototype 2 UX & UI analysis: Rewards & leaderboards. Copyright 2018 by Wennie Lun.
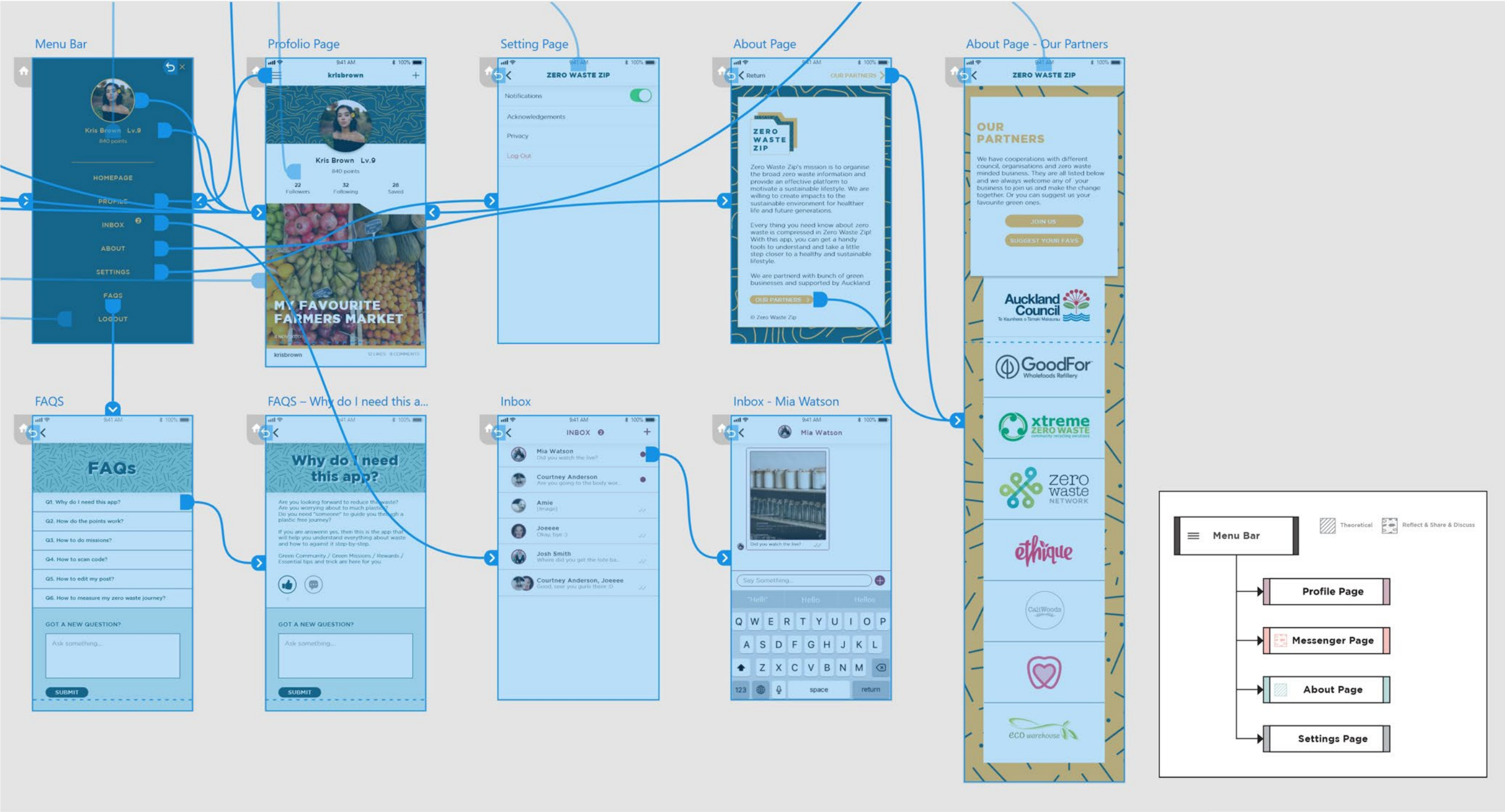
Prototype 2
Menu Bar Interaction

Figure 107. Prototype 2: Menu bar interaction in Adobe Xd. Copyright 2018 by Wennie Lun.
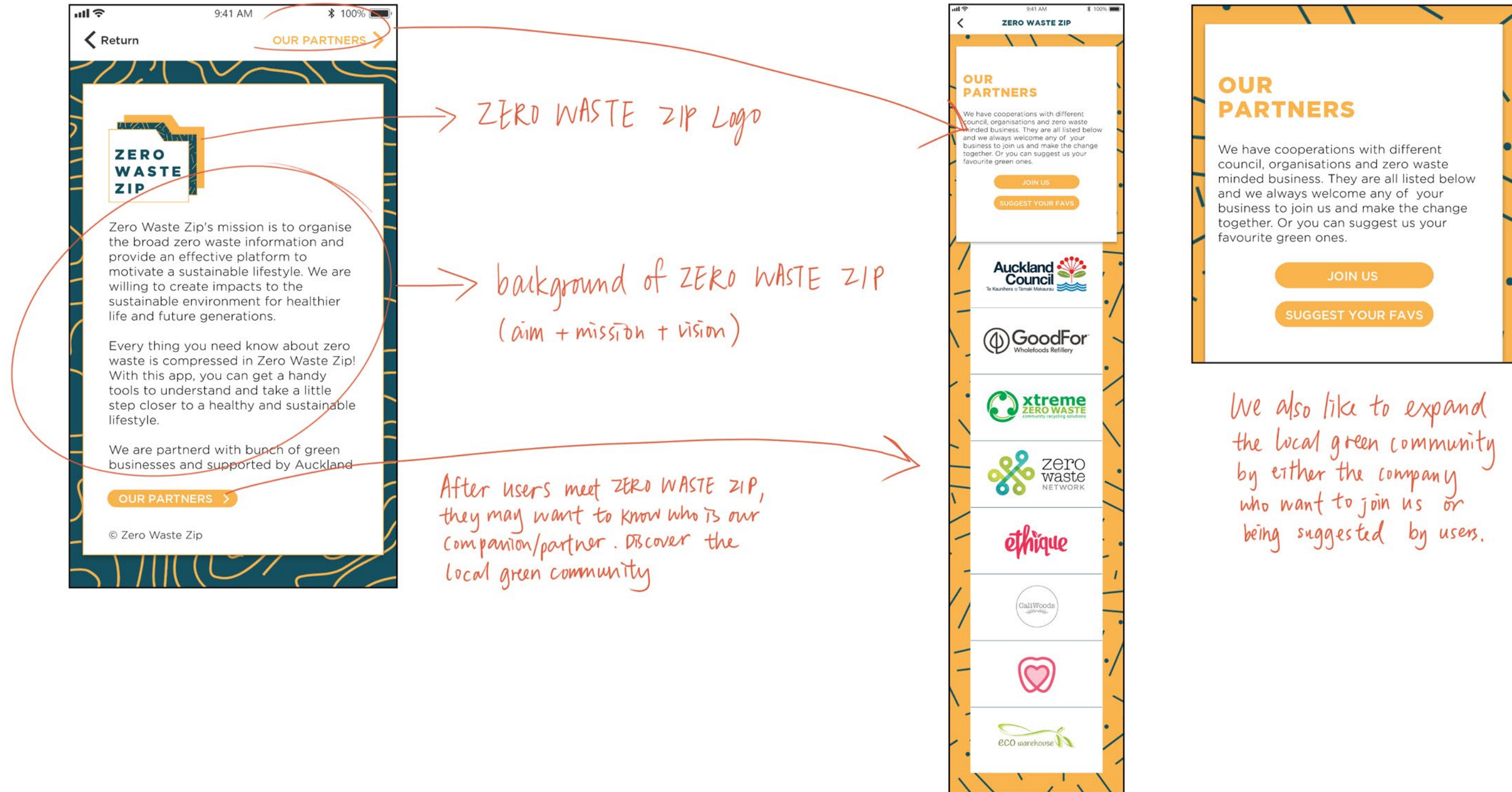
Prototype 2
About Page Interface & Navigation

ZERO WASTE ZIP Logo

background of ZERO WASTE ZIP

(aim + mission + vision)

After users meet ZERO WASTE ZIP, they may want to know who is our companion/partner. Discover the local green community

We also like to expand the local green community by either the company who want to join us or being suggested by users.

Figure 108. Prototype 2 UX & UI analysis: About page interface & navigation. Copyright 2018 by Wennie Lun.
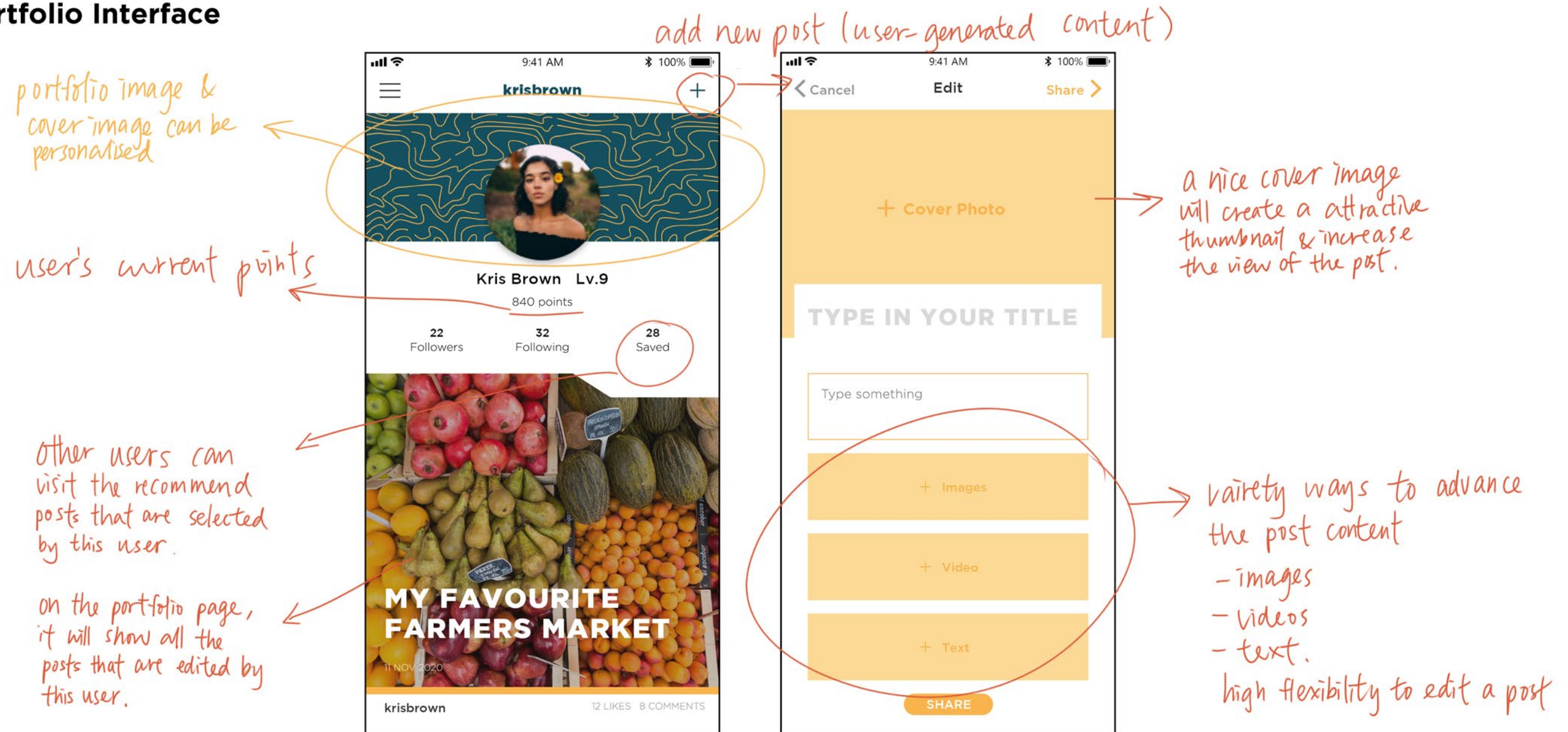
Prototype 2
Portfolio Interface

add new post (user-generated content)

portfolio image & cover image can be personalised

user's current points

Other users can visit the recommend posts that are selected by this user.

on the portfolio page, it will show all the posts that are edited by this user.

a nice cover image will create a attractive thumbnail & increase the view of the post.

vairety ways to advance the post content
- images
- videos
- text.
high flexibility to edit a post

krisbrown

Kris Brown   Lv.9
840 points

| 22 | 32 | 28 |
| Followers | Following | Saved |

MY FAVOURITE FARMERS MARKET

11 NOV 2020

krisbrown   12 LIKES   8 COMMENTS

Cancel   **Edit**   Share

+ Cover Photo

TYPE IN YOUR TITLE

Type something

+ Images

+ Video

+ Text

SHARE

Figure 109. Prototype 2 UX & UI analysis: Portfolio interface. Copyright 2018 by Wennie Lun.
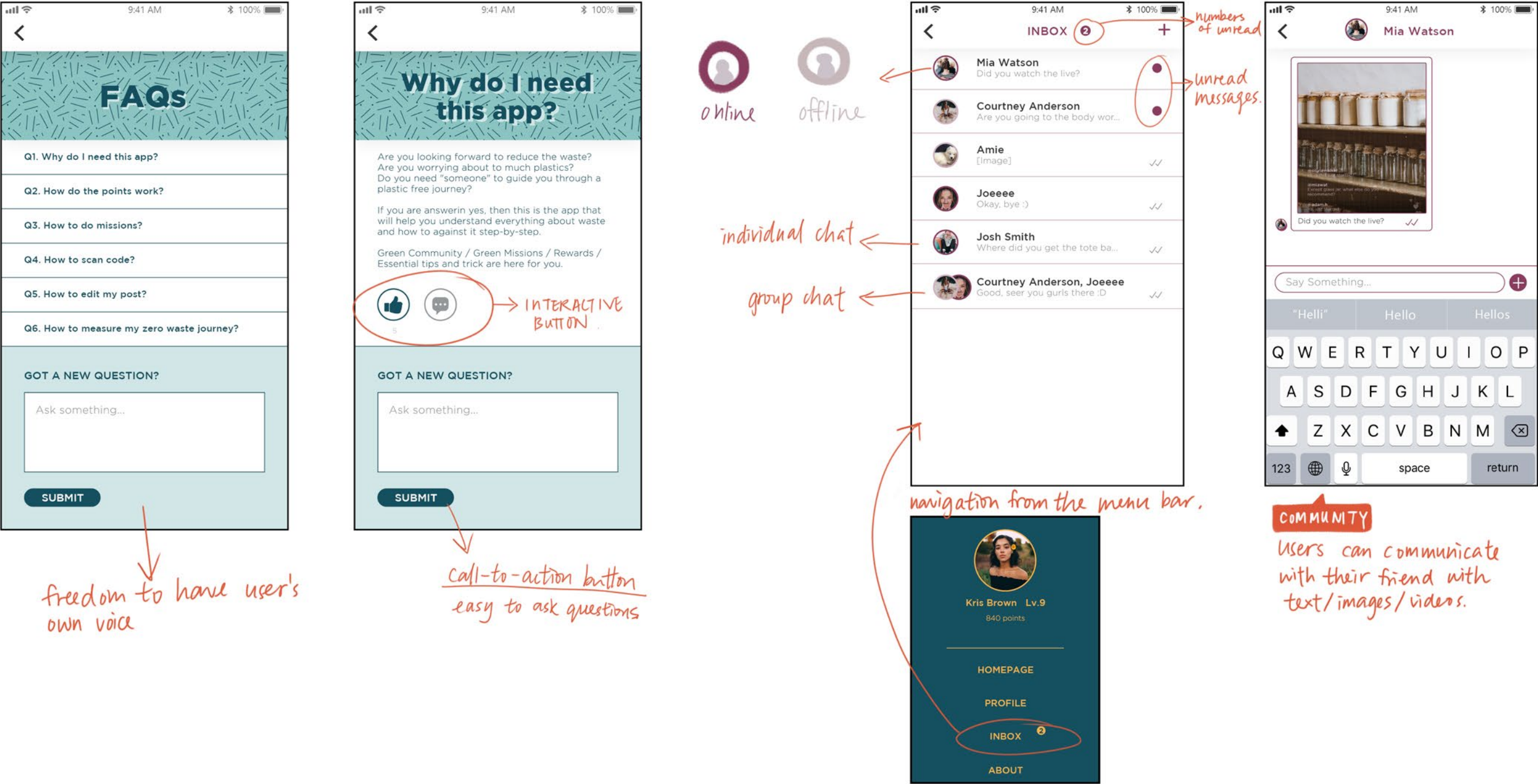
Prototype 2
FAQs & Inbox Interface

FAQs

Q1. Why do I need this app?

Q2. How do the points work?

Q3. How to do missions?

Q4. How to scan code?

Q5. How to edit my post?

Q6. How to measure my zero waste journey?

GOT A NEW QUESTION?

Ask something...

SUBMIT

freedom to have user's own voice

Why do I need this app?

Are you looking forward to reduce the waste?
Are you worrying about to much plastics?
Do you need "someone" to guide you through a plastic free journey?

If you are answerin yes, then this is the app that will help you understand everything about waste and how to against it step-by-step.

Green Community / Green Missions / Rewards / Essential tips and trick are here for you.

→ INTERACTIVE BUTTON

GOT A NEW QUESTION?

Ask something...

SUBMIT

Call-to-action button easy to ask questions

online offline

numbers of unread

INBOX ❷

Mia Watson
Did you watch the live?

Courtney Anderson
Are you going to the body wor...

unread messages.

Amie
[Image]

Joeeee
Okay, bye :)

individual chat ←

Josh Smith
Where did you get the tote ba...

group chat ←

Courtney Anderson, Joeeee
Good, seer you gurls there :D

navigation from the menu bar.

Kris Brown Lv.9
840 points

HOMEPAGE

PROFILE

INBOX ❷

ABOUT

Mia Watson

Did you watch the live?

Say Something...

"Helli" Hello Hellos

Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
123 space return

COMMUNITY

Users can communicate with their friend with text/images/videos.

Figure 110. Prototype 2 UX & UI analysis: FAQs & inbox interface. Copyright 2018 by Wennie Lun.

7. Discussion

The Zero Waste Zip app is the result of the project showing that human factors could be combined with communication technology based on the zero waste mindset, in order to trigger sustainable behaviour and attitude change permanently. Referring to the research question set at the beginning, an edutaining zero waste app was created to answer that visually. The result was built based on the in-depth analysis of three disciplines: human factors, communication technology and the zero-waste mindset.

The concept reveals that it is possible to design a joyful, lighthearted and valuable app to create positive social and environmental impacts by changing the way we consume and manage waste, and finally embracing a waste-free lifestyle permanently. Gamification is the key ingredient to communicate the zero-waste lifestyle by providing an edutaining experience in one delightful app. It is supported by the expectation of Fogg's behaviour and the four pleasures, which are helpful to identify the arrangement of motivation, ability, triggers and pleasures.

7

The terms green, sustainability and environmentally friendly are declared as one of the core values for vast business products or services, as well as the Zero Waste Zip. A declaration of core values will powerfully present the deep meaning of the app. Zero Waste Zip's values stem from taking the sustainable responsibility to raise awareness regarding our environment, strategically organise the green theory in order to deliver them with innovative technology and to establish a green online community. Apart from the values proposition, the body of the app is unique from other existing design as gamification is adapted to it.

Using the Zero Waste Zip, users can discover useful waste-free hacks shared and discussed between green peers or step-by-step tips organised by the Zero Waste Zip. On the other hand, the app also enables users to start practising those waste-free hacks in real life by following the green missions recommended by the app. A virtual point can be gained by completing missions in different situations. Accrued points can be traded for special discounts or gifts as a reward. Those rewards can motivate people to continue behaving sustainably and increase self-esteem, acting for themselves and thriving in the environment, and, at the same

time, minimising waste that pollutes the environment. While the learning process is conducted online digitally, practising is conducted in real life, and the results are recorded and connected back to the app digitally. A zero waste learning cycle is established within the Zero Waste Zip.

7.1 Behavioural Change Based on the Fogg Behaviour Model and The Four Pleasures

I emphasised changing our mindset to the zero waste theory by not simply telling people what to do, but triggering the change in a joyful, lighthearted and valuable way by adapting edutainment and gamification to the app. Furthermore, these design studies show that designers have the potential to use their creative mindset and tools to solve a serious problem in an innovative way. When designers maintain valuable insights to create upcycling and environmentally friendly outcomes, it is more appreciated and precious that we are taking the responsibility as members of the planet.

Irresponsible consumer behaviour and improper waste management are causing the growth of waste, and this can only be prevented before it occurs by changing human behaviour. Theories like Fogg's behaviour model and the four pleasures are summaries of human factors that influence the entire project. The Zero Waste Zip is gamified to trigger the permanent green behaviour change by organised ability and motivation. Step-by-step waste-free tips empower users with the ability to practice it in real life. Rewarding

points for completing green missions and peer competitions will generally motivate users to continue practising and embracing a zero-waste lifestyle.

While I believe that the content and the experience journey of the app had been well-considered, further work still needs to be done to tune the journey and interactivity of the app for public use. User testing and further modification will help to improve the user experience. The Fogg behaviour model, the four pleasures, interdisciplinary model, edutainment and gamification theory can effectively enhance this kind of sustainable-aimed design. Further exploration will improve it little by little and create a sustainable impact on our environment.

7.2 Gamified App With Zero Waste Mindset

From the exploration, it presented eight game mechanics from the gamification theory which can enhance a zero-waste edutaining app. These are: missions, points, goals, badges, leaderboards, progress, feedbacks and notifications. Gamification was adapted to create a pleasurable zero-waste experience based on the four pleasures expectation. The application interpretation of that was visually indicated in the Zero Waste Zip app, which is a digital tool to inform the green theory and trigger the performance of change based on an enjoyable experience.

Based on communication technology, user-generated content can effectively gather the local green community on the same online platform. The app intends to provide a specific platform where the green community are existing to support each other in all things green. When users are sharing and discussing their green experience, they are inspiring each other and gaining continuous improvement together.

On the other hand, the missions, points, rewards and leaderboards are included in the app which can lead to motivation and encourage a continuous green practice among users. Missions are recommended based on the 5Rs theory which is easier to follow. Apart from gaining points from the missions, the measurements of the green practice can be explored more to show the particular impacts users had made by. For example how many footprints the user had saved by avoiding plastic straws for a week. The display of the measurement can show the achievements in a pleasurable way that improve the user experience.

8

Conclusion

In conclusion, human factors have majorly influenced the gamified app design of Zero Waste Zip, which aims to trigger permanent green behaviour change based on a zero-waste mindset. The behaviour change means to minimise the amount of waste that is harming our environment and social health. The cross-disciplines between humanities, science and design can be combined for an original design solution for the waste problem.

The Zero Waste Zip is a delightful and valuable app that aims to encourage the shifting to a waste-free lifestyle by consuming sustainably and managing waste appropriately. This design solution is preventing the waste before they generate it. The app allows users to start their zero waste journey effectively and efficiently with three sections: theoretical learning, practising in real life and reflection. From that, gamification is adapted to the process for a challenging and delightful user experience. Firstly, users will learn sustainable tips that are shared by zero-waste peers or

organised by Zero Waste Zip. Then, users can practise it with a list of recommended green missions. Finally, users will be rewarded with points after completing missions, and reflect on it by sharing their experience online with their peers. Furthermore, the behaviour change from that is aligned with the Fogg behaviour and the four pleasures.

The design is still at the early stage, but it has the potential to explore further to improve the user experience that will provide a more pleasurable and functional supports on their waste free journey. We need to continue sustainable exploration to improve waste management or other fields that will end up thriving the planet – our mother nature. Further exploration can dig for more design solutions that align with human factors and technology.

9
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10

10. Exhibition Documentary

Title of Work:
Nurturing A Zero Waste Mindset Through A Gamified App

Materials: Digital Media & Video & Poster
Exhibition Name: Matariki Postgraduate Exhibition 2018
Exhibition Duration: 15 - 21 June 2018

My project was presented to indicate the interaction of the Zero Waste Zip app, showcase the creative thinkings and the insights behind the project. The showcase items includes a Zero Waste Zip app prototype, a poster, a printed project report and a short teaser video (3"45).

Exhibition Setup
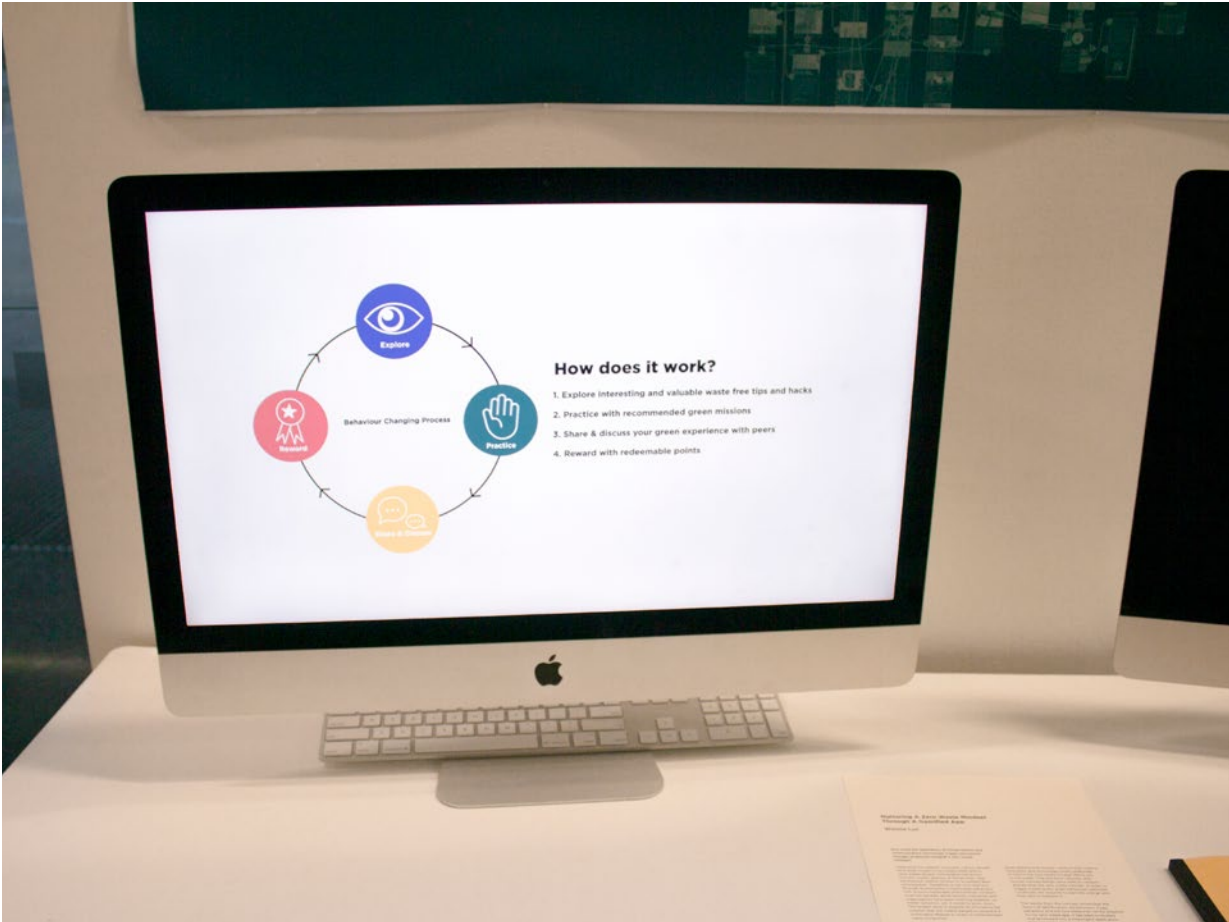
Video Screenshots

The probem starts from us & so does the solution.

The Essential Guide to Zero Waste

Tips and advice from experts and your online green buddies

How does it work?

1. Explore interesting and valuable waste free tips and hacks

2. Practice with recommended green missions

3. Share & discuss your green experience with peers

4. Reward with redeemable points

Explore
Reward
Behaviour Changing Process
Practice
Share & Discuss

3 Catergories Post

Exploring everything about waste free in three catergories.

BASIS   TIPS   POSTS
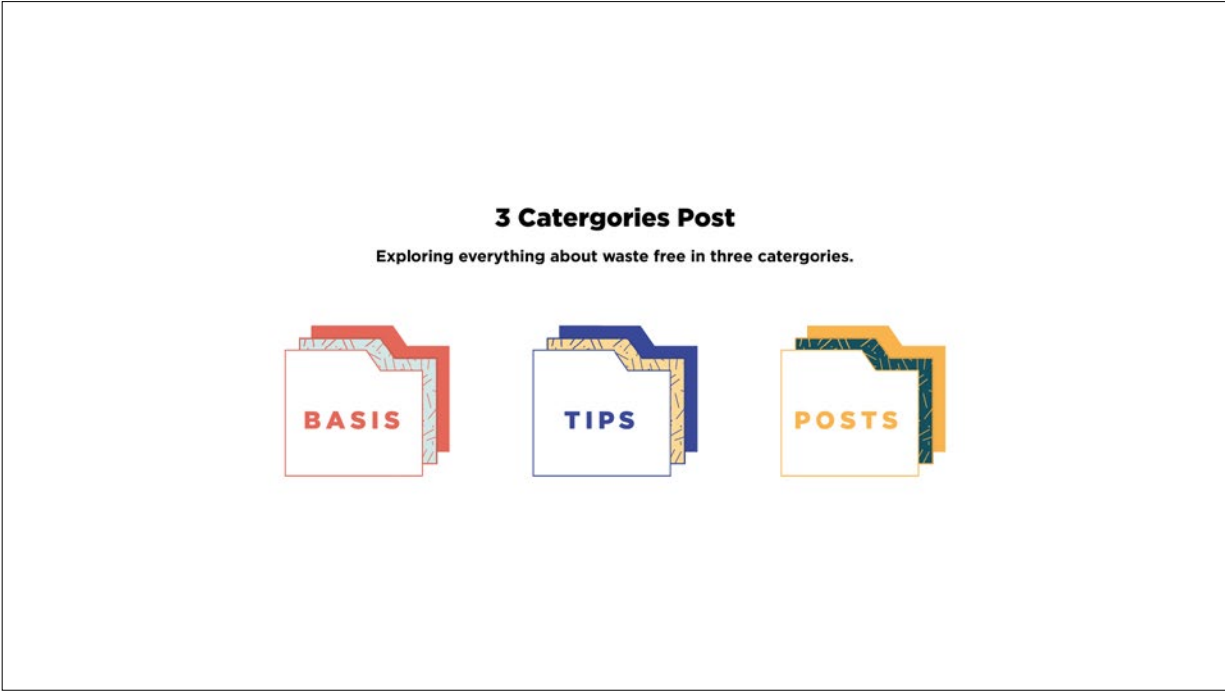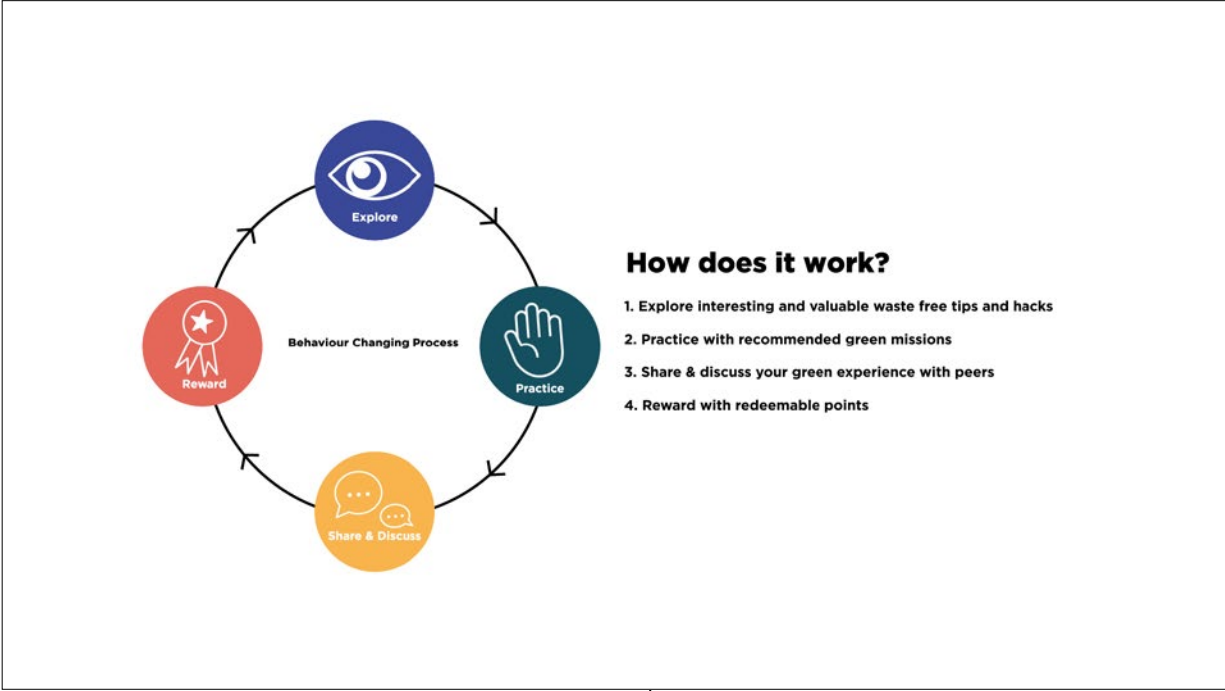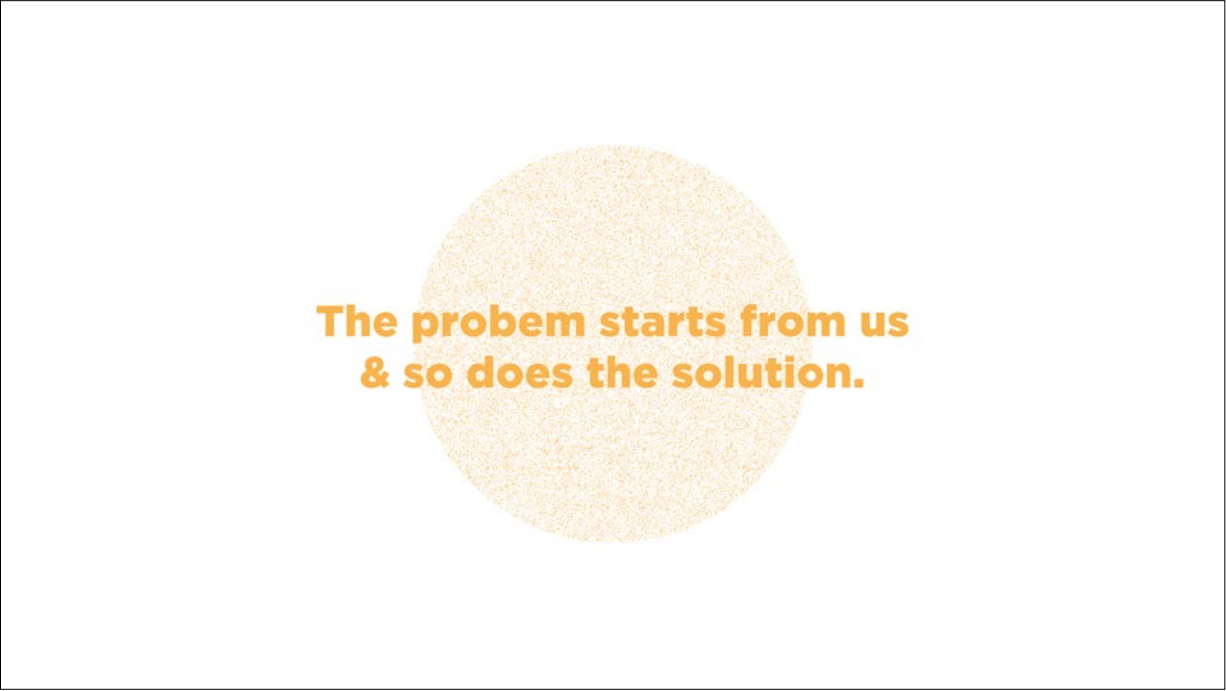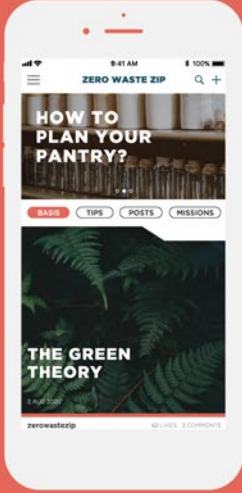
Video Screenshots
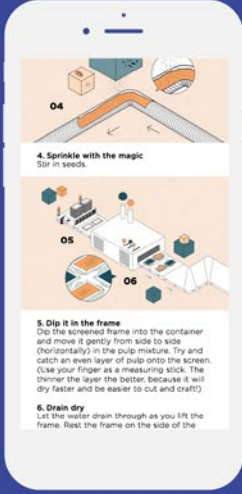
BASIS

Basis information, impacts, green theory and updated news of the general waste problem.

TIPS

Special tips analysed by Zero Waste Zip. Step-by-step guides, festival editions, pictures and videos.

Stepp-by-step guide with video & image

POSTS
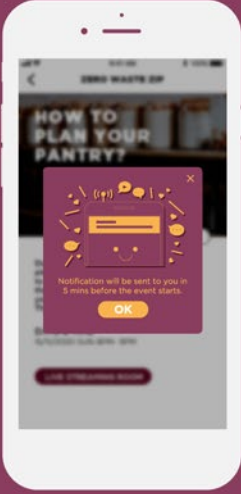
Learn From Your Peers

Users shared hacks and experiences based on their own zero waste journey. You can interact or discuss the post with others online zero waste peers.

Discover how others turn zero waste into a healthy and joyful lifestyle

EVENTS

Live Streams

Watch live streams of zero waste talks and workshops speaked by inspiring experts.

Learn and discuss with other users.

Watch talks and workshops online anywhere and anytime

EVENTS

Live Streams

Watch live streams of zero waste talks and workshops speaked by inspiring experts.

Learn and discuss with other users.

Ask questions & get feedbacks immediately

MISSIONS

Range of green missions designed for you to practice what you learnt from tips and posts. Milestones to track your green journey.

Green missions selected just for you

MISSIONS

Range of green missions designed for you to practice what you learnt from tips and posts. Milestones to track your green journey.
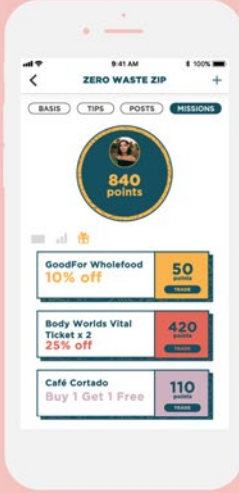
MISSIONS

Range of green missions designed for you to practice what you learnt from tips and posts. Milestones to track your green journey.

Track your process & visualise your impacts

Video Screenshots

MISSIONS

Rewards

After you complete a mission, you get reward with redeem points.

Create impacts and get reward

MISSIONS

Rewards
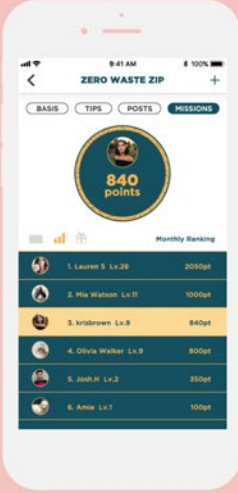
After you complete a mission, you get reward with redeem points.

Redeem your green impacts for coupon or valuable experience

MISSIONS

Leaderboards

Ranking boards will allow users to visualise their results among other green peers.

Competitions will stimulate continuous green practices and improvements.

Compete with your peers & stay motivate

Monthly Ranking

Simple Post

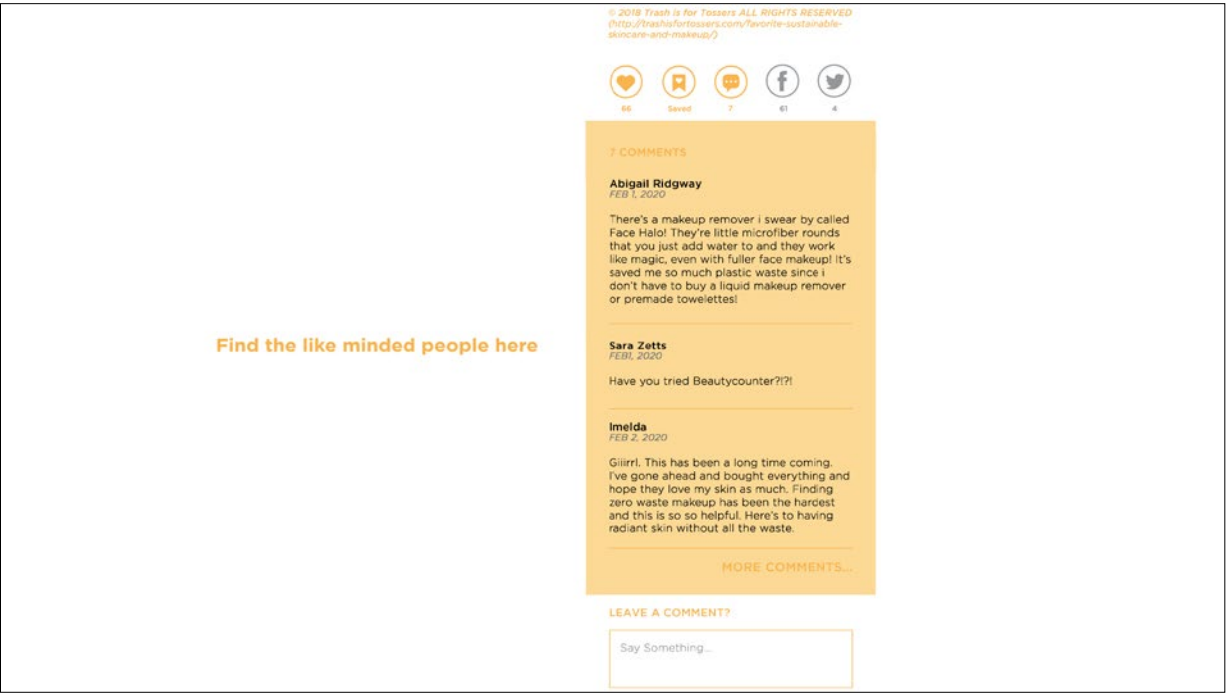Flexible posting features to share your experience

Short Post

Long Post

ZERO WASTE SKIN CARE & MAKEUP ROUTINE

7 COMMENTS

Abigail Ridgway
FEB 1, 2020

There's a makeup remover i swear by called
Face Halo! They're little microfiber rounds
that you just add water to and they work
like magic, even with fuller face makeup! It's
saved me so much plastic waste since i
don't have to buy a liquid makeup remover
or premade towelettes!

Sara Zetts
FEB1, 2020

Have you tried Beautycounter?!?!

Imelda
FEB 2, 2020

Giiirrl. This has been a long time coming.
I've gone ahead and bought everything and
hope they love my skin as much. Finding
zero waste makeup has been the hardest
and this is so so helpful. Here's to having
radiant skin without all the waste.

MORE COMMENTS...

LEAVE A COMMENT?

Say Something...

Find the like minded people here

**Discover how little changes can make
your life and the world differenent**
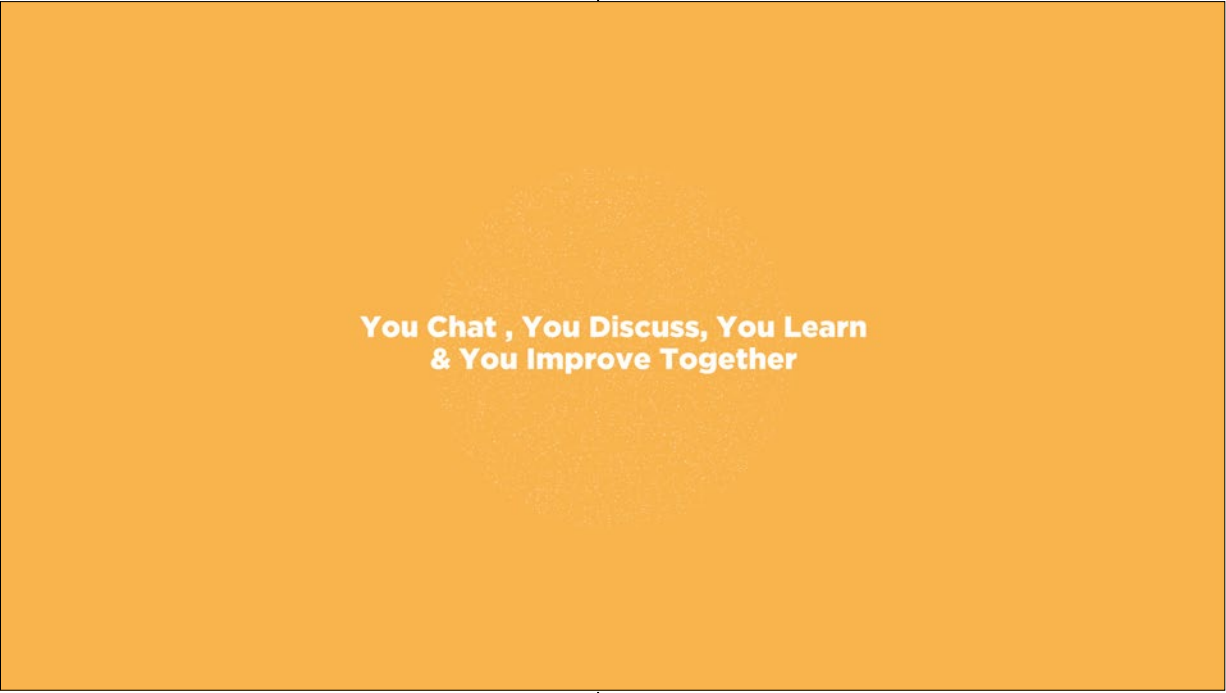
**You Chat , You Discuss, You Learn
& You Improve Together**