



7015AAD - DESIGN MANAGEMENT FINAL PROJECT

**IMPROVE RECYCLING RATES  
IN THE UK BY CHANGING HUMAN  
INTENTION AND BEHAVIOUR**

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# CONTENTS

<b>A. EXECUTIVE SUMMARY</b>	01	<b>2. RECYCLE APP</b>	28
<b>B. INTRODUCTION</b>	03	<b>III. CONCEPT SOLUTIONS</b>	29
<b>C. RESEARCH</b>	05	<b>1. SMART BIN</b>	29
<b>I. PRIMARY RESEARCH ANALYSIS - FOCUS GROUP FINDINGS</b>	05	<b>2. RECYCLE APP</b>	31
<b>II. CASE STUDIES OF RIS</b>	10	<b>IV. PRIMARY RESEARCH ANALYSIS - USABILITY TESTING FINDINGS</b>	35
<b>III. BENCHMARKING</b>	11	<b>V. HOW THE SOLUTIONS FIT THE USER PERSONAS?</b>	37
<b>1. EXISTING BINS</b>	11	<b>1. SMART BIN</b>	37
<b>2. EXISTING RECYCLING APPS</b>	14	<b>2. RECYCLE APP</b>	38
<b>IV. COMPARISON OF 2 LOCAL COUNCILS IN RECYCLING</b>	16	<b>VI. HOW THE SOLUTIONS IMPACT ON TPB THEORY?</b>	39
<b>V. INFLUENCE OF COLOUR</b>	18	<b>VII. CUSTOMER JOURNEY MAP – FIRST TIME USER</b>	40
<b>VI. GREEN ENERGY</b>	19	<b>1. SMART BIN</b>	40
<b>VII. USER PERSONAS</b>	20	<b>2. RECYCLE APP</b>	42
<b>VIII. SCENARIO MAP</b>	23	<b>VIII. MARKETING STRATEGY</b>	43
<b>1. PUBLIC</b>	23	<b>X. RACI MATRIX</b>	45
<b>2. HOUSEHOLD</b>	24	<b>XI. GANTT CHART</b>	47
<b>IX. TARGET COUNCILS &amp; GOALS OF SUCCESS</b>	25	<b>IX. SWOT ANALYSIS</b>	49
<b>D. DEVELOP &amp; DELIVER</b>	26	<b>E. CONCLUSION &amp; LIMITATIONS</b>	50
<b>I. BRANDING</b>	26	<b>F. FURTHER DEVELOPMENT</b>	50
<b>II. DESIGN SPECIFICATIONS</b>	27	<b>G. REFERENCES</b>	51
<b>1. SMART BIN</b>	27	<b>H. APPENDIX</b>	55

## LIST OF FIGURES

<b>Figure 1</b> - Illustration of the double diamond diagram _____	04
<b>Figure 2</b> - Comparison recycling websites of 2 English council having the best and worst recycling rates _____	16
<b>Figure 3</b> - Percentages of recognisable colours to recycling bins _____	18
<b>Figure 4</b> - How solar panel works? _____	19
<b>Figure 5</b> - Imogen's persona - Involuntary Non-Recycler _____	20
<b>Figure 6</b> - Craig's persona - Uncommitted Non-Recycler _____	21
<b>Figure 7</b> - Joanne's persona -Uncommitted Recycler _____	22
<b>Figure 8</b> - Public - Craig's scenario map _____	23
<b>Figure 9</b> - Household - Joanne's scenario map _____	24
<b>Figure 10</b> - Rank of English councils with Worst recycling rates _____	25
<b>Figure 11</b> - Recycle On's Branding _____	26
<b>Figure 12</b> - Smart bin's specification _____	27 - 28
<b>Figure 13</b> - Recycling app's specification _____	28
<b>Figure 14</b> - Smart bin with solar panel's design concept _____	29
<b>Figure 15</b> - Recycling app interface for tracking location and main features _____	31
<b>Figure 16</b> - Resigter or Log in to the Recycling app _____	31
<b>Figure 17</b> - Help function _____	31
<b>Figure 18</b> - Scanning items to know what can or cannot be recycled _____	32
<b>Figure 19</b> - Scanning QR codes to collect points _____	32
<b>Figure 20</b> - Recycling tracker function _____	33 - 34
<b>Figure 21</b> - Points/ Rewards feature - exchange vouchers and track ranking _____	33 -34
<b>Figure 22</b> - Pick-up Day feature _____	34
<b>Figure 23</b> - TBD for Recycling intention and behaviour _____	39
<b>Figure 24</b> - Customer journey map for Smart bin - Bin is not full _____	40
<b>Figure 25</b> - Customer journey map for Smart bin - Bin is full _____	41
<b>Figure 26</b> - Recycling app's customer journey map _____	42
<b>Figure 27</b> - Reach of social media used in the UK 2020 _____	43
<b>Figure 28</b> - Percentage of British pay attention to ads on traditional media in July 2021 _____	44
<b>Figure 29</b> - RACI matrix for RIS's development _____	45 - 46
<b>Figure 30</b> - Gantt chart for RIS's development _____	47 - 48
<b>Figure 31</b> - SWOT analysis for RIS _____	49

# A. EXECUTIVE SUMMARY

## ● OVERVIEW

This report is about designing a new national Recycling Incentive Scheme (RIS) in the UK. It aims to improve the British population's recycling rates by changing human intentions and behaviours around recycling.

## ● PROBLEMS

Like most advanced western economies, the UK generated a large volume of waste. Of this about 2.4 million tonnes of packaging waste is produced every year (GOV.UK, 2019). The UK government has devolved the control of recycling to local councils. They make all the contractual decisions about what is and what is not recycled. They have autonomy and they can choose what to collect and how to collect it. This has meant that there is no uniform policy around the country. Different councils operate in many different ways, this leads to major variations in levels of recycling (Nimble Fins, 2020).

Additionally, there are 39 complex rules or regulations laid down by central government for what can be put in plastic recycling collections (BBC, 2018). These rules are such that up to 27% of people are mystified as to what plastics are accepted for recycling in their areas (Statista, 2020). The most common reason cited for not recycling is confusion over what can be recycled with some people thinking that only plastic bottles can be recycled when actually in most cases all plastic packaging can be recycled (Packaging News, 2017).

## ● METHODOLOGIES

This report uses secondary and primary research. Secondary research will be used to collect quantitative and qualitative data in order to look at existing known knowledge (Johnston, 2014; Creswell, 2014). Then it should be possible to find out what is not known about recycling.

Primary research will be used to collect data about current consumer issues in relation to this report. The ethical implication for this primary research has been approved by Coventry University.

## ● THEORIES AND MODELS

This report utilises two theories. Firstly, the Theory of Planned Behaviour (TPB), which is a widely used theory used in research into recycling intentions and behaviour (Wan et al., 2017). Nudge theory is about the subtle influencing of human behaviour. It is an effect that causes a small change in behaviour and choice that then has a much larger impact and benefit for people (Thaler and Sunstein, 2008, Flygansvær et al., 2021).

Double Diamond model has been used as a structure to develop the report. It also considers a Recycling characters model (Johansson, 2016) that identifies 4 different types of recyclers, Committed recyclers, Uncommitted non-recyclers, Involuntary non-recyclers and Uncommitted recyclers.

## ● SOLUTIONS

The aim of the new RIS is to try to make consumers in the UK become much more Committed recyclers. In reach that goal, there are two solutions, the first of which directly targets the public and a second one aimed at people in their homes.

- **Public** - Smart bins which have a built-in mechanism that allows users to where scan their item waste, if the item can be identified as being able to be recycled in that area, the recycling element of the bin will open and accept it. If not, the non-recycling part of the bin will open and take the waste. After consumers have put the recyclable items in, the bin will generate a QR code that consumers can scan with their new recycling app. The code will help users keep track of their recycling footprints and give them reward points each time they recycle.

- **Households** - Users can use the recycling app based on their locations to show which kind of materials that can be recycled in their areas. It also provides a scanning feature that can scan their packaging and show them what kinds of materials they have in their house and which can or cannot be recycled. The app can also give them a pickup time; depending on how much they recycle; they will receive points from their councils to their apps.

Points can be exchanged for various vouchers or offers such as restaurants, coffee shop, gyms or car park credit.

## ● KEY TO SUCCESS

The target organisations will be the five local authorities with lowest levels of recycling within England, these are Wandsworth in London, Birmingham City, Westminster City in London, Barrow-in-Furness in Cumbria and Newham also in London (Nimble Fins, 2020). The goal is to try to at least double their shockingly low recycling rates.

## ● VALUE

Value of this new RIS is that not only does it make recycling easier, but also motivates people to recycle by nudging their recycling intentions and behaviours. This then will possibly impact on increasing recycling rates throughout England and the UK as a whole.

# B. INTRODUCTION

This report is the second part of research report (7037). Initially, the aim was focused on plastic, but during the research process, the aim has expanded to look at all recyclable materials. Therefore, the Research Question for this project has changed to a boarder question: **“HOW CAN DESIGN MANAGEMENT IMPROVE RECYCLING RATES IN THE UK?”**.

It will continue to use the Double Diamond model<sup>1</sup> shown in the Figure 1, which the second diamond including the Develop and Delivery part as a focus. The author has chosen the Double Diamond to use because it is a simple tool to describe a whole design process from identifying problems to solving them. However, if the project needs more in-depth development, other management tools will be involved such as agile stage gate hybrid methodology.

<sup>1</sup> - **Discover:** Help identify problems faced by consumers in relation to plastic recycling initiatives especially those for plastic packaging.  
- **Define:** Understanding what motivates people’s attitudes about recycling and establish what are their needs in relation to increasing their rates of recycling their discarded plastic packaging.  
- **Develop:** Creating solutions that can encourage the recycling of plastic packaging by making a prototype that is simple to use and understand.  
- **Deliver:** Completing an outcome that improve recycling rates of plastic packaging and is a simple, easy, convenient and is less confusing for consumers.

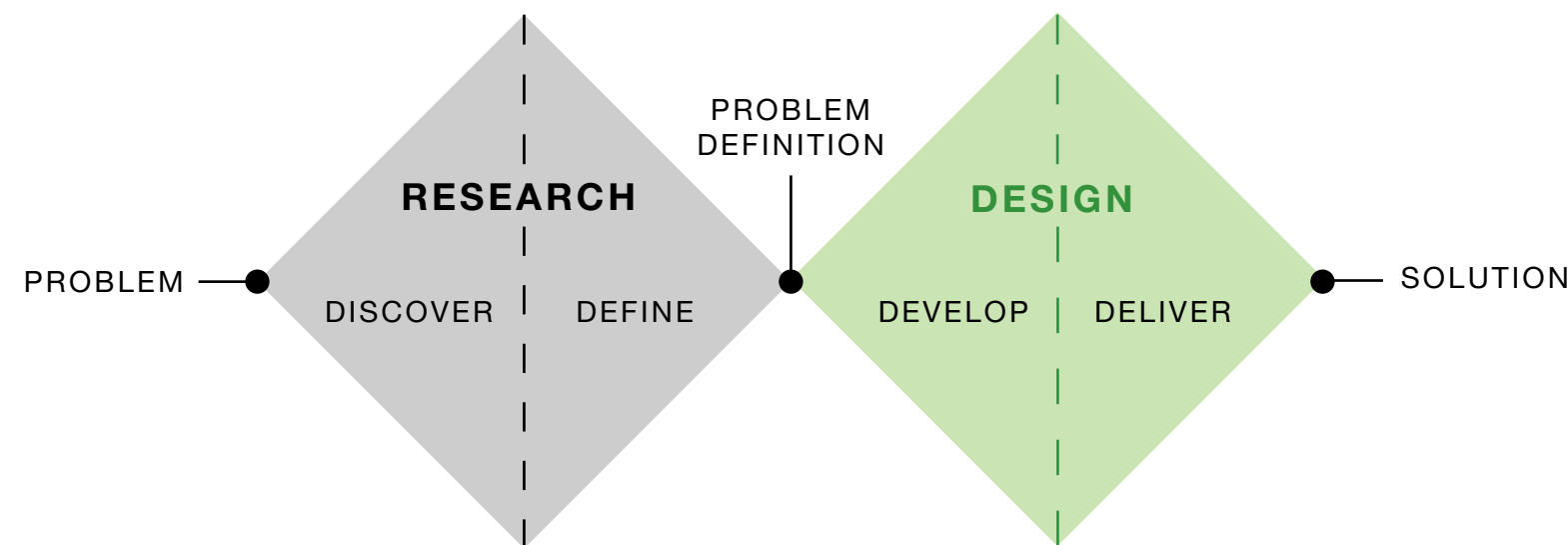


Figure 1: Illustration of the Double Diamond diagram

Source: Wikipedia, 2021

The report uses User-Centred Design as a framework. It includes a variety of primary research methods (Xue et al., 2019), in which a focus group and usability testing have been used to gather in-depth information in order to create the best solutions for users in this project.

According to the literature review and research from the previous report the new RIS will have 2 solutions which are a smart bin and a recycling app both of which will be designed and developed in this report. It will use some management tools including user personas, alongside several methodologies for market research such as benchmarking. Also, scenario maps and user journey maps to identify any problems that user personas may face; and understand customer’s motivations, needs, resistances, hesitations, and concerns when using the solutions respectively. SWOT analysis will be used to evaluate the final solutions. RACI matrix also will be utilised for assigning roles and who will be responsible for each task during the project. Gantt Chart will be considered for scheduling and supporting the project.

## C. RESEARCH

To get more in-depth qualitative data about real-time consumer experiences and needs for this project, primary research has been used including a focus group and usability testing. In this Research session, there are findings from the focus group. The findings for usability testing will be analysed in the Develop & Deliver section.

### I. PRIMARY RESEARCH ANALYSIS - FOCUS GROUP FINDINGS

The focus group was run online because it was easy to gather people from different regions of the UK. It had 4 participants who are living in different areas in the UK, 2 in Worcester, 1 in Birmingham and 1 in London. The author lives in Birmingham and commutes to Coventry to attend university. This led to quite broad discussions about recycling systems in these places. They are all young people who are Millennial generation. The reason for selecting young people is because it is far easier for the author to get them to attend and also, they stand for the group that has more of a stake in the future health and wellbeing of the planet. However, this is also a limitation with this project in that it largely focuses on getting in-depth information from one demographic who tend to already be better at using technology than other generations. This then could have an impact on the RIS application which is going to be for all citizens in the UK, although it must be noted that there is an ever-growing use of technology by older generations for things such as online shopping, so in the future when the RIS project is more advanced there will be an even larger number of technology users.

Additionally, these participants are from different nations with 1 American, 1 British, 1 Taiwanese and 1 Chinese, also the author is Vietnamese. Therefore, they have had quite different experiences about plastic recycling around the world. Additionally, 1 used to be an exchange student in Korea so has additional recycling experiences.

#### ● STORY TELLING

Firstly, a story telling technique has been used to get information from participants about their experiences around recycling in the UK and their home countries. Also, to provide some ideas for improvements. There are some main themes around their own recycling experiences.

##### ○ Attitude in the UK

People sometimes are reticent to check what can and cannot be recycled, so they tend to put everything in the general bin which saves them time. Clearly this behaviour is detrimental to the environment and also impacts on recycling rates.

##### ○ General Challenges and Problems in the UK

Many of the UK's modern apartments or complex buildings do not have recycling or green bins. Some apartments have some different recycling bins, but people still put everything in the normal bin not the recycling bins because they are confused about what can be recycled.

Furthermore, some businesses do not have separate recycling bins, an example being Starbucks. Public areas like parks or streets tend to have more recycling bins. Some recycling bins have pictures to tell users what can be recycled, which is helpful but sometimes still confusing. Plastic packaging often has a number on it to show if can be recycled, but users often do not know the difference between them because of confusing labels. Additionally, there are mixed recycling bins which consumers put all recyclable materials in one bin. One participant thinks that it is not very good, because consumers may actually have doubts that items will be separated later. However, putting everything in one bin saves time for consumers. 3 people state that there is a need to have more bins in public places especially recycling bins.

Many companies have marketing campaigns about reduce, reuse and recycle. For example, Tesco has stopped issuing single-use plastic bags and started only issuing bags for life. However, people tend to buy more bags for life and that in itself can become another issue.

### ○ Motivation

Some cities in the UK are trying to make recycling easier and more fun with new innovations such as bins that make some noises, or open without hand touching using a foot peddle, in order to make people recycle more.

Some companies have shown how recycling is positive. For example, Adidas have used recycled plastic to make their shoes. This raises consumers awareness about recycling plastic and potentially encourages them to recycle more.

### ○ Ideas from other places

In the USA, there is also a functioning deposit return scheme for soft drink cans and bottle caps in some states or from companies that want to become greener.

Some universities in Korea teach students how to recycle properly for a week. They have different recycling bins for example plastic and glass. After that if students do not recycle or do it wrong, they will lose marks.

Some cities in China have many different rules for recycling and provide many different bins for it. They also have a deposit return scheme such as for yogurt packages.

Most cities in Taiwan provide 6 different bins such as general waste, glass, plastic, metal and paper. Also, everyone has been educated about recycling at schools or universities, so they have strong awareness about it. They also have a deposit return scheme for glass bottles.

In Vietnam, they have a system where consumers collect and clean used plastic containers and other kinds of recyclable materials such as paper or aluminium cans. Then contact a local collector who will come to check and weigh or count the recyclable items and pay a small sum of money for them. That benefit encourages people to recycle more even though they do not have recycling bins at home.

### ○ Other points

Having a unified general policy in relation to recycling for the whole country will make it much easier for consumers. Like the NHS, which is a single unified organisation, having recycling nationally organised will make it easier to understand recycling.

Convenience for recycling is obviously very important especially for some people may want to recycle because of financial rewards, but for some people these things are not essential to them and if it is inconvenient, they will not do it. One participant even said that “I AM ONLY GOING TO DO IT BECAUSE IT IS CONVENIENT OR IF IT IS A BIG ENOUGH REWARD, THEN I WILL DO IT.”

One person said, “PEOPLE TEND TO PREFER CARROTS THAN STICKS, SO HAVING A RIS COULD BE BETTER THAN THE DRS”. He also thinks that the DRS is a bit unfair because some consumers do not want to buy food wrapped in plastic or in plastic boxes, but companies do not provide other options for them to choose, so they have to buy food inside plastic packaging. Then, they have to pay a deposit for something that they cannot control.

### ● CO-DESIGN

Co-design method was the next activity which the author gave all participants about 10 to 15 mins to write/draw or think about solutions or ideas.

All of them had the same idea about using QR codes and they all felt that there needs to be more bins in public. They all think that marketing is the most important way to boost people’s intentions around recycling. 3 people had ideas about rewards, particularly, one had an idea about a recycling game app to educate people about recycling which users also can gain points or rewards from the game. One person had another idea about educating younger people by a comic book with some recycling heroes. The participant’s ideas are all quite interesting and some had similar thoughts to the author’s ideas such as using QR code and having more bins in public.

## ● FEEDBACK FOR INITIAL IDEAS SOLUTIONS

Finally, the author shared initial thoughts of solutions about the smart bin and the recycling app to get feedback from the participants.

All of them thought these ideas are good, especially the automatic smart bins, which will make recycling easier and more convenient for consumers. They also like the app, and they think having the rewards and competition are good, but the problem is how to keep people engaged.

Furthermore, one person was also concerned that people might use more plastic to get the rewards. One person had an idea about making the points become digital money like bitcoin so people around the world recycle more because plastic pollution is not an issue for just one country, it is a global problem. This could be a great idea to develop this project further in the future.

**-> These findings strongly showed there is a need for a national and convenient recycling process and the feedback for the initial solutions demonstrated that using the new RIS through the bin and app could change human behaviour around recycling because it is not only simple, but also can give people some benefits through the rewards and competitions.**

**The author has considered some ideas from the storytelling to develop solutions. For example, different bins for different kinds of recyclable materials in Korea, China and Taiwan. Therefore, the smart bin will have a function that automatically separates the recycled materials when the user puts items into the bin. Additionally, an inspiration for the reward's idea of the RIS comes from the financial benefits that the recycling system in Vietnam offers.**

## II. CASE STUDIES OF RIS

There are 2 case study examples for RIS which provides prizes/ rewards to people participating in the program.

### ● HONG KONG

To help the resident population to use community recycling facilities, GREEN\$ (Greeny Coins) smart cards have been introduced by the Hong Kong government's Environmental Protection Department (EPD) from November 2020. The public can earn GREEN\$ and exchange them for gift items. The scene is for people to bring in 2 kg or more of recyclables to the new community recycling points and get a GREEN\$ smart card. Each kilogram of recyclables will be awarded with 10 GREEN\$ points. Some recyclables, e.g., plastics and glass bottles will have higher rates of awards. By showing the QR code on the back of GREEN\$ smart card, the public can earn GREEN\$ and redeem them for gift items including groceries, or environmentally friendly products, such as bamboo tissues and recycling bags (EPD, 2021).

**-> These two studies show that RISs have a positive impact on reducing waste and improving recycling rates. Also, apparent is that local authorities in the UK are not working together.**

**The government should create and introduce a new national RIS in the UK similar to the plastic bag levy and DRS. These initiatives should in some way be centralised to maximise the benefits that clearly are there.**

### ● ENGLAND

Bracknell Forest Council in England manage the waste of 118,000 people. Due to a very low recycling rate, they decided to start a pilot, self-funded incentive scheme in order to increase people's participation in the recycling service and to lower the rate of recyclable materials in residual fractions (Plastic smart cities & WWF, 2021). Citizens can opt out with no obligation to join the reward system. Every citizen opting-in is given an "E+ card" which 200 points gotten per pickup of these specified bins collected (Bracknell Forest Council, 2021). No direct cash value is given to the users, but a maximum total value of £26 in credits (points) per year is awarded which can be exchanged for offers in council owned leisure facilities such as swimming pools and gyms (Plastic smart cities & WWF, 2021).

The implementation was deemed to be a success by the council, as the amount of residual waste was reduced by 1,000 tonnes, saving the council £90,000 between April 2013 and July 2014 (Plastic smart cities & WWF, 2021).



### III. BENCHMARKING

Benchmarking analysis is a specific type of market research that compares existing services or products. This technique helps organisations or companies gauge what is the best performance that can be achieved or know what potentially missing products in the market are. This is all done in order to make changes that create the best solutions (Downs, 2018).

#### 1. EXISTING BINS

##### ● Public bins in the UK

###### ○ Birmingham



Most bins in Birmingham just have 1 part for rubbish and do not have a recycling part. This partly can be blamed for Birmingham City having one of the top five least-efficient recycling rates.

###### ○ London



Similarly, London too has a significant number of bins that have just 1 part. However, there are still some bins do have a recycling element.

###### ○ Coventry



Coventry has many different designs of bins. Most of their bins have recycling parts. It is particularly noticeable that bins in and around Coventry university focus on recycling. They are operated by the university rather than the local authority. These bins all have pictures on them indicating which things can be put in. Some bins also have pedals to open them.

###### ○ Worcester



Different to bins in Coventry and London, Worcester tends to put 2 separate bins together, 1 is for litter and the other for recycling. Bins here also have sensors so when the bins are opened, they will make an amusing eating sound. Also, similarly to some Coventry's the bins have pedals as well.

-> A surprising point is that London and Birmingham are big cities in the UK and the efficiency of public bins is poorer than in smaller cities like Coventry and Worcester. Among the 4 cities, just bins in Worcester have sensors.

## ● Smart bins

### ○ Bin-e



Bin-e is an IoT device that sorts out 4 different types of recycled materials including plastic, glass, metal and paper, and then crushes recyclables automatically. It brings together a unique AI-based object recognition, fill level control and data processing system that is controlled through an app to make waste management simple and efficient (Bin-e, 2021).

### ○ Smart City Bin 120



Smart City Bin 120 is a waste compacting bin with a fill-level measurement system, operating on sustainable solar power. It is an automatic urban rubbish container for outdoor use. It comes with a built-in solar panel, with a compactor for crushing the volume of material and it has a fill-level measurement system that uses a smart algorithm (Binology, 2021).

## EVALUATING EXISTING SMART BINS

### ● Function & Technology

Both smart bins are IoT devices with fill level controls and an automatic crushing system. They also connect to an app that controls the bins functions. However, the Bin-e is designed to be smart so it has a function that can sort out different types of materials by an AI object recognition device. They are both suitable for indoor and outdoor use.

### ● Design

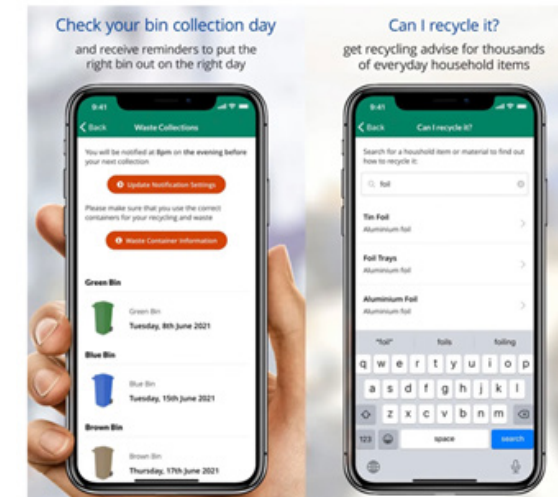
The bin-e is bigger than the smart city bin 120, because it needs more space for different bins inside for the automatic sorting of materials. The bin-e also has an automatic door which will open to collect the items. Additionally, it has a screen that provides more information for users. The smart city bin 120 has a hands-free function which users operate with a foot pedal.

### ● Power

Just only Smart City Bin 120 uses green energy which is solar power, but it also has a backup electric battery power supply. The Bin-e is only electrically powered.

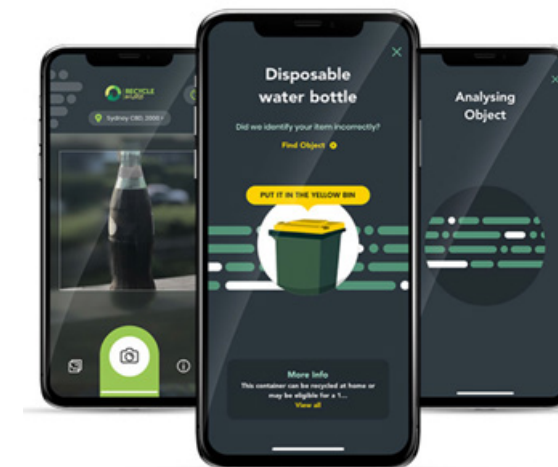
## 2. EXISTING RECYCLING APPS

### ○ East Riding Council app - UK



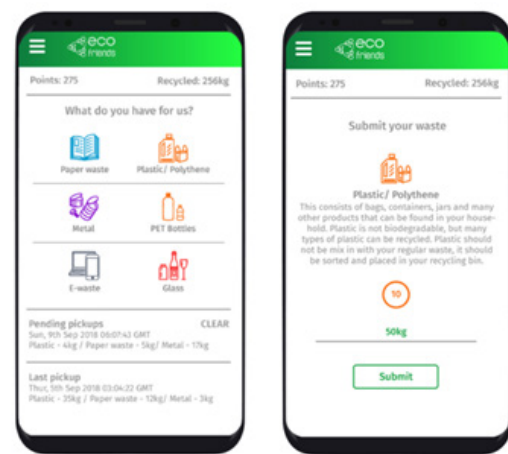
East Riding Council in Yorkshire has England's highest recycling rates (Nimble Fins, 2020) and has released a new app simply called the 'East Riding Council' app. This app allows residents to find a lot of information about the local authority's work especially its bin collection service and waste and recycling. Once a resident has entered their address, they receive information about the days of waste collection, and it sends a reminder telling users to put their bins out ready for collection. The app also includes a new, easy to use function that tells users what bin an item should go in (Duffill, 2021).

### ○ Recycle Mate - New South Wales, Australia



The Recycle Mate is a modern app that uses advanced AI technology to recognise and classify any user's rubbish to reduce levels of recycling contamination. Users point their mobile phone's camera at any object and then they can instantly see which bin it should go in (Dream Walk, 2021).

● **Eco Friends - Sri Lanka**



Eco Friends is another useful app used for household waste recycling in Sri Lanka where homes generate organic, recyclable and even toxic waste. Using the app, users can enter the type and the volume of waste available. After this, Eco Friends will dispatch a vehicle to pick up this waste. Eco points are then awarded to the user for each waste category collected (glass, plastic, paper, E - waste, metal). Every six months, these points can be redeemed against the subscription fee thus reducing their waste collection costs (Biz, 2019).

**EVALUATING EXISTING RECYCLING APPS**

● **Design**

- Colours: All apps use green as a main colour theme. East Riding council app and Eco Friends have white backgrounds while the Recycle Mate interface has a dark background.
- Layout: All apps have quite clear layouts and are easy to understand however they all have quite small writing. Dark background and small writing are generally considered not good for elderly people. According to Hill (2012) oversized text and bright colours are easily recognisable and easy to find in order to help seniors using apps.

● **Function**

Only Recycle Mate has a scanning feature, the other two apps allow users to find more information about what materials or products can be recycled in their houses. These two apps also show users their pick-up day and the Eco friends app even allows users to choose their pickup day. Only Eco friends provides benefits which are points for users after they recycle.

**IV. COMPARISON OF 2 LOCAL COUNCILS IN RECYCLING**

The council with the best recycling rate is East Riding Council in Yorkshire and the worst is Newham in London. (Nimble Fins, 2020). To find out why there is this wide disparity between them, the author compares recycling information from their respective websites.



Figure 2: Comparison recycling websites of 2 English council having the best and worst recycling rates

Source: East Riding, (2021) and Newham London, (2021)

Both websites have very detailed recycling information, but East Riding council tends to have more pictures and videos to explain what can and cannot be recycled (East Riding, 2021). Whereas Newham council just provides a very general written list of recyclable products (Newham London, 2021) which the author thinks this is not good enough for consumers to know what specific products can be recycled. Also only having written information may make people less likely to read.

An interesting point of East Riding's website is has many different activities for supporting recycling such as a Recycling App and Recycling Superheroes (East Riding, 2021). Their recycling app has been evaluated in the benchmarking section, additionally the app was launched in 2021 (Duffill, 2021) after the council had achieved the best recycling rates in 2020 (Nimble Fins, 2020). Therefore, this shows that although they have already achieved the best recycling rates, they have still continued to create more interesting and supportive activities for users in order to maintain their high recycling rates. The Recycling superheroes are a series of activities that encourage children to recycle at home. The aims of this is to make recycling more fun and interesting for children with some fun games and missions (East Riding, 2021).

-> Their websites show that the reasons East Riding council had the best recycling rates are not only because they supply details of supporting information through pictures and video, or because they have created the app to make recycling easier and convenient for users, but critically it is because they think about recycling education for children who in turn have a stronger attitude to recycling when they get older. Attitude is also one of the important factors influencing recycling intentions and behaviours based on the TPB theory.

Although Newham council's website provides quite interesting details about recycling information it is somewhat dull and lacks interactive activities to support recycling. This may lead to a lack of motivation around recycling in that area and may be a reason why it has the worst recycling rate.

## V. INFLUENCE OF GREEN COLOUR

The colour green is often seen as very soothing and is related to balance and harmony. From a colour psychology perspective, it is viewed as the ultimate balancer of human feelings and emotions (Empowered by color, 2018). Green is often associated with nature, as it is usually the colour of grass, plants and trees. It also is a sign of renewal, spring and rebirth. An additional aside is the idiom "getting the green light" which means to go ahead, giving it an association with taking action (Lundberg, 2019).

Furthermore, Motazeri et al., (2012) wrote that colour can affect the significance of an object and thus produce new patterns of human behaviour. Using green for a recycling bin is more striking than other colours such as grey, red and blue which is shown in Figure 2. Their research found that people tend to recycle more in a green recycling bin rather than bins of other colours.

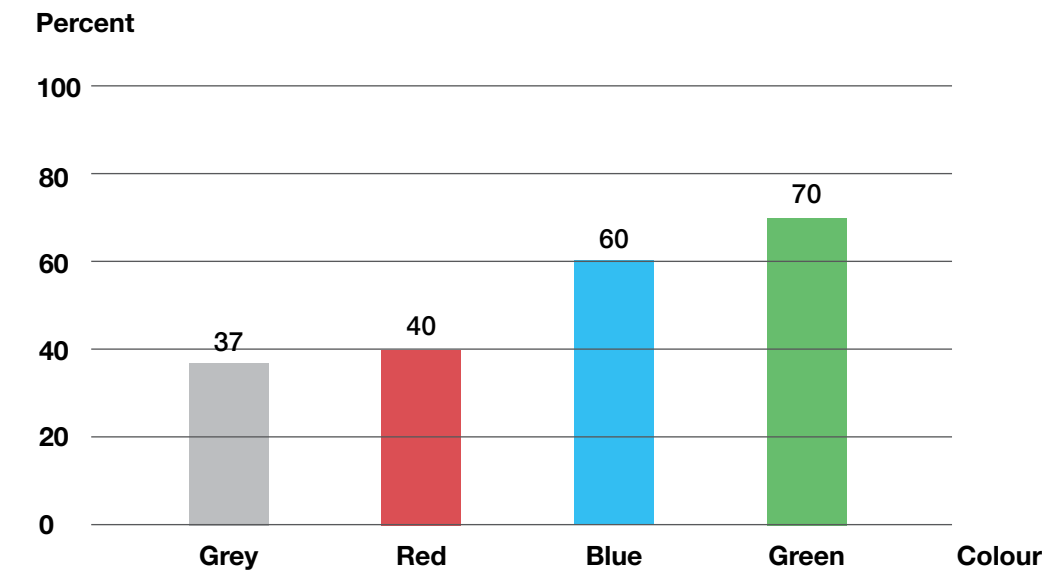


Figure 3: Percentages of recognisable colours to recycling bins

Source: Motazeri et al., (2012)

-> Therefore, the colour green is suitable as a colour for recycling. It not only brings a feeling of responsibility to the environment, but also triggers human behaviour around recycling.

## VI. GREEN ENERGY – SOLAR POWER

Some public bins already on the market use solar power including the Smart City Bin 120. Therefore, we need to know about the general viability of solar energy and if will it be able to work effectively in the UK given its latitude in the northern hemisphere.

Solar energy comes directly from the light produced by the Sun. Solar energy is a renewable source of energy as it is replicated daily as the sun shines on this planet. It is obviously a free source of energy and does not cause any damage to the environment (BBC, 2021). However, it has some issues such as it depends on where the solar power is collected because the further north or south the energy is collected is affected by seasonal factors with more northerly solar panels collecting less energy in the winter than in summertime. Cloud cover can also reduce solar panels effectiveness (Trvst, 2019).

Contrary to what many would think, despite the perception that the UK is too cloudy the UK actually has more than enough sun to power solar panels. The UK gets around 60% of the sun that is experienced in equatorial regions, in some areas in the south. The UK has similar sunlight to Germany, which is one of the biggest markets for photovoltaic cells in the world (Green Match, 2021).

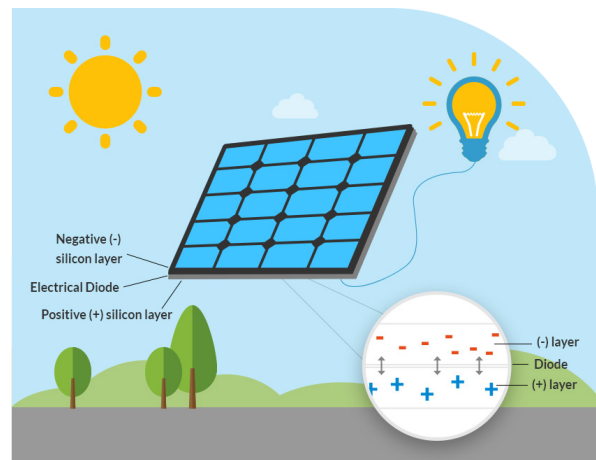


Figure 4: How solar panel works?

Source: Let go Solar, (2021)

-> Therefore, using solar energy is a good solution for the smart bin in the UK based on these evidences.

## VII. USER PERSONAS

User personas will be used to create fictitious users in which their characteristics stand for the needs of a bigger group of users. The aim of these personas is to help identify potential users and understand the target market in order to create the most appropriate solutions for the personas (Faller, 2019). This project will focus on 3 people from different demographics including young, middle aged and the elderly generation. These personas also represent 3 different types of recyclers, Involuntary Non-Recycler, Uncommitted Non-Recycler and Uncommitted Recycler.

### Imogen Clark Involuntary Non-Recycler



“Recycling is too confusing, complicating and I don’t have time to do it”

AGE 25  
OCCUPATION TRAVEL  
BLOGGER  
FAMILY SINGLE  
LOCATION LONDON, UK  
INCOME HIGH

DYNAMIC

EXTROVERTED

FRIENDLY

CONFIDENT

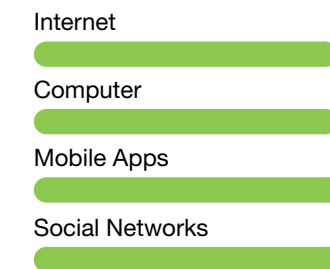
#### BIO

Imogen is a travel blogger, her job requires her to travel a lot and stay in home stays between cities in the UK. She is physically active and is tech savvy. She is concerned about her waste management and recycling, but she doesn’t have time to check how to recycle properly. Therefore, she usually doesn’t recycle.

#### GOALS

- Tracking her recycling footprint
- Knowing what can and cannot be recycled in different area

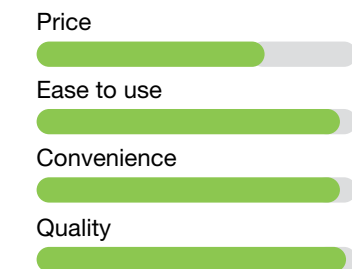
#### TECHNOLOGY



#### FAVOURITE BRANDS



#### MOTIVATIONS



#### FRUSTRATIONS

- Confused what can and cannot be recycled
- Moving to different areas makes recycling even more difficult and confusing because of different recycling rules

Figure 5: Imogen’s persona

## Craig Dudley

Uncommitted Non-Recycler



“Recycling doesn’t give me any benefits”

AGE 45

OCCUPATION DELIVERY DRIVER

FAMILY MARRIED - 4 CHILDREN

LOCATION NOTTINGHAM, UK

INCOME LOW

PRODUCTIVE

ENERGETIC

FUNNY

FAMILY-ORIENTED

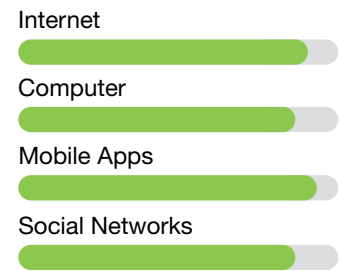
### BIO

Craig is a driver, he has to drive to many places to delivery products to people. He usually has food and drink in his car; and public bins are usually full, so he has to take his rubbish home. He does not trust recycling systems and also thinks it is complicated, a waste of time and does not give him any benefits. Therefore, he has never done any recycling outside or at home. However, if recycling is easier and gives him benefits, he will do it.

### GOALS

- Ease to find accessible bins and recycle
- Getting benefits for recycling

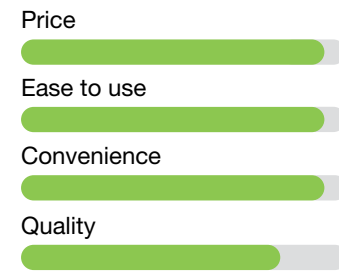
### TECHNOLOGY



### FAVOURITE BRANDS



### MOTIVATIONS



### FRUSTRATIONS

- Finding bins to put his waste in
- Bins are usually full

Figure 6: Craig’s persona

## Joanne Jackson

Uncommitted Recycler

HOUSEBOUND

EDUCATED

CAREFUL

CURIOUS



“I don’t know how to recycle properly as it is too difficult”

AGE 78

OCCUPATION RETIRED TEACHER

FAMILY WIDOW

2 CHILDREN  
2 GRAND CHILDREN

LOCATION BIRMINGHAM, UK

INCOME MIDDLE

### BIO

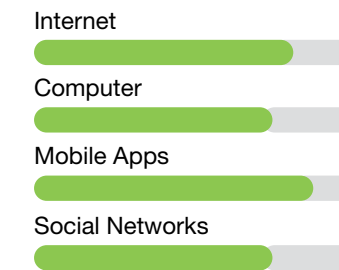
Joanne lives alone at her house, her closest family member is her grandson who lives in Coventry, he usually visits her at weekends. She has eyesight problem and wears glasses.

She feels recycling is very difficult because she sometimes cannot read the labels as the words are too small; also the recycling labels are confusing, she cannot recognise different symbols or numbers for recycling. This leads to her having reduced motivation or support for recycling, but she still recycles by guessing which things can or cannot be recycled. She also usually does not remember the pick-up day in her area; therefore, she forgets to leave the bins outside.

### GOALS

- Ease to find which can and cannot be recycled at home
- Getting support or motivation to recycle

### TECHNOLOGY



### FAVOURITE BRANDS



### MOTIVATIONS



### FRUSTRATIONS

- Doesn’t understand recycling symbols
- Doesn’t know how to recycle properly

Figure 7: Joanne’s persona

## VIII. SCENARIO MAPS

Scenario maps have been used to identify any problems that user personas may face. These maps will help the author have an overview about what users are feeling and thinking during each step. Then they will help to create ideas or suggestions that come up during the process to solve those problems (Miro, 2021).

### 1. PUBLIC – Craig Dudley

STEPS	FINISH HIS FOOD AND DRINK	FIND A PUBLIC BIN	THROW THE PACKAGING	FIND ANOTHER BIN	FINALLY THROW THE PACKAGING AWAY
DOINGS	<ul style="list-style-type: none"> <li>Finish his meal</li> </ul>	<ul style="list-style-type: none"> <li>Walk around to find a bin</li> </ul>	<ul style="list-style-type: none"> <li>Put the packaging into the bin</li> </ul>	<ul style="list-style-type: none"> <li>Walk around to find another bin</li> </ul>	<ul style="list-style-type: none"> <li>Put the packaging into the bin</li> </ul>
THINKINGS	<ul style="list-style-type: none"> <li>I need to throw these packaging.</li> </ul>	<ul style="list-style-type: none"> <li>Where can I find a bin?</li> </ul>	<ul style="list-style-type: none"> <li>The bin is full, I can't put my rubbish in.</li> </ul>	<ul style="list-style-type: none"> <li>Where can I find another bin?</li> <li>Will it still be full?</li> </ul>	<ul style="list-style-type: none"> <li>Luckily the bin is not full, I don't need to find any more bins.</li> </ul>
FEELINGS	<ul style="list-style-type: none"> <li>Satisfied/ Full but need to find a bin to throw the rubbish</li> </ul>	<ul style="list-style-type: none"> <li>Worried</li> </ul>	<ul style="list-style-type: none"> <li>Annoyed</li> </ul>	<ul style="list-style-type: none"> <li>Tired</li> </ul>	<ul style="list-style-type: none"> <li>Glad but still annoyed because of wasting of time to find the bin</li> </ul>

Figure 8: Craig's scenario map -> Here we see a map showing how Craig deals with annoyances about finding public bins. The worries of finding bin, then finding out that the bin is full, and he has to find another bin clearly has given Craig a bad experience and made him feel that he has wasted his time.

### 2. HOUSEHOLD – Joanne Jackson

STEPS	FINISH HER FOOD/ DRINK/ OTHERS	CHECK WHICH PACKAGING CAN BE RECYCLED	DECIDE WHICH THINGS PUT INTO WHICH BINS	PUT THINGS INTO THE BINS
DOINGS	<ul style="list-style-type: none"> <li>Throw the packaging of the food/drink/ others</li> </ul>	<ul style="list-style-type: none"> <li>Read the labels to find out what can be recycled</li> </ul>	<ul style="list-style-type: none"> <li>Separate what can and cannot be recycled by guessing</li> </ul>	<ul style="list-style-type: none"> <li>Put the packaging into the bins</li> </ul>
THINKINGS	<ul style="list-style-type: none"> <li>I need to throw away and recycle this packaging.</li> </ul>	<ul style="list-style-type: none"> <li>The writing on the recycling liabe is too small and I can't read it.</li> <li>What do these different recycling numbers mean? I don't understand.</li> </ul>	<ul style="list-style-type: none"> <li>I don't know if what I have separated is right or not, but I have tried my best.</li> </ul>	<ul style="list-style-type: none"> <li>I am still not certain if I have put my rubbish in the right bin or not.</li> </ul>
FEELINGS	<ul style="list-style-type: none"> <li>Confused</li> </ul>	<ul style="list-style-type: none"> <li>Stressed</li> </ul>	<ul style="list-style-type: none"> <li>Doubted</li> </ul>	<ul style="list-style-type: none"> <li>Worried</li> </ul>

Figure 9: Joanne's scenario map -> This map shows how Joanne gets confused about what packaging can be recycled at home. Even after spending time checking all the labels, she still has doubts about her decision.

## IX. TARGET COUNCILS & GOALS OF SUCCESS

The target organisations will include the five least-efficient recycling local authorities within England that have been mentioned in the previous report. These are Wandsworth, Birmingham City, Westminster City, Barrow-in-Furness and Newham (Nimble Fins, 2020).

Rank of English Councils with Worst Recycling Rates	Total Household Waste (Tonnes)	Tonnes sent for recycling, compost & reuse	% of Household Waste Recycled
334 Kirklees	158,334	38,443	24%
335 Gosport	23,877	5,675	24%
336 Hammersmith and Fulham	47,075	11,184	24%
337 Barking and Dagenham	86,072	20,391	24%
338 Liverpool City	170,235	40,238	24%
339 Slough Borough	53,037	12,358	23%
340 Tower Hamlets	73,917	17,176	23%
341 Wandsworth	94,840	21,999	23%
342 Birmingham City	412,130	90,708	22%
343 Westminster City	91,076	19,779	22%
344 Barrow-in-Furness	24,394	4,721	19%
345 Newham	120,309	20,374	17%

Figure 10: Rank of English councils with Worst recycling rates

Source: Nimble Fins, 2020

The figure 6 shows that their current recycling rates are 23% for Wandsworth; 22% for Birmingham City and Westminster City; 19% for Barrow-in-Furness; and finally, 17% for Newham. The author's goals are to double these rates to 46%, 44%, 38% and 34% respectively.

Also, to boost the on-street recycling rate which Policy Connect (2019) states is just 42% of local authorities providing on-the-go recycling. The goal will be to increase this by 20%.

Furthermore, if this pilot scheme is successful, the author hopes that this RIS will fully roll out across all of England and perhaps to the devolved parliaments of the UK.

## D. DEVELOP & DELIVER

### I. BRANDING

The design is a combination of a switch on button and a bold recycling symbol in order to show users that recycling is currently switched on and fully operational.

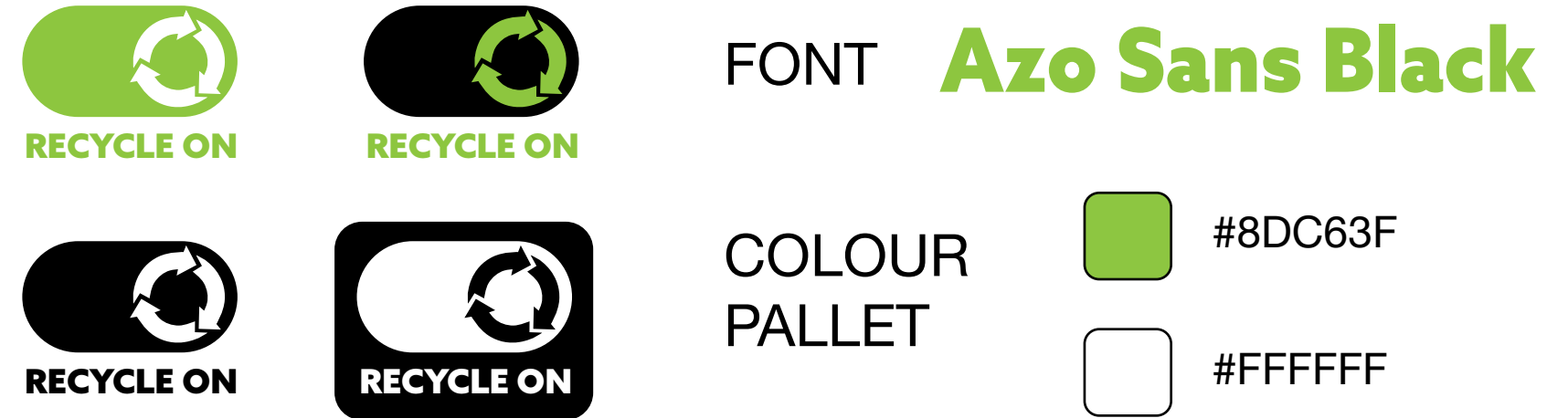
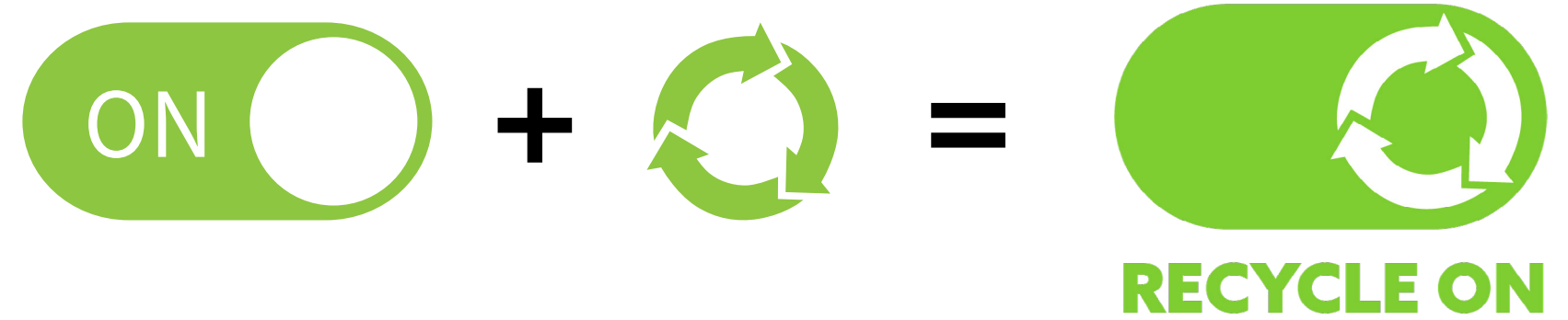


Figure 11: Recycle On's Branding



## II. DESIGN SPECIFICATIONS

### 1. SMART BIN

There are 2 smart bins, and both are publicly used, but one is for outdoor public spaces such as parks or on streets, and the other is for indoor public spaces such as in shopping malls or train stations. They will be identical except outdoor bins which will have a solar power panel.

Smart bin's Specification	Profile									
Height x Width x Depth	1400mm x 1600mm x 60mm									
Material	<ul style="list-style-type: none"> <li>● <b>Outdoor:</b> Recycling Steel, LCD touch screen, Scanning camera, Solar power panel, Reflective vinyl (for the branding)</li> <li>● <b>Indoor:</b> Recycling Steel, LCD touch screen, Scanning camera, Reflective vinyl (for the branding)</li> </ul>									
Colour	Green, black and white									
Capacity	<ul style="list-style-type: none"> <li>● <b>Non-recycling part:</b> 100L</li> <li>● <b>Mixed-recycling part:</b> 200L</li> <li>● <b>Cigarette bin:</b> 1L</li> </ul>									
Function & Technology	<table border="0"> <tr> <td>Touch screen</td> <td>GPS</td> <td>Smoke detector &amp; Notification</td> </tr> <tr> <td>Automatic door</td> <td>Waste compression</td> <td>Scanning feature – AI recognisable technology</td> </tr> <tr> <td>Automatic sorting</td> <td>Full-level management</td> <td></td> </tr> </table>	Touch screen	GPS	Smoke detector & Notification	Automatic door	Waste compression	Scanning feature – AI recognisable technology	Automatic sorting	Full-level management	
Touch screen	GPS	Smoke detector & Notification								
Automatic door	Waste compression	Scanning feature – AI recognisable technology								
Automatic sorting	Full-level management									
Compaction ratio	Up to 1:5 (depends on waste types)									
Compaction force	860N									
Reliable: Durable	Temperature resistance: -30oC to 55oC									
Battery capacity	30Ah									

Power	<ul style="list-style-type: none"> <li>● <b>Outdoor:</b> 50W Solar panel, electrical power supply 230V (back-up)</li> <li>● <b>Indoor:</b> Indoor: electrical power supply 230V</li> </ul>
Life Expectancy	10 years but still depends on surrounding environment and user's use
Warranty	3years
Market	United Kingdom
Patents	To be checked or collaborate with companies that already have the technology such as Bin-e or Smart City Bin 120

Figure 12: Smart bin's specification

### 2. RECYCLING APP

Recycling app's Specification	Profile						
Colour	Green, Black and White						
Design & Layout	Simple and big text/ icon						
Available at	Google play and App store						
Function & Technology	<table border="0"> <tr> <td>Tracking location</td> <td>Recycling tracker</td> <td>Pick-up Day</td> </tr> <tr> <td>Scanning feature – AI recognisable technology</td> <td>Gather points – Exchange rewards – Ranking tracker</td> <td>Helping to use the app by videos</td> </tr> </table>	Tracking location	Recycling tracker	Pick-up Day	Scanning feature – AI recognisable technology	Gather points – Exchange rewards – Ranking tracker	Helping to use the app by videos
Tracking location	Recycling tracker	Pick-up Day					
Scanning feature – AI recognisable technology	Gather points – Exchange rewards – Ranking tracker	Helping to use the app by videos					
Market	United Kingdom						
Patents	To be checked or collaborate with companies that already have the technology such as Dream Walk (Recycle Mate app)						

Figure 13: Recycling app's specification

### III. CONCEPT SOLUTIONS

#### 1. SMART BIN (With solar panel)

There are 8 main features for the smart bin, and 1 other feature.

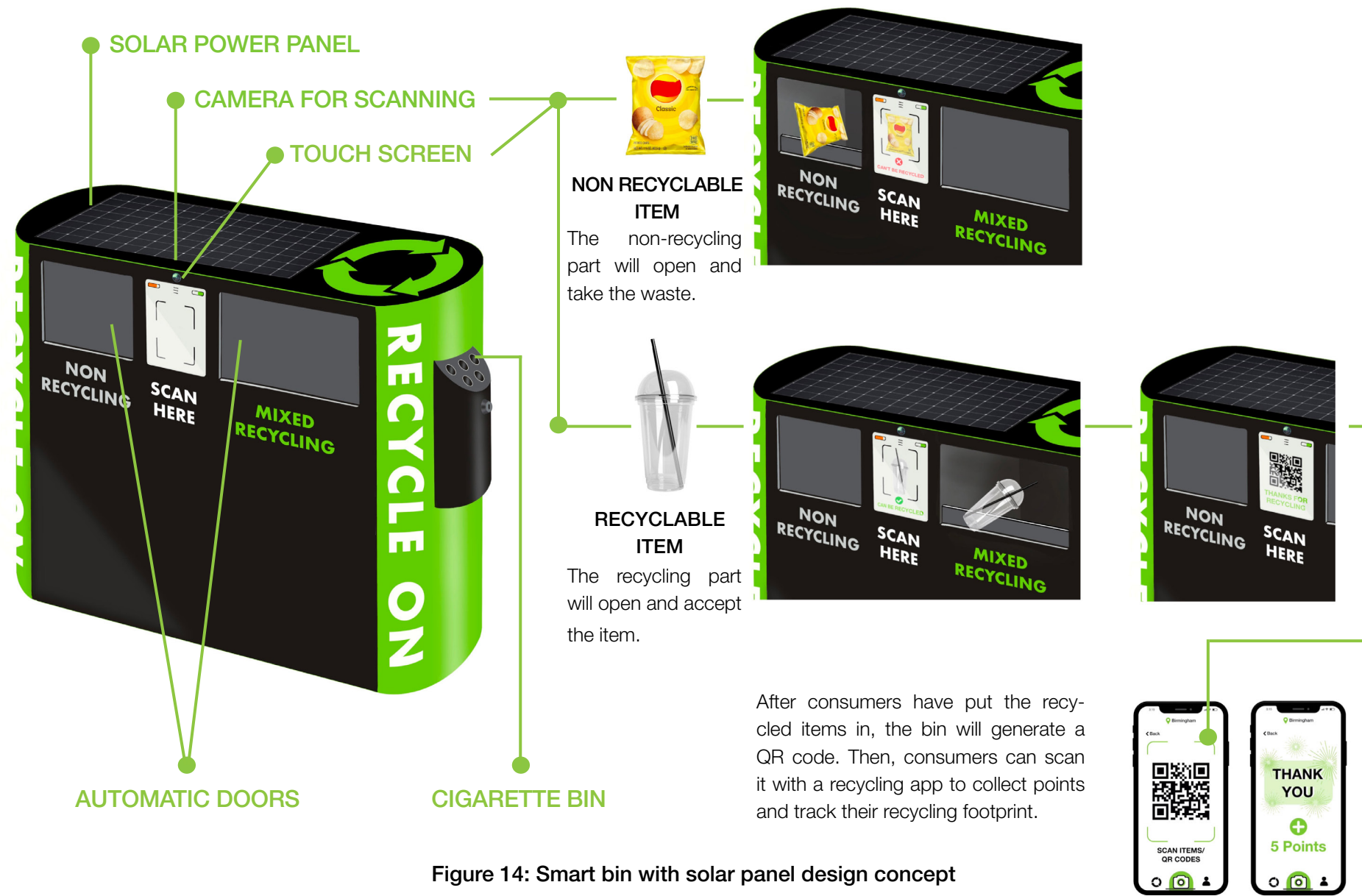


Figure 14: Smart bin with solar panel design concept

#### ● MAIN FEATURES

##### ○ SOLAR POWER PANEL

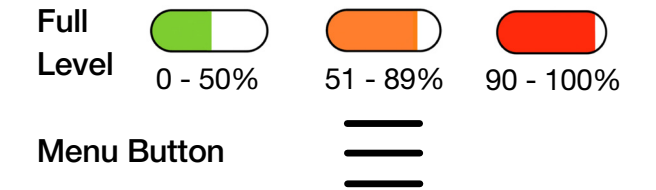
The smart bin transmits a message to the local council when the bin is 80% full to signal that it needs emptying. The transmitter is powered by solar energy.

##### ○ CAMERA FOR SCANNING

Using AI technology to verify types of materials to know which can and cannot be recycled in a specific area.

##### ○ TOUCH SCREEN

Showing users the identity of items and the right bin to place, and also QR codes to collect points. Top left and right parts of the screen show full level of both bins and top middle has a Menu button, where users can find the next or a nearby Smart Bin.



##### ○ WASTE COMPRESSION

A built-in algorithm automatically activates the pressing system according to the filling. The bin can hold 5 times the volume of waste.

##### ○ AUTOMATIC SORTING

The Mixed Recycling part has a special feature which automatically sorts 4 different types of recycled materials including plastic, glass, metal and paper.

##### ○ CLOSED CONSTRUCTION

Automatic doors will close after taking items in order to block and avoid any unpleasant odours leaking into the environment.

##### ○ HANDS-FREE FEATURE

Users do not need to touch the bin to open it, doors will automatically open to take their items.

##### ○ GOOGLE/ APPLE MAP FINDING

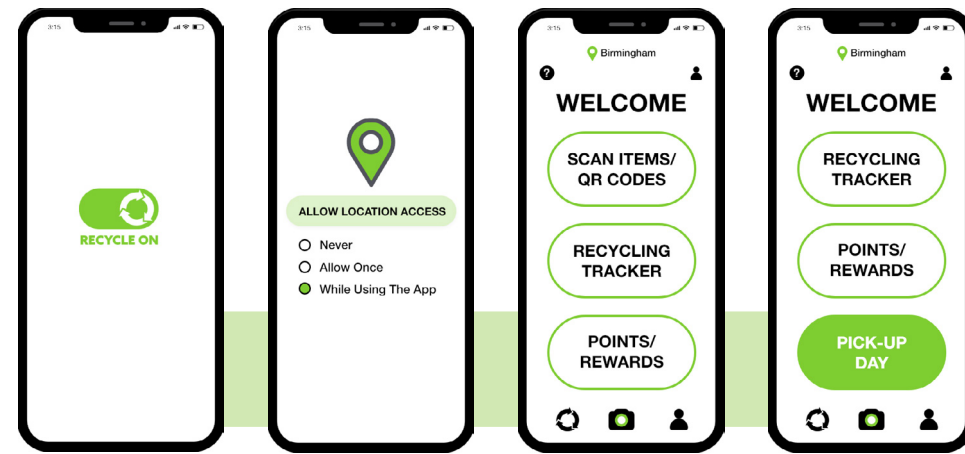
People can find locations of smart bins in Google or Apple maps as the bin has a built in GPS system.

#### ● OTHER FEATURE

##### ○ ALARM

This protective function will be activated when someone wants to steal or damage the bin.

## 2. RECYCLING APP



When users open the app, it will provide them with options. They can track their location in order to provide the right recycling rules in that specific area.

There are 4 main features in the recycling app, and 2 other features.

Figure 15: Recycling app interface for tracking location and main features

### OTHER FEATURES

#### SIGN UP & LOGIN

Users do not need to login to Scan items and read the Pick-up Day feature. However, users do have to register to activate and use other features including adding points, tracking their recycling footprint, exchange rewards and seeing their ranking.

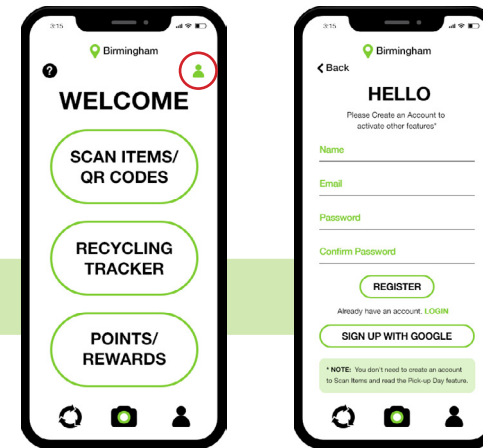
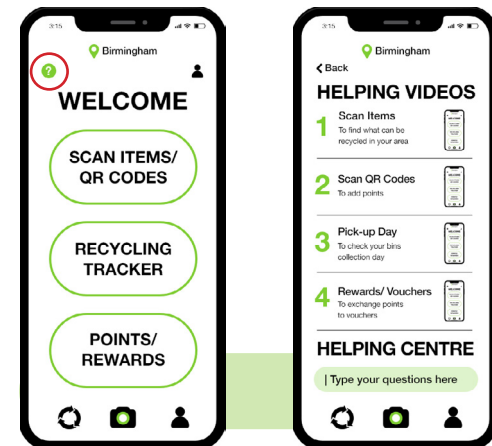


Figure 16: Register or Log in to the Recycling app



#### HELP BUTTON

For first time users who do not know how to use the app, users can press this button which provides some videos showing how different features of the app work and also it helps returning users ask questions if something is wrong with their accounts.

Figure 17: Helping function

### MAIN FEATURES

#### SCANNING ITEMS AND QR CODES

This feature allows users to scan their empty packing in order to check which can and cannot be recycled. This can also scan a QR code from the smart bin in order to add points and keep a record of their recycling footprint.

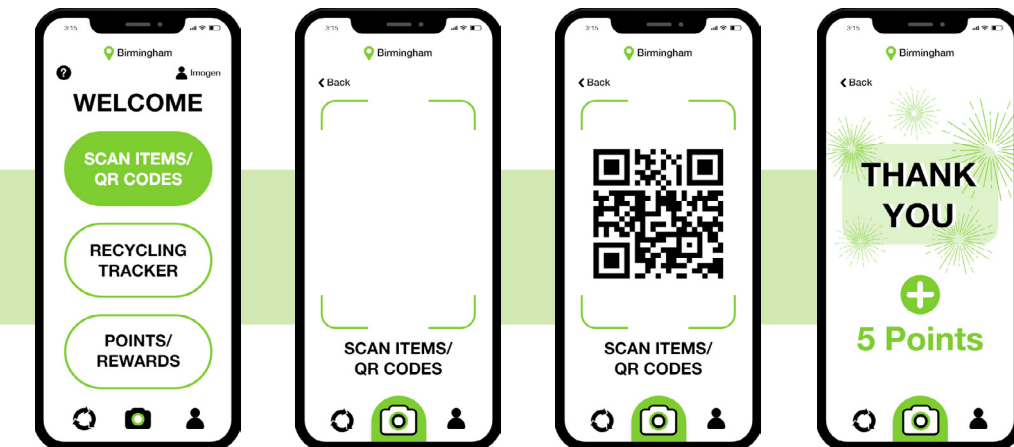
##### - Scanning items



Figure 18: Scanning items to know what can or cannot be recycled

##### - Scanning QR Code

Figure 19: Scanning QR codes to collect points



## RECYCLING TRACKER

Users can use this feature to see how much they recycle for 5 different kinds of recycled materials including plastic, glass, paper, metal and e-waste every month. They also can see how many points they have gathered for each material. These points are collected from the smart public bins or from their local councils when they pick-up household bins.

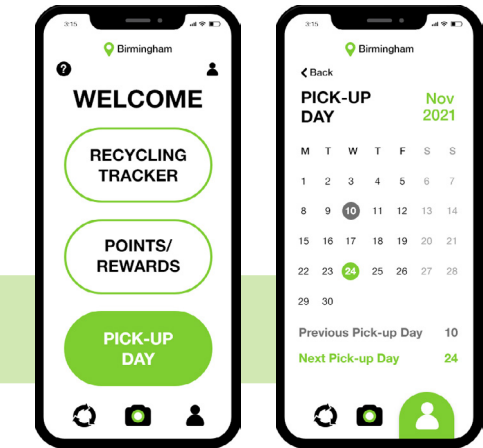
Figure 20: Recycling tracker function



## PICK-UP DAY

For this part, users will see which days of in the month their bins are collected. The app will remind them one day before the pick-up day, so they can leave the bins outside.

Figure 22: Pick-up Day feature



## POINTS/REWARDS - VOUCHERS/RANKING

This part shows users their collected points which then can be exchanged for rewards such as vouchers for a restaurant, gym session or free car parking. Local businesses can sponsor rewards, so some of the rewards can change each month.

Users also can see their ranking in their areas and by the end of each month, the councils will give other rewards to the 3 most active recyclers. For example, gold, silver and bronze medals which they can share on their social media platforms. Additionally, the rewards are valid for 2 months from the date users exchange them.

Figure 21: Points/ Rewards feature - exchange vouchers and track ranking



## IV. PRIMARY RESEARCH ANALYSIS - USABILITY TESTING FINDINGS

The aims of this usability testing are to help make prototypes of the smart bin and recycling app in order to test them with the previous participants. However, due to the time limitation, the author has created a smart bin's concept solution and recycling app's wire frame which shows participants how they look and how to use them. This helps to gather feedback about the design and its functions. Participants can provide other suggestions not only to these solutions, but also other points that can develop the project further.

One day before the testing day with the second focus group, the author sends the solutions to the users to let users have enough time to evaluate them. The author believes that running the test like this will help to gather more insight and useful feedback.

### ● Smart bin

They all like the design of the bin. One person thought the solar panel might not create enough energy due to the UK weather, however this has subsequently been researched and it has been established that the UK weather still can generate and source adequate power from the sun.

Their main concern about the smart bin are the cost and maintenance because the bin is fairly high tech. They worry that local councils cannot get benefits from this new RIS. One person was aware that automatic sorting technology already exists in other smart bins from private companies and suggested that the author should contact these companies to collaborate in order to reduce the patent cost such as Bin-e company. Also, they suggested having two bins; one for outdoor use and the other one for indoor use, which would be cheaper as it would not have solar panels.

Two people also worried that because of its high-tech nature, the bin could be damaged or stolen, so they suggested that it be fitted with an alarm to protect it. For maintenance, they wonder who will be responsible for it, local councils or private organisations?

-> These findings show that there is a consensus of positive feedback for the solutions, they all agreed that this RIS could work as it will change consumer behaviour as it makes recycling simpler and provides new motivation for people by giving them rewards. For the benefits and cost for councils, the author believes this will increase recycling rates which councils can reuse or sell the recycled materials to other companies because reused materials will reduce carbon emissions (Heritage Counts, 2019).

Also, local councils can receive sponsorship from organisations or companies that wish to be associated with this green initiative. These organisations and companies also can provide rewards for the RIS. This sponsorship will help them improve their companies's images as some research shows consumers are interested in sustainability (Close, 2021).

The author also has used some of participants ideas to improve the two solutions. For example, there will now be two smart bins one for outdoors and one for indoors. The later does not have a solar panel. These bins also will have alarms to protect the bin. The recycling app will allow users to use as a guest in order to use the scanning and pick-up day functions. Login is optional for people who want to track their recycling/ ranking, collect points and exchange for rewards. The suggestions of collaborating with private companies that are already using this technology is a good idea, also these companies could be the maintainer for both solutions because of their expertise.

### ● Recycling app

They all agreed that the interface of the app is simple and easy to use. The colours combine well as they make the app eye catching. The big text and icon also make the app easy to read and this will help seniors who often have eyesight problems.

They all like how the app can track their recycling footprint or ranking and using points to exchange for rewards such as vouchers for coffee shops/ restaurants or free parking hours. They thought these vouchers are not too valuable but quite useful in day-to-day life.

One person really likes the pick-up day feature as she never knows her bin pick-up day is. However, there was some feedback for improvements such as the app should have a log in section and help button. Again, they also suggest collaboration with the company that has used a scanning recognition system for materials, for example, Dream Walk who created the Recycle mate app.

### ● Other points

They think the RIS is a good scheme as they feel that people tend to like carrots rather than sticks. However, they were concerned about the costs of applying these solutions for the whole UK, therefore they suggested doing pilot schemes between some high and low recycling rate councils to compare how this RIS works.

They also questioned who will provide the rewards? Councils or private companies? Again, they thought about how to market this RIS as this scheme targets all UK citizens, one person suggested that the author should create a table which has 3 main demographics and marketing ideas such as social media platforms in order to know which marketing idea suits which demographic.

## V. HOW THE SOLUTIONS FIT THE USER PERSONAS?

### 1. SMART BIN



Imogen is an Involuntary Non-Recycler who wants to recycle but does not recycle. This is often down to a lack of recycling facilities or suitable recycling instructions. Also, Craig is an Uncommitted Non-recycler who never recycled because he does not really understand recycling systems and thinks it is complicated, so is a waste of time.

Additionally, Craig and Imogen's jobs require them to be outside a lot. They do not have time to check recycling items. Therefore, the scanning feature will be the best for them because it does not only save their time, but also helps them to recycle properly. This function will help them recycle much more easily as they do not need to think about what can be recycled anymore.

The GPS feature which shows the bins on Google or Apple maps also works well for Craig who usually needs to find a bin to throw his items away. Also, the full-level control and finding nearby bins when the bin is full will also save a lot of his time when he needs to find another bin. The automatic sorting materials also will gain his trust about recycling systems. Furthermore, another reason he did not recycle was because recycling does not give him any benefits. Therefore, getting recycling points to exchange for rewards will motivate Craig to recycle more.

### 2. RECYCLING APP



This app will help all three personas especially Joanne who is an Uncommitted Recycler. She is this kind of recycler because the complicated and confusing nature of recycling reduces her motivation to do it. The scanning feature will help her to know what can be recycled correctly without checking any labels or recycling symbols. Also, the interface of the app has a big font and icon that will help her use the app more easily. The pick-up day feature is a nice feature for Joanne as it will remind her of the pick-up day so she can put her bins outside to be collected.

For Imogen who usually moves to different areas, the scanning feature also helps her to check what can be recycled in the areas that she is staying. It also helps her to check her recycling footprint as she is concerned about her waste management and recycling.

As Craig also did not recycle at home, this app will motivate and help him to do it. Because it is now easier and also, he can get more points from his family items to exchange for rewards. He can try to become the most active recycler in order to gain additional rewards. He can check his ranking through the app as well.

-> The author strongly believes that these solutions will nudge all three personas to change their recycling intentions and behaviours, in order to become Committed Recyclers who do not only follow their beliefs in recycling, but also actively go to the effort to recycle. Because now the recycling systems are simpler and support the user's motivations around recycling.

## VI. HOW THE SOLUTIONS IMPACT ON TPB THEORY?

The previous report shows that there are 5 parts that impact on recycling intention and behaviour. The RIS solutions influence in 4 sections:

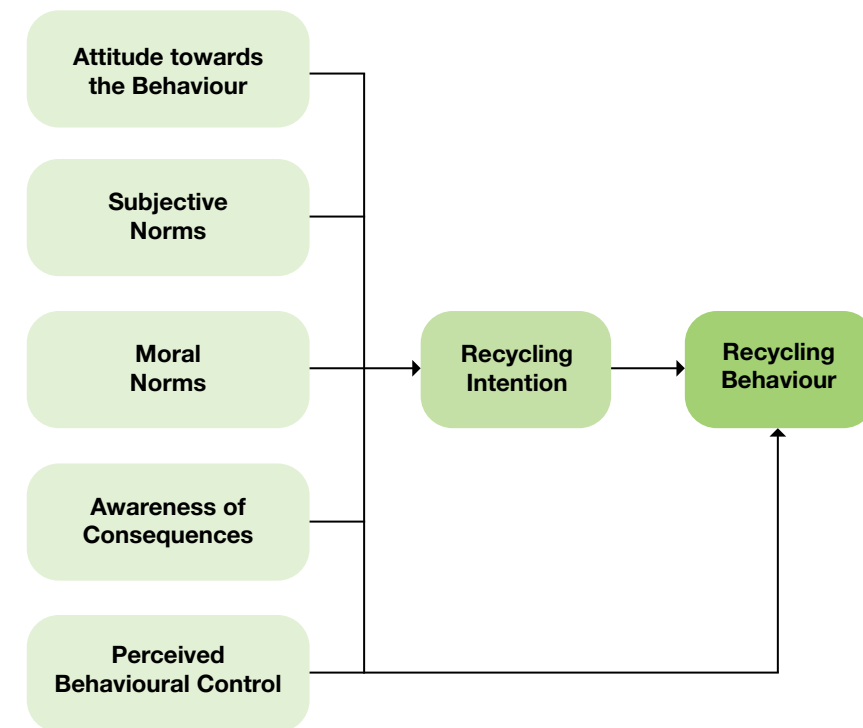


Figure 23: TBD for Recycling intention and behaviour

Source: Wan et al., 2017, p. 71

- Finally, **Perceived behavioural control** which is the perceived ease of recycling. For this, scanning and automatic sorting are important features, because consumers do not need to worry about what kind of materials can be recycled in different areas within the UK. With the RIS solutions, recycling is now easy, simple and fast.

**-Attitude:** both solutions have scanning features that help users to do recycling correctly and also reduce contamination, also the automatic sorting of recycled materials can gain trust about recycling systems for users because they know all recycling materials will be separated correctly.

**-Subject norm** is social pressure that encourages people's behaviour. The author believes that the ranking feature of the recycling app creates social pressure. Because to improve their self and social image, they will try to recycle more in order to gain a higher ranking and get additional rewards if they are one of the three most active recyclers.

-The RIS solutions also impact on the **Awareness of the consequences** of an individual's concerns about the environment. Among them, the RIS strongly influences on individual consequences which are the personal cost and the benefit from taking action from recycling. The benefits here are points and rewards which are also extrinsic motivations to people who may lack intrinsic motivation in recycling. Therefore, these benefits will be a nudge to consumer's recycling intentions and behaviours.

## VII. CUSTOMER JOURNEY MAP – FIRST TIME USER

Customer journey map is a useful tool that shows the steps that customers go through when interacting with the solutions, in order to understand customer's motivation, needs, resistances, hesitations, and concerns when using the solutions (Visual Paradigm, 2021).

### 1. SMART BIN

#### ● Bin is not full

STEPS	Scan an item	See what can or cannot be recycled	Puts the item into the bin	Scan a QR code
INTERACTIONS	<ul style="list-style-type: none"> <li>Point an item at the scanning camera</li> </ul>	<ul style="list-style-type: none"> <li>See if the item can be recycled or not</li> </ul>	<ul style="list-style-type: none"> <li>Automatic door opens and accept the item</li> <li>Put item in</li> </ul>	<ul style="list-style-type: none"> <li>If the item is recyclable, a QR code will be generated</li> <li>Scan the QR code by the recycling app</li> </ul>
TOUCH POINTS	<ul style="list-style-type: none"> <li>Scanning camera</li> <li>Screen</li> </ul>	<ul style="list-style-type: none"> <li>Screen</li> </ul>	<ul style="list-style-type: none"> <li>The correct part of the bin</li> </ul>	<ul style="list-style-type: none"> <li>Screen</li> </ul>
EMOTIONS	<p>The graph shows a line starting at a 'Neutral' level for the first step, rising to a 'Positive' level for the second step, and continuing to rise to a higher 'Positive' level for the third and fourth steps.</p>			
FEELINGS	<ul style="list-style-type: none"> <li>Inquisitive</li> </ul>	<ul style="list-style-type: none"> <li>Curious</li> </ul>	<ul style="list-style-type: none"> <li>Pleased</li> </ul>	<ul style="list-style-type: none"> <li>Happy</li> </ul>

Figure 24: Customer journey map for Smart bin - Bin is not full

● Bin is full

STEPS	Scan an item	Bin is full	Find another bin	Scan the item again	See what can or cannot be recycled	Puts the item into the bin	Scan a QR code
INTERACTIONS	<ul style="list-style-type: none"> <li>Point an item at the scanning camera</li> </ul>	<ul style="list-style-type: none"> <li>Screen shows that the bin is full</li> </ul>	<ul style="list-style-type: none"> <li>The bin automatically shows users nearby available bins that they can choose</li> </ul>	<ul style="list-style-type: none"> <li>Point an item at the scanning camera</li> </ul>	<ul style="list-style-type: none"> <li>See if the item can be recycled or not</li> </ul>	<ul style="list-style-type: none"> <li>Automatic door opens and accept the item</li> <li>Put item in</li> </ul>	<ul style="list-style-type: none"> <li>If the item is recyclable, a QR code will be generated</li> <li>Scan the QR code by the recycling app</li> </ul>
TOUCH POINTS	<ul style="list-style-type: none"> <li>Scanning camera</li> <li>Screen</li> </ul>	<ul style="list-style-type: none"> <li>Screen</li> </ul>	<ul style="list-style-type: none"> <li>Screen</li> <li>Menu button</li> </ul>	<ul style="list-style-type: none"> <li>Scanning camera</li> <li>Screen</li> </ul>	<ul style="list-style-type: none"> <li>Screen</li> </ul>	<ul style="list-style-type: none"> <li>The correct part of the bin</li> </ul>	<ul style="list-style-type: none"> <li>Screen</li> </ul>
EMOTIONS							
FEELINGS	<ul style="list-style-type: none"> <li>Curious</li> </ul>	<ul style="list-style-type: none"> <li>Annoyed</li> </ul>	<ul style="list-style-type: none"> <li>Sceptical</li> </ul>	<ul style="list-style-type: none"> <li>Worried</li> </ul>	<ul style="list-style-type: none"> <li>Excited</li> </ul>	<ul style="list-style-type: none"> <li>Pleased</li> </ul>	<ul style="list-style-type: none"> <li>Satisfied</li> </ul>

Figure 25: Customer journey map for Smart bin - Bin is full

-> These maps show customer's journeys when they interact with the bin in 2 states, not full and full. In comparison to the bin when it is not full, full bin requires users to do more steps because they need to find another bin. This probably leads to an emotional dip, but because of the finding next/nearby bin function, users can easily find a new bin and do not waste a lot of their time. Therefore, after there is likely to be an emotional lift through each step to the end.

## 2. RECYCLING APP

STEPS	Open the app and choose tracking location	Scan an item	See what can or cannot be recycled	Check pick-up days
INTERACTIONS	<ul style="list-style-type: none"> <li>Customers touch screen</li> <li>Choose the option that allows app tracking their locations while using the app</li> </ul>	<ul style="list-style-type: none"> <li>Choose Scan items/ QR code button</li> <li>Point an item at the scanning camera</li> <li>Take a picture</li> </ul>	<ul style="list-style-type: none"> <li>See if the item can be recycled or not</li> </ul>	<ul style="list-style-type: none"> <li>Back to main features screen</li> <li>Chooses Pick-up Days button</li> </ul>
TOUCH POINTS	<ul style="list-style-type: none"> <li>App interface</li> <li>Location tracking</li> </ul>	<ul style="list-style-type: none"> <li>Main features interface</li> <li>Scan items/ QR codes button</li> <li>Scanning camera</li> <li>Taking pictures button</li> </ul>	<ul style="list-style-type: none"> <li>Item information area</li> </ul>	<ul style="list-style-type: none"> <li>Main features interface</li> <li>Pick-up day button</li> <li>Calendar</li> </ul>
EMOTIONS				
FEELINGS	<ul style="list-style-type: none"> <li>Inquisitive</li> </ul>	<ul style="list-style-type: none"> <li>Curious</li> </ul>	<ul style="list-style-type: none"> <li>Satisfied</li> </ul>	<ul style="list-style-type: none"> <li>Pleased</li> </ul>

Figure 26: Recycling app's customer journey map

-> The app allows users to utilise it as a guest, therefore their first-time user experience is quite positive which is built up through each subsequent use. Positive feelings for using the app the first time is very important, because it will encourage users to continue to the app in the future.



## VIII. MARKETING STRATEGY

It is extremely difficult to find the time to be active on all social media platforms. Reducing these to a small number of carefully selected ones, allows businesses to focus their energies and resources for the best return (Action Opportunity Fund, 2021). Therefore, choosing the correct and most useful platforms for the purposes of marketing is really quite valuable.

### ● Social media

Age Groups	Youtube	Facebook	Instagram	Twitter	LinkedIn	Pinterest	Ticktok	Reddit	Tumblr
15 - 25	82%	80%	76%	44%	30%	28%	24%	23%	10%
26 - 35	73%	80%	61%	45%	41%	20%	9%	24%	6%
36 - 45	66%	74%	49%	43%	34%	26%	9%	12%	3%
46 - 55	62%	79%	37%	40%	34%	24%	6%	5%	2%
56+	52%	72%	21%	28%	22%	19%	2%	1%	2%

Figure 27: Reach of social media used in the UK 2020

Source: Statista, 2021

Figure 27 shows some of the most widely used social media sites for five different age groups in the UK. It shows that Youtube and Facebook are the two most popular social media platforms among all age groups with both platforms attracting over 50% for all age groups. Especially, Facebook which has a reach of over 70% for all age groups.

### ● Traditional media

Age Groups	Radio advertisements	Television advertisements	Advertisements on billboards
18 - 24	25%	38%	25%
25 - 49	24%	26%	22%
60 - 64	22%	29%	20%
65+	9%	17%	12%

Figure 28: Percentage of British pay attention to ads on traditional media in July 2021

Source: YouGov, 2021

-> This table shows how likely and much British people pay attention to ads on 3 traditional media platforms including Radio, Television and Billboards. Among these 3, Television advertisements attract the most attention of all age demographics.

The evidence shown in these tables suggests that the most useful social media platforms to promote the RIS should be YouTube and Facebook. Television advertisements will also be very important as a means of spreading the message about the RIS. This marketing strategy will firstly be used for the pilot scheme in the five least efficient recycling councils.

Furthermore, there is the possibility that some companies may want to involve themselves with the scheme as it may help them develop their own "green" agenda. For example, these companies might introduce the RIS to their employees and create a company recycling group, so people will have a competition within the company or compete with other organisations. This is also a nudge. In order to boost the volume of people using the RIS, these companies or organisations could add additional rewards or praise to individuals that have the best recycling points in the companies. Also, RIS could be promoted through these company marketing platforms.

## IX. RACI MATRIX

The RACI model can be utilised in an organisation's managerial structure. It is a means of spreading the workload and responsibilities among a team of people in relation to important functions (Well Grounded, 2019).

<b>Responsible</b>	The person/people with overall control of a task.
<b>Accountable</b>	This is the person with final control and responsibility for the task and is liable for it.
<b>Consulted</b>	This is the resource person/people who have relevant and useful information to help complete the desired task.
<b>Informed</b>	This is the person/people who should be kept informed about the task as it progresses, the task is important to what they do in the organisation.

Figure 29 shows that many teams or members need to be involved in developing this project. This is because this project aims to solve a large-scale problem around recycling in the UK. This will need approval from local authorities and the UK government to apply this RIS nationally. Having many teams and staff also reduces the time from ideation to delivery. However, there could be difficulties communicating with this large number of teams and members.

Activities	Roles/ Teams	UK GOVERNMENT	LOCAL COUNCILS	PROJECT MANAGER	RESEARCH TEAM	DESIGN DIRECTOR	DESIGN MANAGER	DESIGN TEAM	TECHNOLOGY TEAM	PROGRAM TEAM	ENGINEER TEAM	FINANCE TEAM	MARKETING TEAM
Research user's problems & identify design solutions		I	C/I	A/C/I	R/C/I	C/I	C/I	I	I	I	C/I	C/I	C/I
Research & review existing technologies		C/I	I	R/A/C/I	C/I	R/C/I	R/C/I	C/I	R/C/I	C/I	C/I	I	I
Review design solutions to local councils		C/I	I	R/A/C/I	C/I	R/C/I	R/C/I	C/I	C/I	C/I	C/I	I	I
Review cost estimation for the project & target cost for the products		C/I	C/I	R/A/C/I	C/I	R/C/I	R/C/I	I	I	I	I	R/C/I	I
Develop & review design solutions (hardware & software)		I	I	R/A/C/I	R/C/I	R/C/I	R/C/I	R/C/I	R/C/I	R/C/I	R/C/I	I	I
Test & review design solutions (hardware & software)		I	I	R/A/C/I	R/C/I	R/C/I	R/C/I	R/C/I	R/C/I	R/C/I	R/C/I	I	I
Fix design problems		I	I	R/A/C/I	C/I	I	I	R/C/I	R/C/I	R/C/I	R/C/I	I	I
Final testing		I	I	R/A/C/I	C/I	I	I	R/C/I	R/C/I	R/C/I	R/C/I	I	I
Review final products		C/I	C/I	R/C/I	C/I	A/C/I	C/I	C/I	C/I	C/I	C/I	I	I
Final approval from local councils and the UK government		R/C/I	R/A/C/I	R/C/I	C/I	C/I	C/I	C/I	C/I	C/I	C/I	I	I
Start production & launch		C/I	C/I	R/A/I	I	C/I	C/I	C/I	C/I	C/I	C/I	R/C/I	R/C/I
Support & improvement		C/I	C/I	R/A/C/I	C/I	I	I	I	I	I	I	I	I

Figure 29: RACI matrix for RIS's development

# X. GANTT CHART

A Gantt chart sets out a project's time frame. The actual length of a bar representing each activity is directly proportional to the duration of that activity. Gantt charts have become more widely used and are popular because of their simplicity and they are easy to produce and understand. However, Gantt charts may not be particularly useful for projects with a larger number of different activities (Mubarak, 2010).

This RIS project is estimated take six months from the initial research to final launch. This time frame is due to careful consideration of the existing smart bins and recycling apps, it also gives enough time for regulatory aspects of the project to be fully taken into consideration.

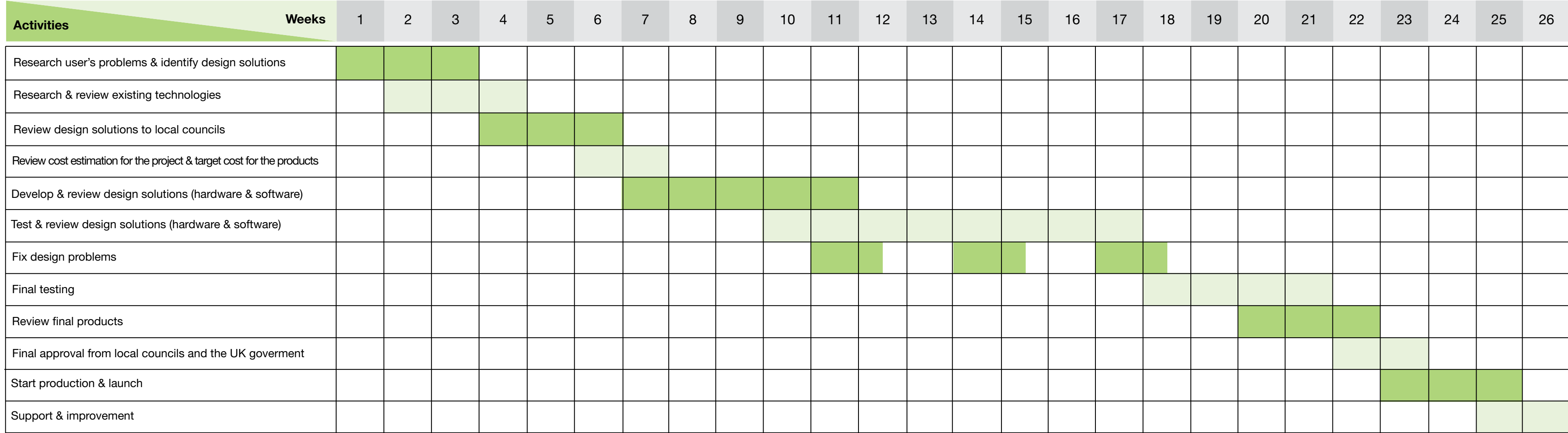


Figure 30: Gantt chart for RIS's development

## XI. SWOT ANALYSIS

SWOT analysis is a tool that helps to understand positive and negative factors around solutions. It considers the internal strengths and weaknesses of the project against the external opportunities and threats (Gürel, 2017) that the UK government or local authorities may face.

<p style="text-align: center;"><b>STRENGTH</b></p> <ul style="list-style-type: none"> <li>● <b>Smart bin</b> <ul style="list-style-type: none"> <li>○ Make public recycling simpler for consumers by scanning and utilising an automatic door feature.</li> <li>○ Sorting functions will help gain the trust of users because they will be confident that all recycling materials will be separated correctly.</li> <li>○ Finding the next/nearby bin and GPS features will save users time in finding a convenient bin.</li> <li>○ Easy to collect points after recycling.</li> </ul> </li> <li>● <b>Recycling app</b> <ul style="list-style-type: none"> <li>○ Scanning feature also makes at home recycling easier and saves users time for checking what can and cannot be recycled.</li> <li>○ Gaining benefits will make users engage more with the RIS.</li> <li>○ Ranking and recycling tracker will also help users know their recycling activities in their areas and how active they are.</li> <li>○ Reminder also will help users not to forget about putting their bins outside for collection.</li> </ul> </li> </ul>	<p style="text-align: center;"><b>WEAKNESS</b></p> <ul style="list-style-type: none"> <li>● <b>Smart bin</b> <ul style="list-style-type: none"> <li>○ Cannot scan many different items and materials at the same time.</li> <li>○ It is quite bulky, so needs a quite wide public space to install.</li> </ul> </li> <li>● <b>Recycling app</b> <ul style="list-style-type: none"> <li>○ Some people may be concerned about the app tracking their location. Users do not need to allow the app to track them, but it will not give them specific recycling rules in different areas and also, they cannot track their ranking.</li> </ul> </li> </ul>
<p style="text-align: center;"><b>OPPORTUNITY</b></p> <ul style="list-style-type: none"> <li>● The possibility of international collaboration with organisations such as in USA, Europe or Australia to make recycling easier for travellers, also they can then possibly use points and rewards in different countries.</li> </ul>	<p style="text-align: center;"><b>THREAD</b></p> <ul style="list-style-type: none"> <li>● Needs to have approval from many different councils, so it could be cumbersome and quite bureaucratic. It will take a lot of time to become a national scheme.</li> </ul>

Figure 31: SWOT analysis for RIS

## E. CONCLUSION & LIMITATIONS

This project has shown how to create a strong user centered design project to develop the new RIS by using primary research and some management tools. Overall, the RIS includes 2 solutions; the smart bin and the recycling app which will solve some major problems of recycling for consumers such as not knowing what materials can be recycled in their areas, or not having time to check what plastic types can be recycled and when the recycling bin is too full. This scheme also provides benefits to people who already recycle. Therefore, this RIS does not only make recycling easier, but also motivates people to recycle by nudging their recycling intentions and behaviours. This then will possibly impact on increasing recycling rates in the UK which is the main aim of this project.

However, there are some limitations of this project. For example, the cumbersome nature of the project in relation to organising all the local authorities in the UK. This will also include national logistics as contracts for collecting the recycled waste will be new and large. Their maybe long-term existing waste contracts that councils are already in that will need to be addressed. The project is thus limited to the ability of many companies to work together. The whole project is going to be bureaucratic and there will be a lot of staff needed to organise everything. The limit being funding to employ people. There are many obstacles and challenges so a phased approach such as a small pilot scheme in some areas in the UK, is likely to be the most successful solution to achieving the projects aims.

## F. FUTHER DEVELOPMENT

The author believes that there is no such thing as waste, there is just stuff that we do not reuse or recycle. Therefore, it is hoped that in the future the smart bins can be further developed to sort all waste including clothing, shoes, food or food waste and sorting this into materials that can be reused or recycled. It is desirable to reduce the volume of landfill which in turn will result in a need for fewer new resources for products in future.

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# H. APPENDIX

## ● Reflection

To start to have a plan and choose a topic for the final project was not too difficult because I have been interested in ways that encourage people to reduce, reuse, and recycle materials for many years. Initially, I intended to do a project about a new product that uses Bioplastic from food waste which I have some experiences in my previous MA. However, I wanted to make a new recipe for food wasted bioplastic for my project, not use existing food waste bioplastic that is already in the market. Unfortunately, doing this was impossible due to the time limitation of this project because creating a new recipe and testing it for a specific product requires a lot of time. Therefore, I have changed my project slightly to how to improve recycling rates in the UK?

During the project, I have learnt that changing human behaviour is a key to increase recycling rates, as identified in the previous research report 7037. Also, motivation is another essential factor that impacts on recycling behaviour. To boost recycling rates for both public and households, I designed a new recycling incentive scheme, including a smart bin and a recycling app. Although this project does not need to have visual design and branding for these solutions, I know that visual appeal is very important as an industrial and graphic designer. It was a challenge for me to develop these solutions due to the limited time for this report and I have had very limited experience of using software to design an app. Therefore, I was somewhat stressed, but persevered as I wanted to self-learn a new skill and also wanted to practice time-management skills to achieve the best result within a short period of time.

Overall, I am very happy and pleased with this project which is again thanks to my tutor who has always given me enormous support and direction throughout the time I have worked on it. Also, this project has not only helped me to learn about how to manage from ideation to delivery, but it has also helped me to improve and develop my design skills which I believe will help me to achieve success in my future design management career.



## Certificate of Ethical Approval

Applicant: Dao Phuoc  
Project Title: HOW DESIGN MANAGEMENT CAN IMPROVE RECYCLING RATES OF PLASTIC PACKAGING FOR YOUNG PEOPLE IN THE UK?

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Medium Risk

Date of approval: 15 Sep 2021  
Project Reference Number: P125383





## Medium Risk Research Ethics Approval

Project title

**HOW DESIGN MANAGEMENT CAN IMPROVE RECYCLING RATES OF PLASTIC PACKAGING FOR YOUNG PEOPLE IN THE UK?**

### Record of Approval

#### Principal Investigator

I <b>request an ethics peer review</b> and confirm that I have answered all relevant questions in this checklist honestly.	X
I confirm that I will carry out the project in the ways described in this checklist. I will immediately suspend research and request new ethical approval if the project subsequently changes the information I have given in this checklist.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the Code of Research Ethics issued by the relevant national learned society.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the University's Research Ethics, Governance and Integrity Framework.	X
I understand that I cannot begin my research until this ethics application has been approved.	X

Name: Dao Phuoc (7007AAD)

Date: 08/08/2021

#### Student's Supervisor (if applicable)

I have read this checklist and confirm that it covers all the ethical issues raised by this project fully and frankly. I also confirm that these issues have been discussed with the student and will continue to be reviewed in the course of supervision.

Name: Emma Waight

Date: 15/09/2021

#### Reviewer (if applicable)

Date of approval by anonymous reviewer: -

## Medium Risk Research Ethics Approval Checklist

### Project Information

Project Ref	P125383
Full name	Dao Phuoc
Faculty	Faculty of Arts and Humanities
Department	School of Art and Design
Supervisor	Emma Waight
Module Code	7007AAD
EFAAF Number	
Project title	HOW DESIGN MANAGEMENT CAN IMPROVE RECYCLING RATES OF PLASTIC PACKAGING FOR YOUNG PEOPLE IN THE UK?
Date(s)	13 Sep 2021 - 31 Jan 2022
Created	11/07/2021 19:25

### Project Summary

The project will investigate ways to increase recycling rates among younger consumers specifically millennials and generation Zs.

The project will be user focussed and will utilise both primary and secondary research to get quantitative and qualitative data.

Secondary research will use books, journals or articles from the internet, Research gate and CU library. Additionally finding existing case studies such as on Ted talks or Podcasts.

This project is based on User centered design so primary research will be done by using 2 focus groups including story telling and Co design method of young people including Millennials and Generation Zs.

After collecting and analysing the information collected, a new recycling solution for plastic packaging will be developed. Then making a prototype. Finally, a new qualitative survey will be done with the same interviewees to get their feedback from the prototype in order to complete the final outcome.

Names of Co-Investigators and their organisational affiliation(place of study / employer)	N/a
Is this project externally funded?	No
Are you required to use a Professional Code of Ethical Practice appropriate to your discipline?	No
Have you read the Code?	No

### Project Details

<p>What are the aims and objectives of the project?</p>	<ul style="list-style-type: none"> <li>- To help identify major problems or difficulties that consumers face in relation to plastic recycling especially that of plastic packaging.</li> <li>- Understanding what motivates young people about recycling and establish what are their needs in relation to the problem of getting them to recycle more of their discarded plastic packaging.</li> <li>- Develop a solution for encourage the recycling of plastic packaging by building a prototype mobile phone application or something similar that is easy to understand and use.</li> <li>- Completing a final outcome which encourage the recycling of plastic packaging and is a simple, easy and convenient way forward that is less confusing for consumers especially young people.</li> </ul>
<p>Explain your research design</p>	<p>Beside using secondary research including books, journals or articles from the internet, Research gate and CU library. This study will involve two separate focus groups of younger people. It will use this data to validate findings from a review of existing literature data.</p> <p>The first group will be friends and peers from the Coventry University community which I will personal contact and invite through social media.</p> <p>This is a qualitative research study and will involve story telling with follow up questions and will use co design methods to ask them with appropriate workable solutions.</p> <p>The second focus group will have the same participants but will be feedback of solutions for the project all participants will be asked to provide informed consent after they have had the project and their participation fully explained.</p> <p>It does not seek to collect personally identifiable information.</p>
<p>Outline the principal methods you will use</p>	<ul style="list-style-type: none"> <li>- Literature review,</li> <li>- Focus group</li> <li>- Story telling</li> <li>- Co-design</li> </ul>
<p>Are you proposing to use a validated scale or published research method / tool?</p>	<p>No</p>

### Data Analysis

Does the research seek to understand, identify, analyse and / or report on data / information on terrorism or from terrorist organisations?	No
Does your research seek to understand, identify, analyse and / or report on information for other activities considered illegal in the UK and / or in the country you are researching in?	No
Are you dealing with Secondary Data? (e.g. sourcing info from websites, historical documents)	Yes
Is this data publicly available?	Yes
Could an individual be identified from the data? e.g. identifiable datasets where the data has not been anonymised or there is risk of re-identifying an individual	No
Are you dealing with Primary Data involving people? (e.g. interviews, questionnaires, observations)	Yes
Are you dealing with personal data?	No
Are you dealing with sensitive data (special category data)?	No
Is the project solely desk based? (e.g. involving no laboratory, workshop or offcampus work or other activities which pose significant risks to researchers or participants)	Yes
Will the data collection, recruitment materials or any other project documents be in any language other than English?	No
Are there any other ethical issues or risks of harm raised by the study that have not been covered by previous questions?	No

**DBS (Disclosure & Barring Service) formerly CRB (Criminal Records Bureau)**

Question		Yes	No
<b>1</b>	Does the study require DBS (Disclosure & Barring Service) checks?		X
	If YES, Please give details of the level of check, serial number, date obtained and expiry date (if applicable)		
<b>2</b>	If NO, does the study involve direct contact by any member of the research team:		
	a) with children or young people under 18 years of age?		X
	b) with adults who have learning difficulties, brain injury, dementia, degenerative neurological disorders?		X
	c) with adults who are frail or physically disabled?		X
	d) with adults who are living in residential care, social care, nursing homes, re - ablement centres, hospitals or hospices ?		X
	e) with adults who are in prison, remanded on bail or in custody?		X
	If you have answered YES to any of the questions above please explain the nature of that contact and what you will be doing		

**External Ethics Review**

Question		Yes	No
1	Will this study be submitted for ethical review to an external organisation ? (e.g. Another University, Social Care, National Health Service, Ministry of Defence, Police Service and Probation Office)		X
	If YES, name of external organisation		
2	Will this study be reviewed using the IRAS system?		
3	Has this study previously been reviewed by an external organisation?		

**Confidentiality, security and retention of research data**

Question		Yes	No
1	What data are you collecting / using / recording?	<p>Qualitative data using focus group prompt sheet which will be share in advance. Consent form ad participant information form will be given to the participants before the session begin. The session will be recorded for transcription purposes only and the data will be destroy after transcribing. The data will not collect any individual identifiable.</p> <p>Photos and videos may be taken if participants write or draw their idea's solution for improving plastic recycling and when people using solution's prototype. However, people will not be photographed and videoed.</p>	
2	Are there any reasons why you cannot guarantee the full security and confidentiality of any personal or confidential data collected for the study?		X
	Please provide an explanation	All data will be password protected and no personal data will be stored.	
3	Is there a significant possibility that any of your participants, and associated persons, could be directly or indirectly identified in the outputs or findings from this study?		X
	Please provide an explanation	No individual will be identified.	
4	Is there a significant possibility that a specific organisation or agency or participants could have confidential information identified, as a result of the way you write up the results of the study?		X
	Please provide an explanation	No organisation or agency or participants will be identified.	
5	Will any members of the research team retain any personal of confidential data at the end of the project, other than in fully anonymised form?		X
	Please provide an explanation	No sensitive or personal data will be identified.	
6	Will you or any member of the team intend to make use of any confidential information, knowledge, trade secrets obtained for any other purpose than the research project ?		X
	Please give an explanation	No confidential data will be collected.	
7	Have you taken necessary precautions for secure data management, in accordance with data protection and CU Policy	X	
8	Specify location (physical and electronic) where data will be stored	All information will be stored on One Drive and will be deleted after the project finish.	
9	Will you be responsible for destroying the data after study completion?	X	
	If NO, who will be responsible for this?		
	Please explain how any identifiable and anonymous data will be destroyed	Delete all files.	
	Planned disposal date	31 Jan 2022	

**Participant Information and Informed Consent**

Question		Yes	No
1	Will all the participants be fully informed BEFORE the project begins why the study is being conducted and what their participation will involve ?	X	
	Please explain why		
2	Will every participant be asked to give written consent to participating in the study, before it begins ?	X	
	If NO, please explain how you will get consent from your participants.If not written consent, explain how you will record consent		
3	Will all participants be fully informed about what data will be collected, and what will be done with this data during and after the study ?	X	
	If NO, please specify		
4	Please explain what recordings (audio, visual or both) will be made and how you will gain consent for recording participants	Video recordings of people write or draw solution ideas for improving plastic recycling. No identity will be recorded. Consent form will be signed before the activity takes place.	
5	Will all participants understand that they have the right not to take part at any time, and/or withdraw themselves and their data from the study if they wish?	X	
	If NO, please explain why		
6	Will every participant understand that there will be no reasons required or repercussions if they withdraw or remove their data from the study?	X	
	If NO, please explain why		
7	Does the study involve deceiving, or covert observation of, participants ?		X
	Will you debrief them at the earliest possible opportunity?		
	If NO to debrief them, please explain why this is necessary		



**Risk of harm, potential harm and disclosure of harm**

Question		Yes	No
1	Is there any significant risk that the project may lead to physical harm to participants or researchers ?		X
	If you have answered Yes, please explain how you will take steps to reduce or address those risks. If you have answered No, explain why you believe this is the case	N/A	
2	Is there any significant risk that the project may lead to psychological or emotional distress to participants and/or researchers?		
	If you have answered Yes, please explain how you will take steps to reduce or address those risks. If you have answered No, explain why you believe this is the case		
3	Is there any risk that your project may lead or result in harm to the reputation of the University Group, its researchers or the organisations involved in the study?		X
	If you have answered Yes, please explain how you will take steps to reduce or address those risks. If you have answered No, explain why you believe this is the case	N/A	
4	Is there a risk that the project will lead to participants to disclose evidence of previous criminal offences, or their intention to commit criminal offences?		X
	If you have answered Yes, please explain how you will take steps to reduce or address those risks. If you have answered No, explain why you believe this is the case	N/A	
5	Is there a risk that the project will lead participants to disclose evidence that children or vulnerable adults are being harmed, or at risk or harm?		X
	If you have answered Yes, please explain how you will take steps to reduce or address those risks. If you have answered No, explain why you believe this is the case	N/A	
6	Is there a risk that the project will lead participants to disclose evidence of serious risk of other types of harm ?		X
	If you have answered Yes, please explain how you will take steps to reduce or address those risks. If you have answered No, explain why you believe this is the case		X
	Will participants be made aware of the circumstances in which disclosure has implications for confidentiality?		

### Payments to participants

Question		Yes	No
1	Do you intend to offer participants cash payments or any kind of inducements, or reward for taking part in your study ?		X
	If YES, please explain what kind of payment you will be offering(e.g.prize draw or store vouchers)		
2	Is there any possibility that such payments or inducements will cause participants to consent to risks that they might not otherwise find acceptable ?		
	If YES, please explain)		
3	Is there any possibility that the prospect of payment or inducements will influence the data provided by participants in any way ?		
	If YES, please explain)		
4	Will you inform participants that accepting payments or inducements does not affect their right to withdraw from the study at any time ?		

**Capacity to give valid consent**

Question		Yes	No
<b>1</b>	Do you propose to recruit any participants who are:		
	a) children or young people under 18 years of age?		X
	b) adults who have learning difficulties, mental health conditions, brain injury, advanced dementia, degenerative neurological disorders ?		X
	c) adults who are physically disabled and cannot provide written and/or verbal consent		X
	d) with adults who are living in residential care, social care, nursing homes, reablement centres, hospitals or hospices ?		X
	e) with adults who are in prison, remanded on bail or in custody?		X
	If you have answered YES to any of the questions above please explain overcome any challenges to gaining valid consent		
<b>2</b>	Do you propose to recruit any participants with possible communication difficulties, including difficulties arising from limited use of knowledge of the English language ?		X
	If YES, please explain how you will overcome any challenges to gaining valid consent		
<b>3</b>	Do you propose to recruit participants who may not be able to fully understand the nature of the study, the foreseen implications or cannot provide consent?		X
	If YES, please explain how you will overcome any challenges to gaining valid consent		

## Recruiting Participants

Question		Yes	No
1	Who are the participants?	Friends and peers from CU who are young people living in the UK.	
2	How are participants being recruited? Please provide details on all methods of recruitment you intend to use	Via social media direct message to my young friends and peers.	
3	Do you foresee any conflict of interest?	X	
	Please explain how will this conflict of interest be addressed	I will only ask people who I do not have a position of authorities over.	

### Online and Internet Research

Question		Yes	No
1	Will any part of your project involve collecting data via the internet or social media?		X
	If YES, please explain how you will obtain permission to collect data by these means		
2	Will this require consent to access?		
	If NO, please explain how you will get permission/ consent' to collect this information?		
3	Will you be collecting data using an online questionnaire/ survey tool? (e.g. BoS, Filemaker)?		X
	If YES, please explain which software and how you are ensuring appropriate data security		
4	Is there a possibility that the study will encourage children under 18 to access inappropriate websites, or correspond with people who pose risk of harm ?		X
	If YES, please explain further		
5	Will the study incur any other risks that arise specifically from the use of electronic media ?		X
	If YES, please explain further		

**Information gathered from human participants**

Question		Yes	No
Primary			
1	Does your project involve primary data collection from human participants via questionnaires, focus groups, interviews, psychological tests, photography/videography etc.?	X	
	If YES, Please detail the information to be collected and methods that will be used.	Focus groups of young friend and peers from Coventry University. There will be recruitment of participants via social media direct message. The first focus group will involve story telling and following questions from their stories, then Co design method for getting their solution ideas about improving plastic recycling. The second one will have the same participants to get their feedback from a solution prototype.	
2	Is there the possibility of physical or psychological harm to the researcher(s) or the participants?		X
	If YES, please explain the possible harm and action taken to reduce/remove the risk		
3	Are any specific exclusions needed to prevent possible harm to participants (e.g. excluding people with known mental health problems)?		X
	If YES, please explain exclusions needed and how these will be carried out		
4	Are any of the questionnaires or other tests being used in the research diagnostic for specific clinical conditions?		X
	If YES, Please explain how you will take steps to reduce or address these risks		

## CONSENT FORM

### HOW CAN DESIGN MANAGEMENT IMPROVE RECYCLING RATES OF PLASTIC PACKAGING IN THE UK?

You are invited to take part in the above research project for the purpose of collecting data on:

- Helping identify major problems or difficulties that consumers face in relation to plastic recycling especially that of plastic packaging.
- Understanding what motivates young people about recycling and establish what are your needs in relation to the problem of getting you to recycle more of your discarded plastic packaging.
- Developing a solution to encourage recycling of plastic packaging that is easy to understand and use.

Before you decide to take part, you must read the accompanying Participant Information Sheet and [Privacy Notice](#)

**Researcher(s):** Nghiem Thien Phuoc Dao  
**Department:** Faculty of Arts and Humanities  
**Contact details:** daonghiemd@uni.coventry.ac.uk

**Supervisor name:** Emma Waight  
**Supervisor contact details:** ac9048@coventry.ac.uk

This form is to confirm that you understand what the purposes of the research project are, what will be involved and that you agree to take part. If you are happy to participate, please initial each box to indicate your agreement, sign and date the form, and return to the researcher.

Please do not hesitate to ask questions if anything is unclear or if you would like more information about any aspect of this research. It is important that you feel able to take the necessary time to decide whether or not you wish to take part.

1	I confirm that I have read and understood the <u>Participant Information Sheet</u> for the above research project and have had the opportunity to ask questions.	
2	I understand that all the information I provide will be held securely and treated confidentially. I understand who will have access to any personal data provided and what will happen to the data at the end of the research project.	
3	I understand my participation is voluntary and that I am free to withdraw my participation and data, without giving a reason, by contacting the lead <u>at any time</u> until the date specified in the Participant Information Sheet.	
4	I understand the results of this research will be used in academic papers and other formal research outputs.	
5	I am happy for the interview to be audio/ <u>video recorded</u> .	
6	I agree to take part in the above research project.	

\_\_\_\_\_  
**Name of Participant**

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Name of Researcher**

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Date**

## **Participant Information Sheet for**

### **HOW CAN DESIGN MANAGEMENT IMPROVE RECYCLING RATES OF PLASTIC PACKAGING FOR THE YOUNG GENERATION IN THE UK?**

You are being invited to take part in research on improving recycling rates of plastic packaging for the young generation in the UK. Nghiem Thien Phuoc Dao, Student at Coventry University is leading this research. Before you decide to take part, it is important you understand why the research is being conducted and what it will involve. Please take the time to read the following information carefully.

#### **What is the purpose of this research?**

The purpose of the research is to:

- Help identify major problems or difficulties that consumers face in relation to plastic recycling especially that of plastic packaging.
- Understand what motivates young people about recycling and establish what are your needs in relation to the problem of getting you to recycle more of your discarded plastic packaging.
- Develop a solution to encourage recycling of plastic packaging that is easy to understand and use.

#### **Who is organising the research?**

The research is being organised by Coventry University. The research was granted ethical approval by Coventry University's Research Ethics Committee **P125383**.

#### **Do you have to take part?**

No – it is entirely up to you. If you do decide to take part, please keep this Information Sheet, and complete the Consent Form to show that you understand your rights in relation to the research, and that you are happy to participate. Please note down your participant number and provide this to the lead researcher if you wish to withdraw from the research at a later date. You are free to withdraw your information from the research at any time until the data is destroyed on 31/01/2022. You do not need to provide a reason for withdrawing. A decision to withdraw, or not to take part, will not affect you in any way.

#### **What will happen if I decide to take part?**

This is a two-part study, in the first one, you will be asked to tell a story about your experience of recycling especially plastic in the UK. If you are from outside the UK, you will be asked to compare the recycling experience you have had in the UK to your own country. Follow up questions may be asked after your storytelling. Finally, you will be asked to provide any solutions that you think may work for improving plastic recycling in the UK. Again, follow up questions may be asked when you provide any solutions to help Nghiem Thien Phuoc Dao understand in detail what you need and want.

The second part will be a usability testing study in which you will be asked to experiment with a prototype solution. Follow up questions will be asked to gather feedback for the researcher.

The focus group will take place online through Zoom call or Whatsapp call. The first activity should take around 1 and a half hours including 45 minutes for Storytelling and following questions, and 45 minutes for Co-design and following questions. There will be a short break between the two parts. Nghiem Thien Phuoc Dao would like to record your responses. No identity will be recorded.



The usability testing will be run on another day and should be around an hour. Nghiem Thien Phuoc Dao also would like to record your responses.

**Why have you been invited to take part?**

You have been invited to participate in this research because you are living in the UK.

**What are the benefits and potential risks and benefits in taking part?**

By taking part, you will be helping Nghiem Thien Phuoc Dao and Coventry University to better understand major problems or difficulties that consumers face in relation to plastic recycling especially that of plastic packaging. Understand what motivates young people about recycling and establish what are your needs in relation to the problem of getting you to recycle more of your discarded plastic packaging. There are no significant risks associated with participation.

**What information is being collected in the research?**

Your experience about recycling plastic in the UK or your own country and solutions and ideas for improving plastic recycling in the UK are being collected through this research.

**What will happen to the results of the research?**

The results of this research may be summarised in published articles, reports and presentations. Quotes or key findings will always be made anonymous in any formal outputs unless we have your prior and explicit written permission to attribute them to you by name

**Who will have access to the information?**

Your data will only be accessed by Nghiem Thien Phuoc Dao.

**Where will the information be stored and how long will it be kept for?**

Your data will be processed in accordance with the UK General Data Protection Regulation 2016 (UK GDPR) and the Data Protection Act 2018 (DPA). All information collected about you will be kept strictly confidential. Unless they are fully anonymised in our records, your data will be referred to by a unique participant number rather than by name. If you consent to being audio recorded, all recordings will be destroyed once they have been transcribed.

All electronic data will be stored One Drive. All paper records will be stored in a locked filing cabinet in researcher's home. Your consent information will be kept separately from your responses. The researcher will take responsibility for data destruction and all collected data will be destroyed on or before 31/01/2022.

**What will happen next?**

If you would like to take part, please contact the lead researcher. You will be asked to complete a consent form before taking part.

**Researcher contact details:**

Nghiem Thien Phuoc Dao. Email: [daonghiemd@uni.coventry.ac.uk](mailto:daonghiemd@uni.coventry.ac.uk). Phone: 07506333201

**Who do I contact if I have any questions or concerns about this research?**

If you have any questions, or concerns about this research, please contact the researcher. If you still have concerns and wish to make a complaint, please contact the University's Research Ethics and Integrity Manager by e-mailing [ethics.uni@coventry.ac.uk](mailto:ethics.uni@coventry.ac.uk). Please provide information about the research project, specify the name of the researcher, and detail the nature of your complaint.

Thank you for taking time to read this information sheet and for considering participating in this research.

**Focus Groups Outline for**  
**HOW CAN DESIGN MANAGEMENT IMPROVE RECYCLING RATES**  
**OF PLASTIC PACKAGING IN THE UK?**

**I. WELCOME**

Thanks for agreeing to participate in this focus group.

**II. INTRODUCTION**

My name is Nghiem Thien Phuoc Dao and I am a researcher.

**III. PURPOSE OF FOCUS GROUPS**

There are two focus group studies that will be held. The reason we are having these focus groups is to:

- Help me identify major problems or difficulties that consumers face in relation to plastic recycling especially that of plastic packaging.
- Understand what motivates people about recycling and establish what are your needs in relation to the problem of getting you to recycle more of your discarded plastic packaging.
- Develop a solution to encourage recycling of plastic packaging that is easy to understand and use.

Therefore, I need your input and want you to share your honest and open thoughts with me.

**IV. DURATION**

The first activity should take around 1 and a half hours including 45 minutes for Storytelling and follow up questions, and 40 minutes for Co-design and further follow up questions. There will be a short break between the two parts.

The second one is a usability testing study that will be run on another day and should be around an hour.

**V. GROUND RULES**

There are some rules for these focus groups

**1. TO DO THE TALKING**

I would like everyone to participate if possible. I may call on you if I haven't heard from you during the allotted time.

**2. THERE ARE NO RIGHT OR WRONG ANSWERS**

Every person's experiences and opinions are important. Speak up whether you agree or disagree. I hope to have a broad spectrum of opinions and ideas.

**3. WHAT IS SAID IN THIS ROOM STAYS HERE**

I want people to feel comfortable sharing about anything that come up.

#### **4. RECORDING THE GROUP**

I want to capture everything you have to say. I don't identify anyone by name in our report. You will remain anonymous. I will record this, but no faces will be seen.

### **VI. QUESTIONS – STORYTELLING**

#### **1. ENGAGEMENT QUESTION**

To begin, please tell me about your experience of plastic recycling in the UK or your own countries?

When did you first become aware of the problem of plastic pollution?

Have you changed your behaviour about plastic usage over the years?

Have you had any difficulties recycling plastic?

#### **2. FOLLOW UP – EXPLORATION QUESTION**

What do you think about current plastic recycling systems in the UK?

Are they good enough or could they be improved? If they need to be improved, please tell me how?

#### **3. EXIT QUESTION**

Is there anything else you would like to say about why you do or do not recycle plastic?

This is the end of the first part, we will have a short break before moving to the second part.

### **VII. QUESTIONS – CO DESIGN METHOD**

#### **1. ENGAGEMENT QUESTION**

What can be done to encourage people to recycle plastic?

#### **2. FOLLOW UP – EXPLORATION QUESTION**

What do you think we can do to change people's behaviour? Carrot or stick?

Please explain why you choose that?

#### **3. EXIT QUESTION**

Are there any more solutions that you think might help?

This is the end of the first focus group. For the second one, I will contact you. Thank you for your participation.

### **VIII. QUESTIONS – USABILITY TESTING**

#### **1. ENGAGEMENT QUESTION**

What do you think about this solution?

#### **2. FOLLOW UP – EXPLORATION QUESTIONS**

Is it easy to use?

It is confusing when you use it?

Would it help you to recycle more?

#### **3. EXIT QUESTION**

Is there anything else you think this solution needs to be improved?

**This is the end of the discussion. Thank you very much for taking part in.**