MA Dissertation

A Guide to Buying a Dog Online

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How can data visualisation be used to help consumers make ethical purchasing decisions when buying a dog online?

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MA Design Informatics

Dyslexic

11760 words

Acknowledgements

Contents

Abstract

The online dog market
is complex for buyers to
navigate due to the lack of
legal legislation and little
consumer knowledge. This
dissertation aims to explore
how information visualisations
can help consumers make
ethical purchasing choices.
This was achieved through
a user centred co-design
method, which helped inform
the development of an online
resource. Data visualisation
worked for utilitarian decisions
making however, different
information visualisation
practices should be explored
for impacting emotional
decision making. The website
encouraged users to make
more ethical decisions in most
cases.

Introduction

The online sales of domestic animals such as dogs has long been unregulated by the UK government. In 2018 legislation was passed that allowed for better monitoring of dog breeding businesses. However, the awareness of these regulations could easily go unseen by market consumers if they fail to do extensive research into best practices. Ethical problems consumers face span from choosing a healthy breed, to sourcing an animal from a breeder that follows animal welfare regulations. Consumers that do not take time to consider these issues are not just likely to buy an unhealthy animal. They may also help bad breeders' profit from unethical practises.

The aim of this body of work was to explore whether data visualisation is an effective aid for consumer decision making in the online pet buying market. Finding out if it allows people to make more informed and ethical decisions. A prototype online resource was created that identified pet market issues and helps users understand what the information in adverts means about the breeding/health of the animal. Data visualisation was used to show the existence and frequency of these issues in the dog market. The data used was made up of online dog adverts posted in 2018. The prototype was tested with target users to determine the effect the resource had on decision making.

An agile co-design approach was taken to develop the prototype. The research conducted for this project was formed of six parts: Focus group of target users, visualisation data analysis, interview with trainee vet, workshop with target users, and user testing. Two iterations of the prototype were created based on the results of each workshop.

The first focus group was used to explore the thought process and real purchasing journey of users who had already made a purchase. The Minimum Viable Product (MVP) prototype was developed based on its findings. The first prototype can be seen in figure 2. The vet interview and co-design workshop were conducted to gain feedback on the MVP prototype. Through this iterative co-design process, the prototype was developed further. The second prototype can be seen in figure 3. Finally, user testing was conducted to gain insight into whether the website positively effects users' decision making.

Figure 1 Research timeline

Primary Data Analysis   Vet Interview   Final Prototype

User Focus Group   MVP Prototype   Co-design Workshop   User Testing

Figure 2 MVP prototype
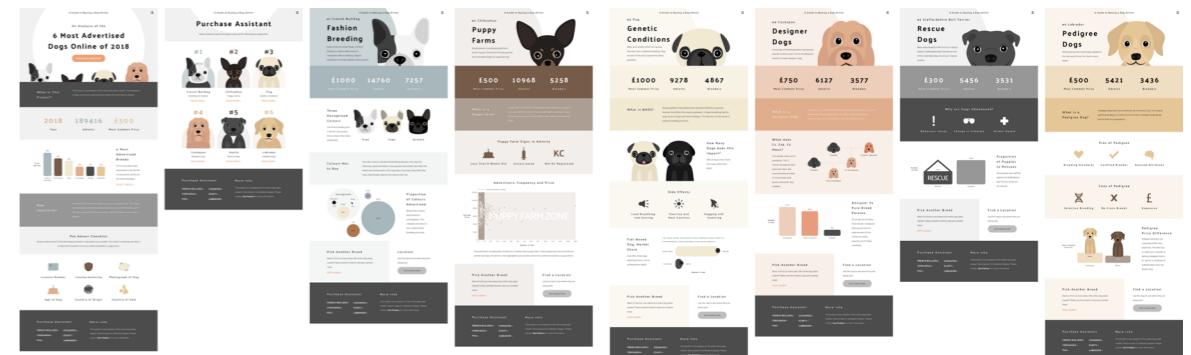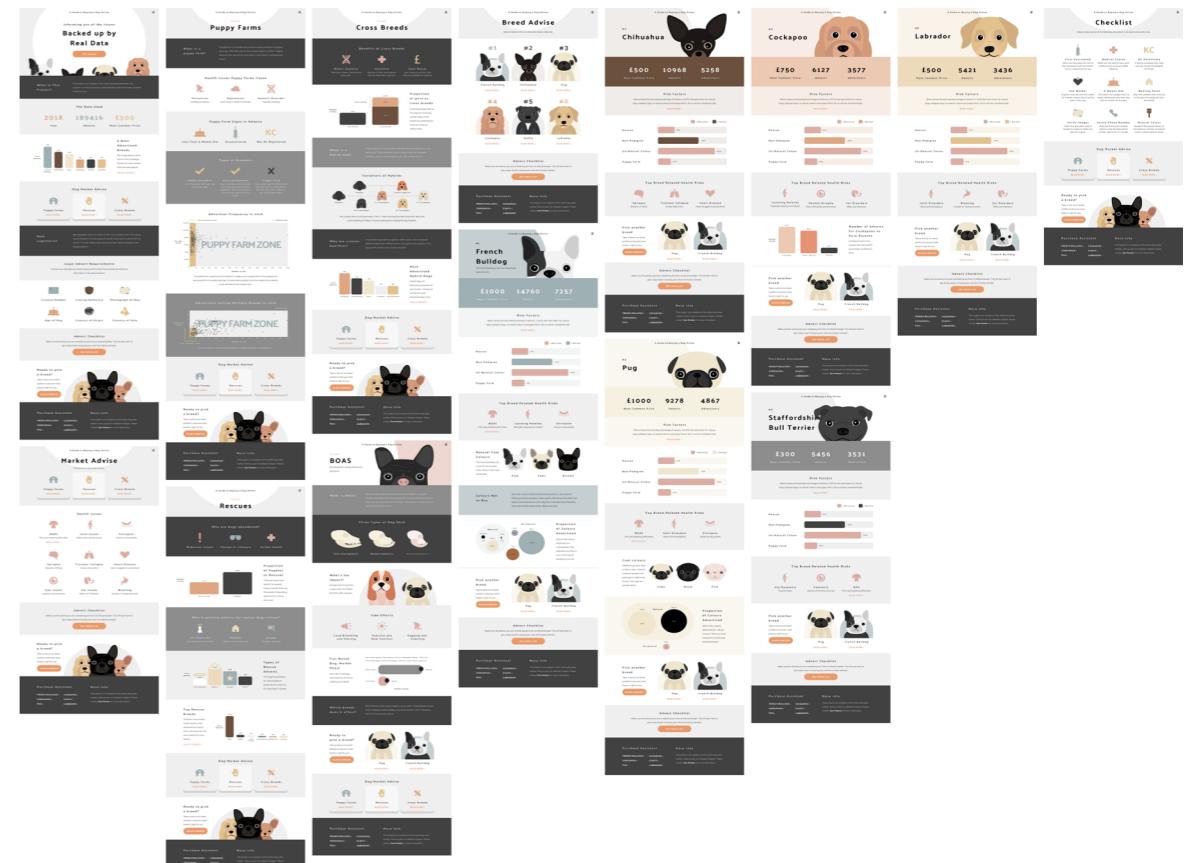
Figure 3 Final prototype

Background

Dog Market

Puppy Farms

A puppy farm is defined as the mass production of puppies with little regard for animal welfare (Cooke, 2011). The RSPCA (2019) reported that 87% of the calls reporting puppy farms had been about animals brought online. A solution to this issue could be raising public awareness of the new legislation (Dogs Trust, 2018). However, Dogs Trust (2018) found in a survey that 37% of buyers do no research when buying a dog.

There are numerous issues around purchasing dogs from puppy farms, the most serious of which include life-long health problems relating to pedigree and inbreeding. Dogs from puppy farms are four times more likely to suffer from Parvovirus than dogs brought from independent breeders and will cost more money in vet bills overall in their lifetime (The Kennel Club, 2019). Parvovirus is a contagious disease that causes diarrhoea, vomiting and can lead to death (Uzuegbu, 2015). A study into Parvovirus found that young animals living in depressing environments are the most at risk to contracting the virus (Godsall et al, 2010).

In 2018 new animal welfare legislation came into effect. This means there are now regulatory requirements imposed on UK animal breeders. The legislation dictates all advertisements of animals for sale must include; the breeders licence number, local authority that issued the licence, photograph, age, origin and country of sale (The Animal Welfare Regulations). Breeders who produce more than 3 litters per year or sell animals for profit now require a breeding licence from the local council. These regulations are part of an effort to demolish puppy farming. However, the Blue Cross revealed that due to budgetary cuts local authorities have a limited ability to effectively enforce animal welfare law (BMJ, 2016).

Before the new legislation, the only way to officially confirm a dog was not the product of a puppy farm was to go through The Kennel Club Assured Breeder scheme (The Kennel Club, 2019). The Kennel Club has many regulations for its breeders like limiting the number of litters register to 4 per mother (2019).
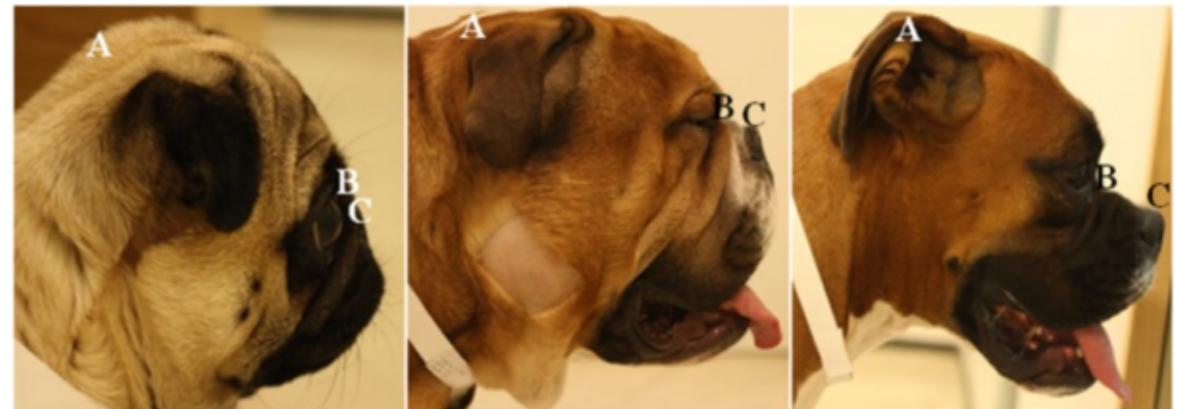
Genetic Conditions

There are some that believe the selective breeding practices promoted by organisations like the Kennel Club can be harmful to flat nosed dogs like pugs and bulldogs (Hanson, 2016). Brachycephalic Airway Obstruction Syndrome (BAOS) is a genetic condition that makes breathing difficult for flat nosed dogs due to their skull structure (McAlinden, 2012). Figure 4 shows the variations of flat skulls. Fawcett's research (et al, 2018) found that this disorder also leads to other conditions later in life including; neurological, dermatological, ophthalmic and orthopaedic. All flat nosed dogs are affected by this disorder but 50% suffer extensively (UFAW, 2019). Current surgical solutions to this medical condition can cost up to £1500 (Embrace Pet Insurance, 2019). The Kennel Club (2019) has started DNA testing to breed away from harmful genes that cause genetic conditions and are funding research into BAOS (University of Cambridge, 2019).

Figure 4 Diagram of how to measure (i) cranial length (A-B) and (ii) muzzle length (B-C) (Packer et al, 2015)

Irregular dog colours have become a popular trend and a way for breeders to charge above market value for dogs. Examples of this include; blue French Bulldogs and pink Pugs. The French Bulldog Club of England (2019) only recognise three colours; Pied, Fawn and Brindle. Any other colours are un-natural and is a sign of abnormal genes that can cause medical issues such as; blindness and dermatological conditions (Dibert, 2017). Pink pugs get their abnormal colour due to being albino and suffer from a variety of other dermatological conditions as a side effect of the disease (Dogs Trust, 2018).

Cross Breeding

Cross breeds have been found to be genetically healthier than pure breeds meaning they are unlikely to suffer from any of the hereditary conditions related to pure breeds. A study (Keijser et al, 2017) found that pure breeds had more hereditary related diseases during their adolescence than mixed breed dogs. This is because dogs that share similar genetics are likely to pass down more disease-causing genes to their offspring (Root Kustritz, 2006). One solution to reducing disease causing genes is cross-breeding (Wedderburn, 2017). In 2015 a study proved back-breeding was an effective method for removing disease causing genes from dogs (Farrell et al). Back breeding is when two different pure breeds of dog are bred to have a cross breed litter. The offspring dogs are then bred back with one of the original pure breeds. By generation ten the dog will be 99% the original breed but will be prone to less genetic disease. Figure 5 depicts the process of back-breeding.
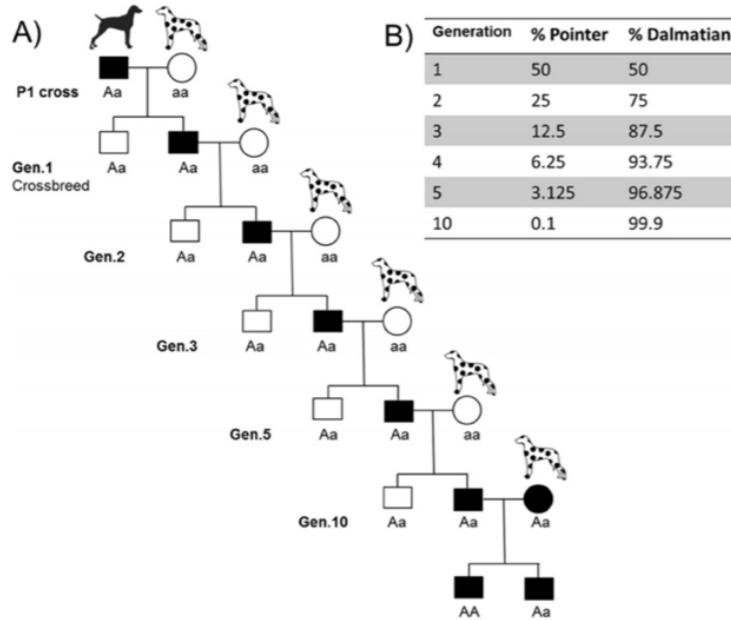

Figure 5
Replacing a detrimental allele (Farrell et al, 2015)

| Generation	% Pointer	% Dalmatian
1	50	50
2	25	75
3	12.5	87.5
4	6.25	93.75
5	3.125	96.875
10	0.1	99.9
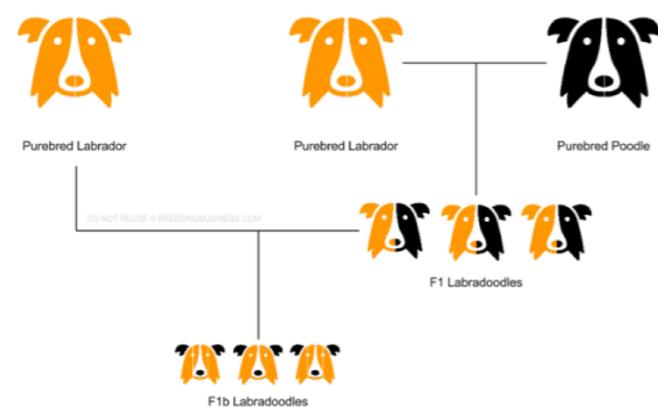
Figure 6 Chart of an F1B Hybrid Dog (Lazharichir, 2015)

Hybrid dogs, commonly referred to as 'designer' dogs, are the product of the cross or back breeding. Designer dogs are not classed as breeds but rather types (Pets4Homes, 2017). Therefore, they are not recognised by The Kennel Club in the UK. This means it is harder to find assured breeders of these types of dogs. Figure 6 shows the different variations of the dogs and shows similarities to the back-breeding practices shown in figure 5.

Rescues

There are many ways to rescue a dog, the most common way in the UK is to go through a charity like the RSPCA or Dogs Trust. Animal Shelter or Rescues are organisations run by the government or a charity that take in unwanted animals and find them new homes (Cyrenne, 2019). The RSPCA (2019) and Dogs Trust Dog School (2019) have a combined 183 rescue branches across the UK. Dogs Trust (2019) estimates that 130,000 dogs get rehomed every year in the UK. In 2018 the RSPCA rescued 102,900 animals but found new homes for less than half.

Staffordshire Bull Terriers were found to be the most likely dogs to end up in a rescue shelter, in the UK (BMJ, 2017). They also take an extra two weeks to rehome than more desirable breeds (Oldfield, 2018). However, the number of Staffordshire Bull Terriers has reduced by 29 percent since 2016 (Winter, 2019). This is thought to be due to popular 'hand bag' dogs like, French Bulldogs, Chihuahuas and Dachshunds and a rise in abandonment rates. Some believe this is due to celebrities and social media glamorising this type of dog. Therefore people, purchase them before doing research into caring for an animal, which results in abandonment (Barnard, 2019).

There are many reasons why a dog would be abandoned by their owner. However, the most common reason people abandon dogs is due to behavioural issues (Towell, 2018). A study also found that nearly all rescue dogs taken into dog shelters are returned because of behavioural problems (Mondelli et al, 2004). A paper, that looked into rescue dogs' behaviour problems, found that puppies and juvenile dogs were less likely to display behavioural problems (Wells and Hepper, 2000). They suggested raising awareness of behavioural therapy and introducing schemes in rescue centres could lower the number of dogs being abandoned.

Many people in the UK have started rescuing dogs from Europe. Pirnay (2017) gave a presentation on stray animals which suggested there is a greater problem in Eastern Europe. This is thought to be because animals are less likely to be picked up by charities and shelters. Due to this, the stray population grows quickly due to un-neutered strays breeding. There are over 30 charities that help people in the UK adopt stray dogs from Eastern Europe with more than 30,000 being imported over in 2016 (Warren, 2017). Carter (2016) argued that adopting a dog from Eastern Europe, while beneficial to the individual animal, does not solve the wider problem. It needs to be properly addressed in by the European governments and measures taken to ensure the care of all the stray animals. The Dogs Trust encourage the public not to rescue dogs from Europe due to disease and cost to import (Wollaston, 2019).

Decision
Making

Ethical Decisions

It is thought among psychologists there are two main frameworks for moral decision making; utilitarian and deontological (Xu and Ma, 2016). Utilitarian choices are based on factual reasoning (Brandy and Wheeler, 1996) whereas, deontological decisions are based on previous experience and following social norms (Alexander and Moore, 2007). In a study of online shopping behaviour, Overby and Lee (2006) found that users make judgements based on utilitarian reasoning; the price, convince and functionality of a product is considered more important than visual appeal. However, many believe that big moral decisions are mainly made upon emotion (Koven, 2011). Olekalns (2015) believes the factors that impact emotion are; "power", "culture" and "gender". There is no method to make sure any decision is completely moral (Michelon, 2006).

Group decisions generally need a leader to make sure the decision is fair. Chatterjee (et al, 2009) believes that a facilitator of group decision is required to create an ethical standard that allows for a moral decision to be made using a deontological decision-making framework. Individual preferences can be changed during social discussion where other opinions are shared (Capuano et al, 2018). Kimura (2018) also found that even in authority rules decisions the outcome is generally made based on group members opinions.

Group decisions effecting family and lifestyle are rarely made to suit one person's needs. Soerjoatmodjo (2016) found that with family decisions, mothers tend to lead the decision-making process. Parents were found to be more likely to take older children's opinions into consideration when making family decisions (Flurry, 2007). Single parents consider children's opinions more deeply as their relationships tends to be more be more dependant of social approval (Watne et al, 2014). Extended family members make good facilitators for nuclear family decisions, because they share the same culture and values (Lien et al, 2018). These social motivations suggest a deontological decision-making process to be common in family decision making scenarios.

Data Visualisation for Decision Making

Sayar and Pierce point out a growing trend in the use of information visuals in making decisions based on data (2013). Sprague and Tory (2012) found data visualisation was a positive tool for motivating users to reach goals which helped users change behaviour patterns. For data visualisation to be effective in decision making it must enable social communication to be incorporated into the process (Moore, 2017). This then allows for the visualisation to spark conversation and criticism of societal behaviour (Pilcher, 2013).

Data visualisation at its core supports a utilitarian way of thinking in terms of decision making, but the design is what influences an emotional response (Danziger, 2008). It is believed that data visualisation cannot be based on reason alone, it must be put into context for the user to fully comprehend the information (Bishop et al, 2013). The importance is not the findings of the data, but the context in which it is presented to the user (Pilcher, 2013). Miller (et al, 2012) believes that weaving a narrative into the presentation of a data visualisation can help highlight the context in a way that is friendly to the user. Using narrative in visualisation helps create an emotional response in the user.

Information Visualisation

Information visualisation takes many forms; data visualisation, infographics and data comics, to name a few. These methods are positive tools for bridging the gaps textual explanations leave (Marchand-Maillet, 2013). Data visualisations are statistical models accompanied by text to put the visualisation in context, this format is generally used in data journalism (Vane, 2017). Infographics are the graphical representation of complex information that allows people to easily understand it (Balliett, 2011). Data comics use narrative to explain a dataset to a user (Bach, 2016). Visualisation is a powerful because the way in which users retrieve information can directly impact their decisions (Dix, 2013).

Data visualisation enables users to see patterns and trends (Sula, 2013). However, Gorkovenko (et al 2018) found that although users could easily spot trends at times, they made incorrect assumptions about the causes and effects that framed these trends. Wang (et al, 2019) also found that data visualisations often need written explanations for users to properly understand the information being presented. Both suggest using data storytelling methods allows for better contextual understanding of the data. Otten (et al, 2015) found infographics had merit in presenting statistical data in a context or narrative that is accessible to users that are less data literate. Segel and Herr (2010) believe for a visualisation narrative to be successful in engaging users it must provide the "Who / What / Where / When / Why / How" of the narrative. Data comics have been found to be better at achieving this type of narrative structure over infographics (Wang et al, 2019).

The framing of the data depends on the user group and information they seek to find (Hullman and Diakopoulos , 2011). Colour can be used to highlight potential risks that can be seen in the data (Daradkeh et al, 2013). Comparison is a proven technique for engaging users with the highest or lowest value in a visualisation (Hullman and Diakopoulos , 2011). To achieve the best user understanding each visualisation should have a maximum of one learning story each (Echeverria et al, 2018). A user centred approach is required in creating information visualisations for the transfer of knowledge to be successful (Gutiérrez et al 2019).

When categorising information for a website it is important to consider what questions users come to the site with (Short, 2007). Upton and Doherty (2007) advise that information should be categorised into sections that are digestible to the user. This way the user can create their own path through the site based upon their own "interests and goals" (Chawla et al, 2019). Call to actions (CTA) are used to direct users on journeys. CTAs are buttons that communicate to the user what or where you want them to go next (Pasman, 2011).

Methodology

Co-Design

This section provides information on the design practices and methods used to conduct and analyse the research conducted in the project. Since the aim of the project was to create an online resource for a specific target user, an agile co-design approach was taken. This approach allowed the creation of a user-cantered resource.

The research conducted in this project was used to build a prototype online resource that helps users make ethical decisions when buying a dog online. So that the prototype could be tailored to the target audiences' needs, a human centred design approach was taken. Co-design methods (Sanders and Stappers, 2008) were used during the focus group and workshop to allow users to help design the information visualisations featured in the prototype. It involved conducting a series of focus groups and workshops that aimed to elucidate what information helped users make more ethical decisions.

An iterative agile workflow was used to support the co-design approach to research. This meant that the site was released in stages. The first iteration was designed as the minimum viable product (MVP). An MVP is a concept used generally by start-ups as a proof of concept to test on customers. Each release

was tested with users which aided the co-design process. It allowed for feedback and improvement while creating the prototypes (Memmel et al, 2007). None of the participants had creative backgrounds therefore activities were tailored towards this. The participants role within the co-creation was to ideate and provide feedback and critique on the prototypes. However, annotations and sketches were encouraged. After each workshop the results were analysed, and the findings were applied to the prototype. This resulted in two iterations of the prototype being created.

Guerrilla User Testing

Guerrilla user testing is a method of conducting usability tests on digital products. This method is popular because it provides rapid feedback at low costs (Nielsen, 1994). This method of user testing was conducted to evaluate the final protypes effect encouraging users to consider more ethical choices in regard to buying a dog online. Audio, video and screen recordings were taken of each session for analysis (Collado, 2013).

Participant Recruitment

The participants that took part in user studies were recruited via a social media dog walking community based in Surrey. Participants needed to fit one of three demographics to participate; (1) have previously brought a dog, (2) currently going through the process of buying a dog or (3) planning on buying a dog in the future. The majority of participants that took part fell into the first or second demographic. A couple of participants took part in every event, but the majority were new recruits.

Data Collection and Analysis

All participants signed consent forms allowing for verbal responses to be audio-recorded and written responses collected for further analysis. Participants who took part in the user testing also consented to being video recorded. Each audio recording was selectively transcribed, for quotes that related to the research. The transcripts and written responses from each event were thematically analysed (Braun et al, 2006). The materials were read through and any key information was highlighted. The highlighted information was then separated into themes, themes were separated using a colour coding system. The themes were then interpreted and reported on.

Findings and Design Process

Focus Group

The following describes, in detail, the research process and findings of the; focus group, vet interview, workshop and user testing. The findings of each research event were then applied to the prototypes. The design processes of the two prototype iterations are described and the design implications of the research findings are discussed.

The purpose of the focus group was to map the process of decision-making consumers go through when buying a dog. Finding out what steps were unanimous and what extra research some consumers conduct to make sure the decision is the most ethical. It was also used as an opportunity to find out how data literate the targets users were. The focus group was made up of three parts; participant survey, dog buying process map and data visualisation review.

The survey was designed to collect the backgrounds of each participants. Determining which participants had purchased a dog before, and how involved with the decision making they were. The survey was sent out and completed a few hours before the focus group started. This is also when participants were assigned a unique ID number, that they were required to write on all materials they produced during the study. This meant each decision role could be analysed separately later on.

The process map was a group activity where participants were asked to write down decisions made and research done, before and during the process of buying a dog, onto post-it notes. Then participants then discussed their notes and as a group put them up on a wall creating a logical process map.

Finally, the participants were shown data visualisations depicting different data about dogs. They were then asked to discuss what they thought each one meant and which they felt were most useful and impactful.

Using the convenient and time saving method of a closed question survey, for collecting background information on participants had limitations. Answers were based on personal opinions rather than evidence. However, answers during the later tasks allowed for a more detailed picture of the participants involvement in the decision-making process to be created.

Creating many individual process maps in interview settings could have created similar results. However, the collaborative focus group approach enabled live comparison of individuals processes to be discussed. It meant that participants reactions to the different ideas and ways of thinking could be recorded. This saved time as analysis in part was done by the participants. The group discussion also helped participants remember research and factors they had considered that may have been missed if the activity was done individually, as other participants had done similar research also. It also made it clear what issues participants all agreed where important and what ideas were limited only a few participants.

The focus group was made up of nine participants aged 20 to 65, four were female and five were male. Since dogs are purchased by both individuals and families, a mixture of participants was required. This way all perspectives would be accounted for within the group, and each participants decision role could be determined.

Figure 8 Focus group process map

Figure 9 Process map flow chart

Process Map Findings

A process map of buying a dog was created during the focus group. Figure 8 shows the process map created. This was then later translated into a flow chart (figure 9). The flow chart was used to understand the decisions people make and in what order.

Decision Roles. Each participant fit into one of four decision roles; (1) head of purchase decision for group, (2) soul purchase decision maker, (3) co-decision maker in group and (4) future decision maker. Three of the participants fit role one, one fit role two, four fit role three, and one fit role four. The participants that fit role one made the decision on behalf
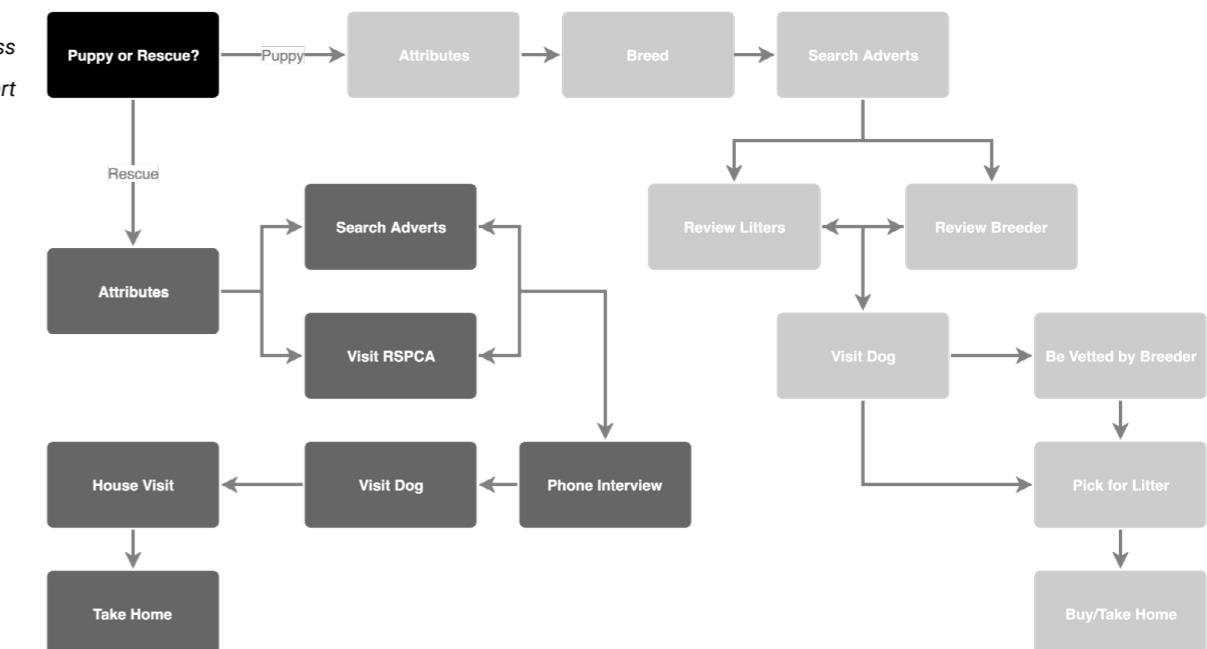
of their family, listening to co-decision makers opinions, but ultimately making the final decision. These participants were all female and were the 'family managers' at home. The participant that fit role two was a single male. The participants that fit role three were the husband or child of a role one persona.

Figure 7 Focus group participants at table

Attributes. The basis for the decision for all participants was dependent on how well the dog would fit into their lifestyle. This was determined by researching the desired attributes and finding a breed that fit that profile the best. All participants started the buying process by researching breeds with their desired set of attributes such as; "non allergenic", "intelligent", "sociable", "size" etc. Choosing the "size" of the dog was the unanimously the first decisions the participants made when narrowing down breeds. Only two of the participants (4 and 8) considered "cuteness" when picking a breed. All participants that wanted a puppy chose their breed before they started looking at pet adverts seriously.

Rescues. All participants had previously brought puppies however, participants 1 and 7 were the only people to have rescued a dog. They found that rescuing was a much trickier process than their previous experience of buying a puppy. "We had two phone interviews and a house visit". Participants who had adopted a rescue made this decision before any other. Once they decided to adopt was made, they went to charities like the "RSPCA" to look at the available dogs "in person". However, they eventually found a pair of dogs to adopt online from Europe, participant 7 said they did this because "it was the only place I could find the breed I wanted to rescue".

Travel and Expenses. None of the participants had a budget when they were looking for a dog. Participant 2 stated that "once you decide on the breed you want, the price doesn't really matter". Participant 8 did not take price or travel into consideration because they "wanted it now".

Timescales. The time scales of each participant differed quite drastically. Participant 5 was put on a "year long waiting list" for their puppy with a "special breeder". Participants 1 and 7 spent a few months going through the rescue process before receiving their dogs. Whereas participant 8 took three days to research and buy their dog. Participant 8 "we should have took more time".

Internet. Participants used the internet to do most of their preliminary research. They used a variety of information websites such as; "The Kennel Club" and "Wikipedia". Most of the websites they used they could not name because they were found through a search engine. Participant 7 read blogs to find out "what living with a dog it like". All participants used the internet to find a breeder. Participant 2 found a breeder through their "Instagram page". The rest of the participants found a breeder through third party dog advertisement websites. Participant 5 used a website called "Cockapoo Club GB" to buy their dog from because it ensured all breeders advertising were "legitimate". The most used website to find a breeder was "Pets4Homes".

Data Visualisation Review Findings

Data Context. Participants were curious about the data used to make the visualisations and how the assumptions were calculated. Participant 6 was interested in the data source used for figure 13 "do you know what data they used to make this?". Sorting the data into a hierarchic was not well received by the participants. Participant 7 was offended by figure 11 because they owned a dog that was rated low. This made them question the data source, "I don't think it's right". Participants liked figure 12 because they all agreed it reflected their own experience of owning a dog.

Simplicity. Participants responded more positively to simpler visualisations like figures 12 and 13. Figures 10 and 11 needed explanation for the participants to be able to understand them. None of the participants understood figure 10. Once explained the participants agreed that is was too complex "there's too much going on" and "it's hard to see" participant 9.
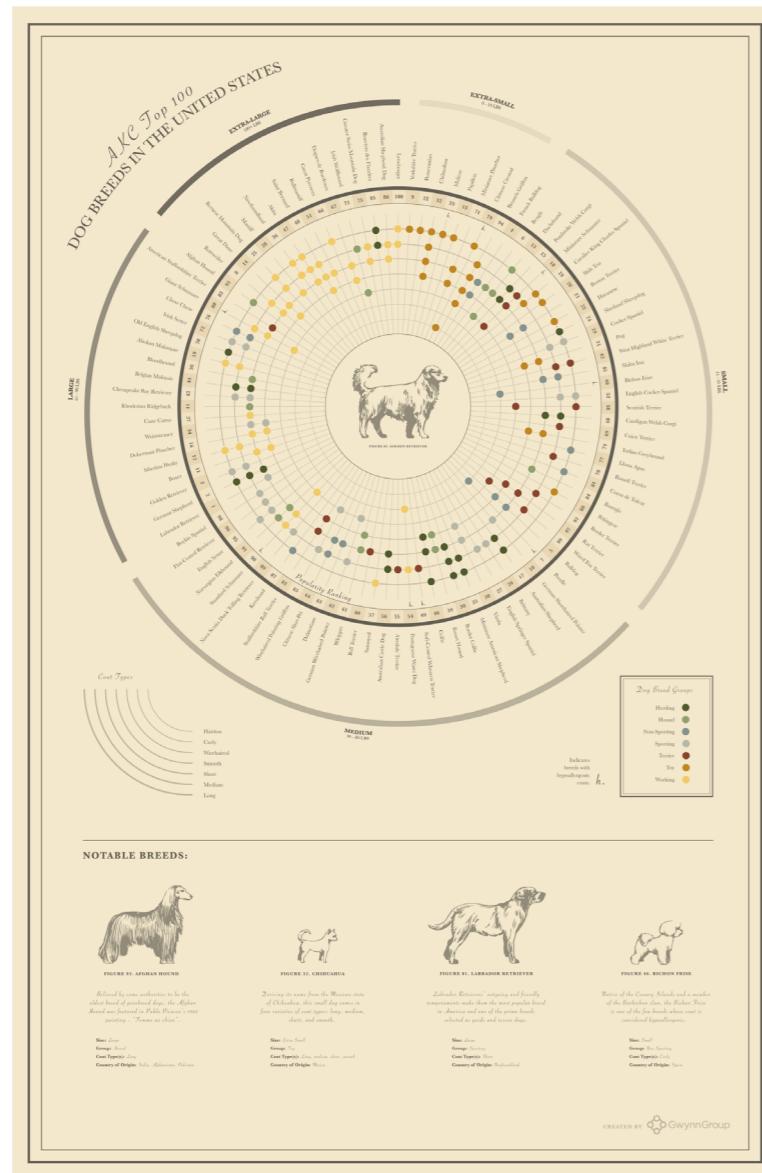
Figure 10 Visualisation example (Gwynn Group, 2019)
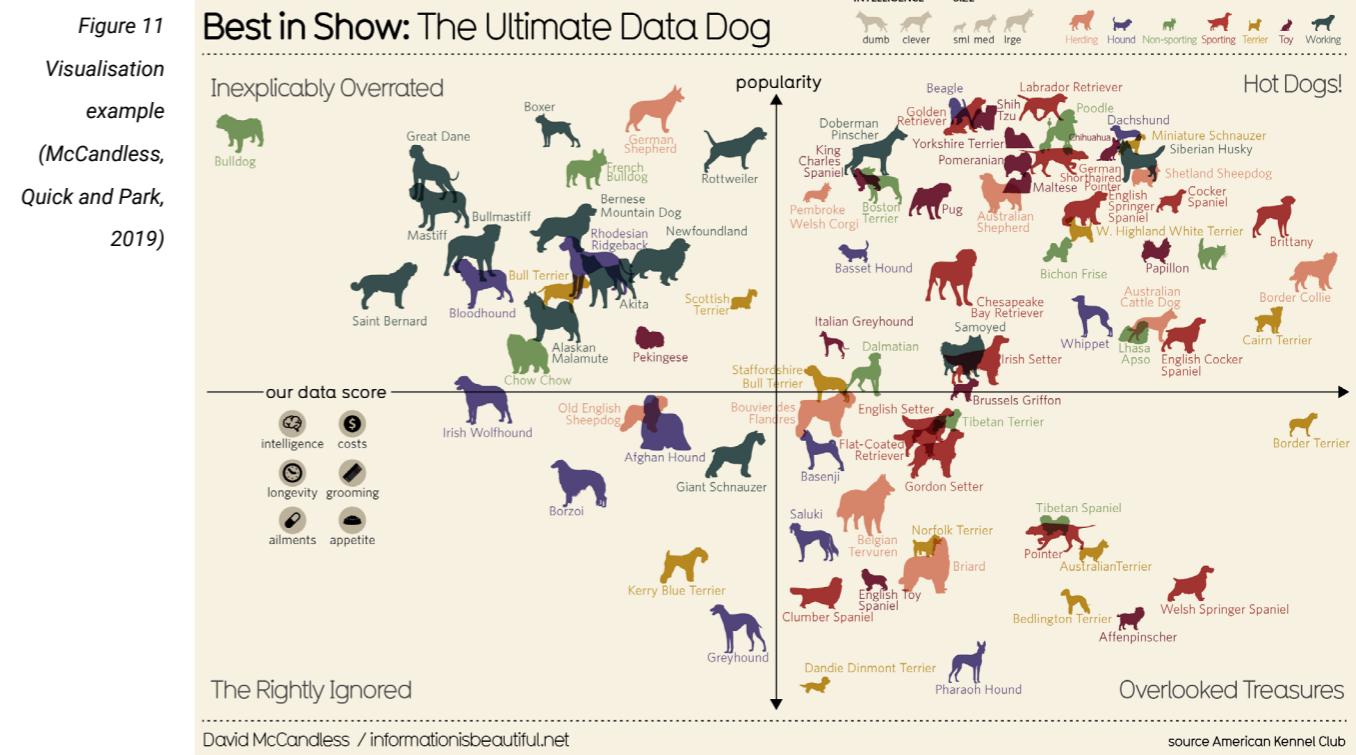
Figure 11 Visualisation example (McCandless, Quick and Park, 2019)
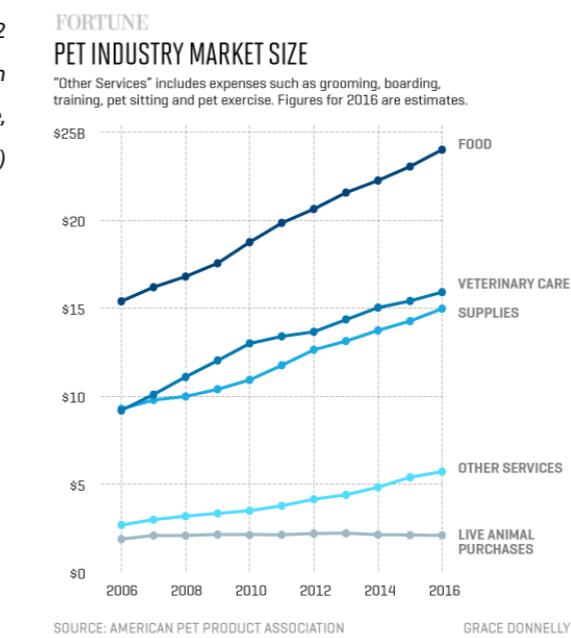
Figure 12 Visualisation example (Fortune, 2016)
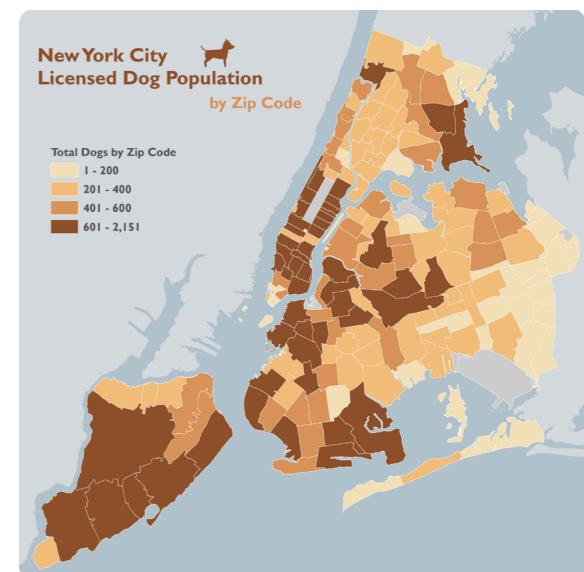
Figure 13 Visualisation example (NYCEDC, 2017)

Visualisation

Data

The primary dataset used to create the visualisations in this project was online pet advertisements scraped from various sales websites. The data spans from 2004 till 2018 and has over one million adverts recorded.

The data was cleaned and analysed using Python. Due to the data being so large the time period was refined to the last full year, 2018. Adverts for wanted dogs and breeding studs were removed. New fields were added by running key word scripts to the title field. To make the new fields more reliable the key word scripts should be applied to the description field in future.

MVP Prototype

The MVP prototype was created after the first focus group. Findings from the focus group helped shape the design for the website. The purpose of the prototype was to create a proof of concept artefact to gain feedback from users and industry experts. The design process was made up of seven parts; sitemap, user journey, wireframes, style guide, design mock-ups and build.

An initial sitemap was created listing the order and structure of the pages (figure 14). Then the user journey was mapped out in a flow chart. Page wireframes were then designed to structure the content of each page. A style guide was created to ensure all site assets such as: text, graphics and visualisations, were visually consistent. The site was designed using

Adobe XD and graphics and icons were created in Adobe Illustrator. The style guide and graphics were then applied to the wireframes to create the final site design mock-ups. The MVP prototype was made using HTML, CSS and D3. D3 is a JavaScript library used to create graphic data visualisations for online use.

Field	Data Type
Website	GumTree/Pets4Homes/PreLoved/DragonDriving
AdvertiserID	Hashed Code
Address	Misc
AdvertID	Hashed Code
Species	Dog/Cat/Rabbit
Date	DD/MM/YYYY
Price	Number
Title	Text
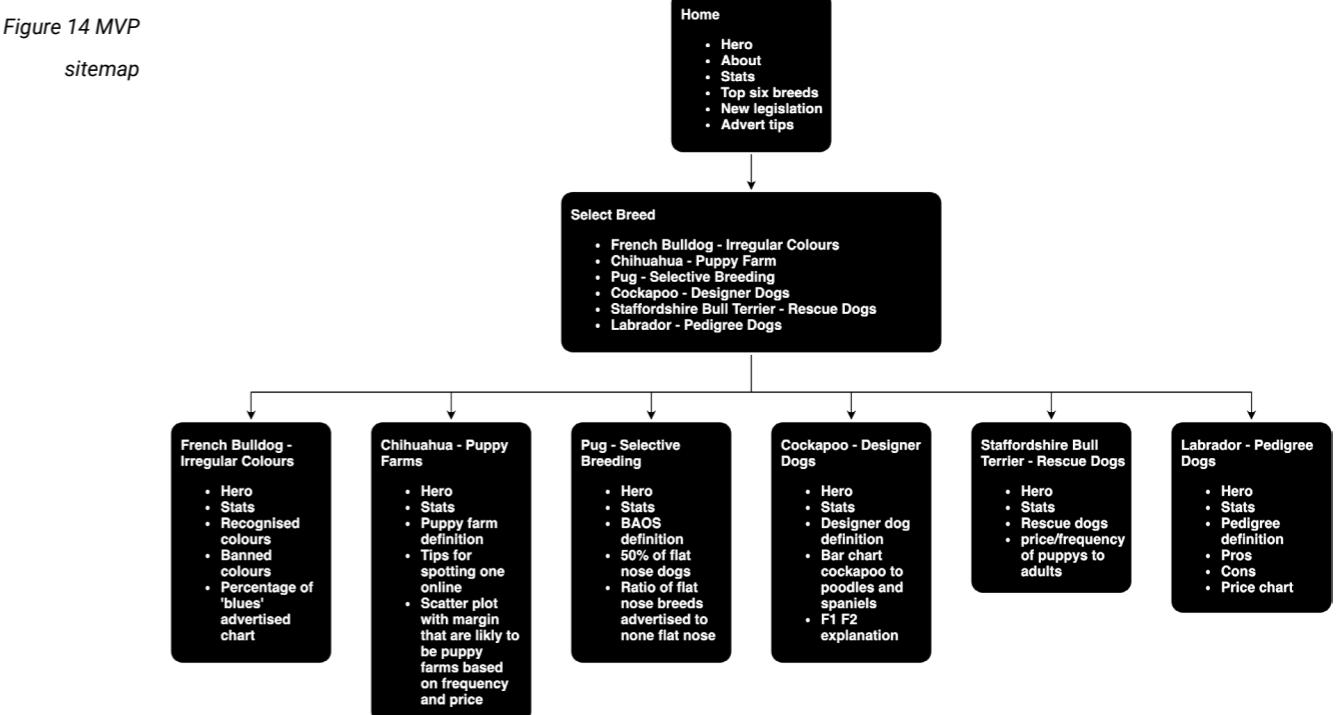
Table 1

visualisation data

variables

Figure 14 MVP

sitemap
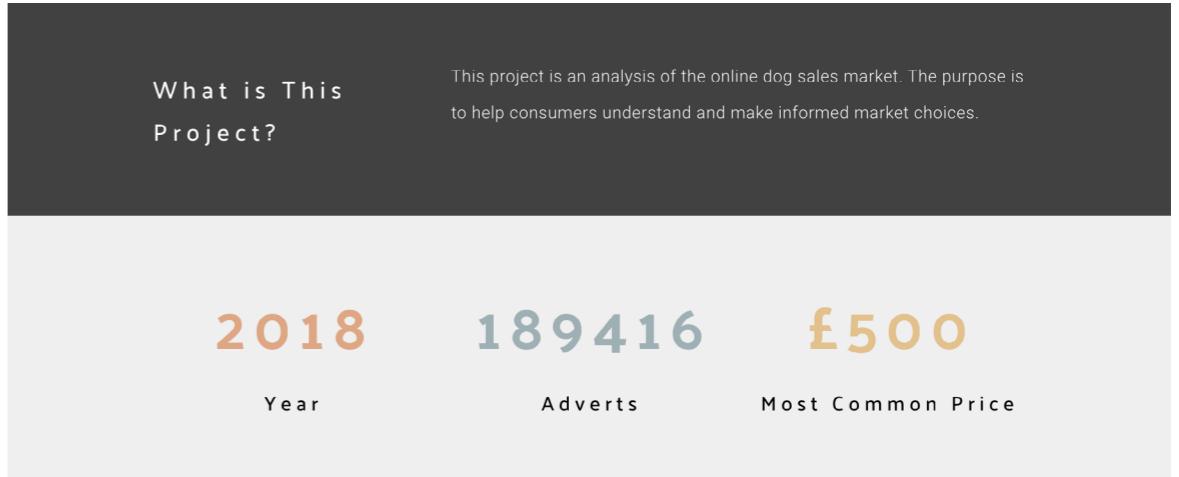
The site was split into breeds because the focus group found that users started researching while they were picking a dog breed. This allowed for the site to be put into a context that would make it relevant to the users in the phase they would interact with it. Each breed was assigned a market issue. This was done so users could be educated in the more general issue they might not know to think about, while putting it in a context that effects their current decision. Structuring the site like this could mean that users only interested in small dog would only read about the issues assigned to the small breeds. However, for the purpose of the workshop it suited as it allowed for all the issues to be presented to the users while not going too deep into issues that were later found to not be of interest to users.

During the focus group participants wanted to know what data was being used to create the information. Therefore, a brief description of the purpose of the website and some stats on the dataset used were included on the homepage under the hero image. These are shown in figure 15. Knowing this would allow users to have a better understanding of how the information affects their journey of buying a dog and give them a clearer idea of the context.

None of the participants mentioned doing research into puppy farms or signs of bad breeding. Therefore, the context of each visualisation would need to be explained before it would be shown to the user. To allow the user to understand in the quickest way possible the information was split into short sections. The sections were made up of definitions and lists on three. The issue would be explained in a short definition, shown in figure 16. It would then be further backed up in a list of three, shown in figure 17. Templates of these sections were created to keep the information retrieval consistent for the users.

What is This Project?

This project is an analysis of the online dog sales market. The purpose is to help consumers understand and make informed market choices.

2018
Year

189416
Adverts

£500
Most Common Price

What is a Puppy Farm?

A puppy farm is a breeder who produces large quantities of puppies every year. With little care for the animals health or welfare. Puppies produced this way are far more likely to have health or temperament issues.

Puppy Farm Signs in Adverts

Less Than 8 Weeks Old

Unvaccinated

KC

Not KC Registered

Since the site structure at this stage was not complex, the user journey was kept simple (figure 18). Users would land on the home page and be directed to the select a breed page. They would then be encouraged to select another breed to using CTAs.

A style guide was created to help keep the design consistent through the website. The style guide can be seen in figure 19. A colourful palette was required so there were enough colour options for visualisations. The primary colour chosen was orange with a secondary colour palette of black, white and grey. Then each breed was assigned a colour. The breed colours had grey undertones to match the original palette while reflecting the individual colour of the animals. This also allowed the primary colour orange to stand out as a CTA.

Research into each breed was conducted to help understand specific breed market trends and issues and design the contexts for each data visualisations. The data was then explored using Python. Information found in the research was used to manipulate the data and find interesting trends. Visualisation ideas were sketched out (figure 20). Relevant charts were exported as SVGs from Python and design mock-ups were created in Illustrator. The designs were then built using D3, a JavaScript library for creating graphics using stats, to put on the website. Rather than being left as design mock-ups the visualisations were coded so they could be updated with new data dynamically. The methods of visualisations were kept simple because the focus group found that users did not understand complex charts with multiple variables. A maximum of two variables were used in each chart represented using bar charts and scatter plots.
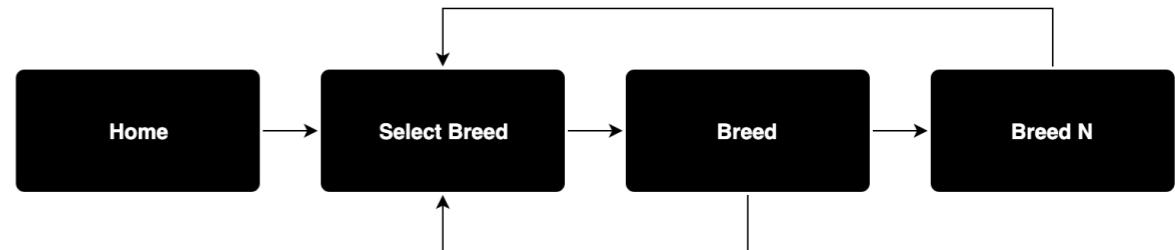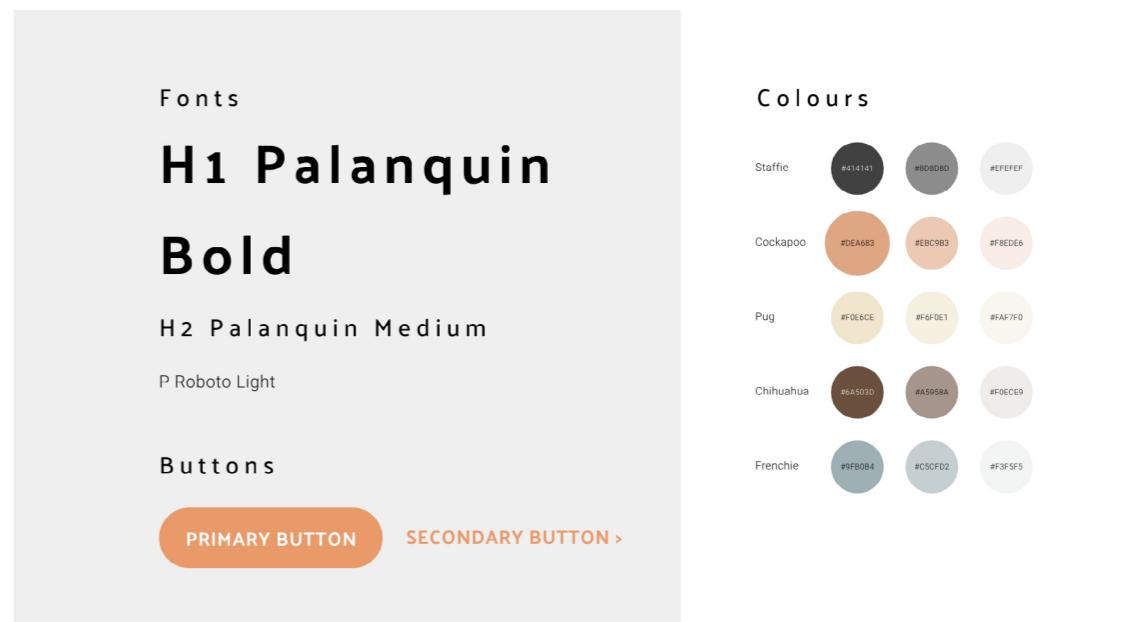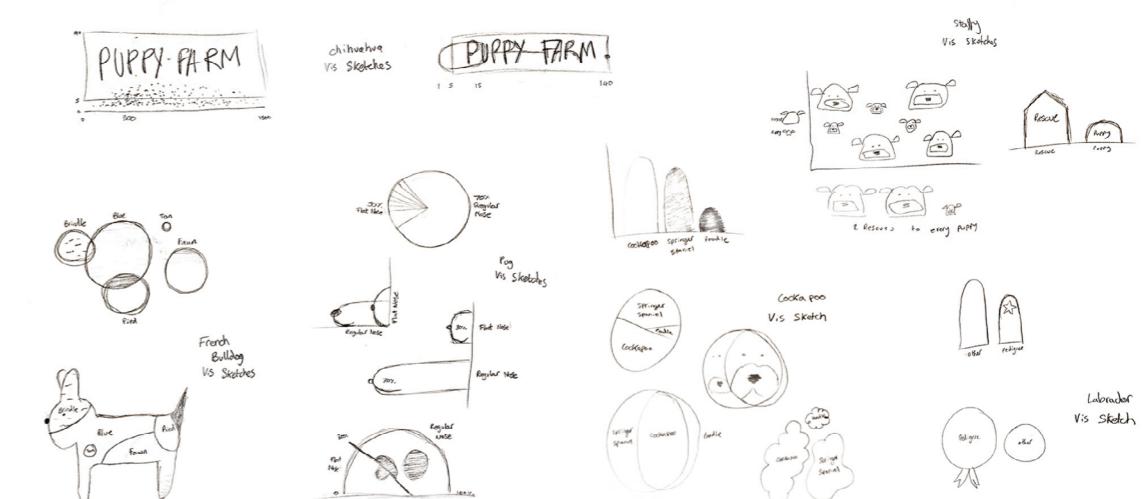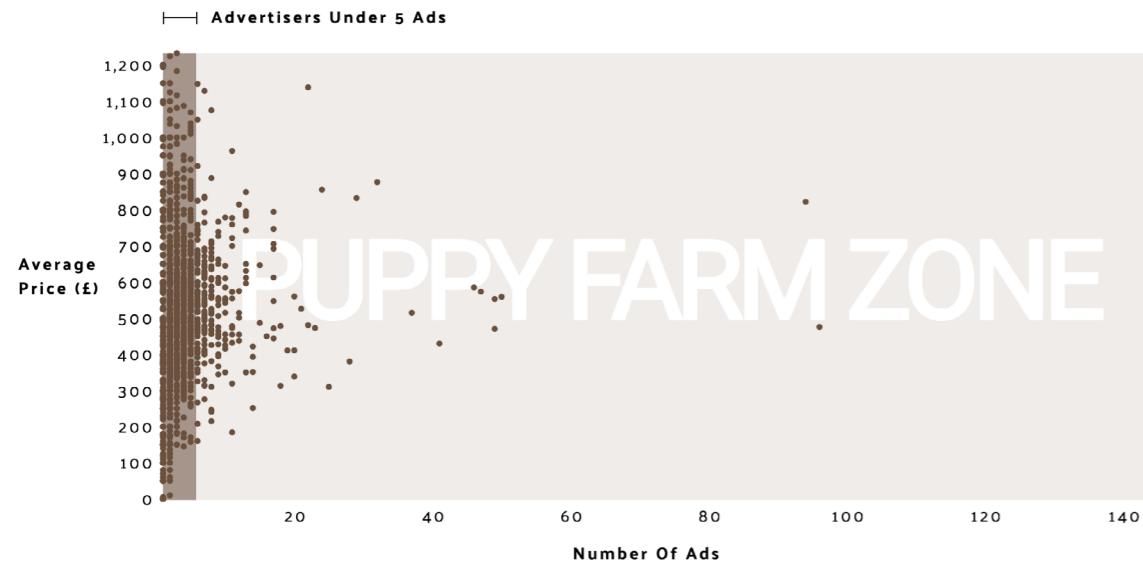
Figure 21 Puppy farm visualisation

Figure 22 French Bulldog colours visualisation
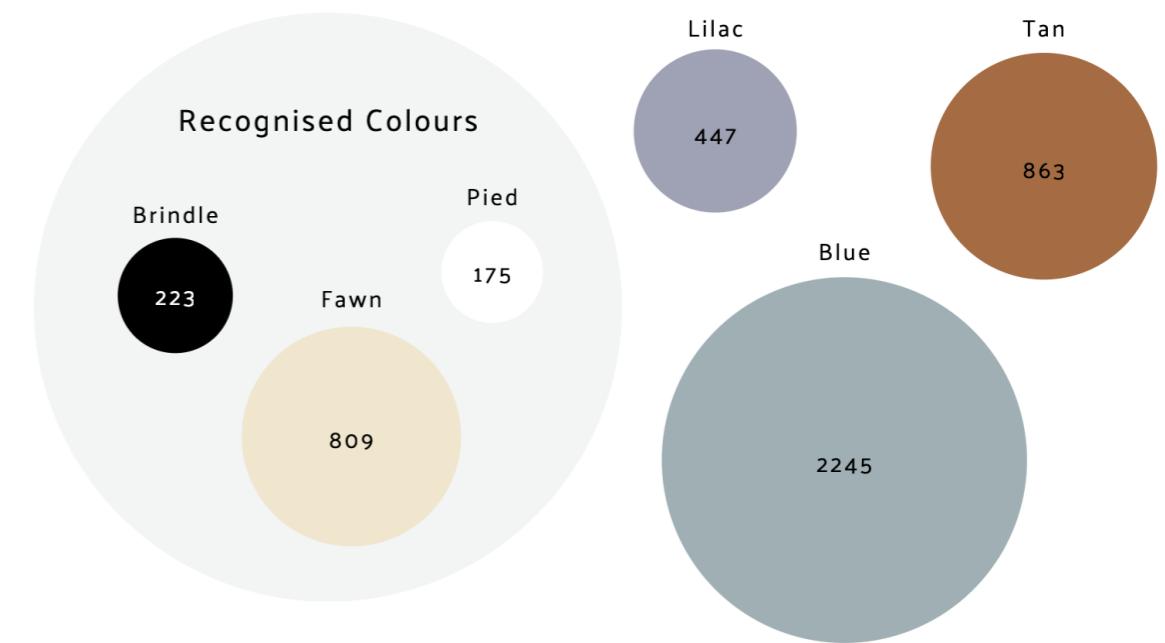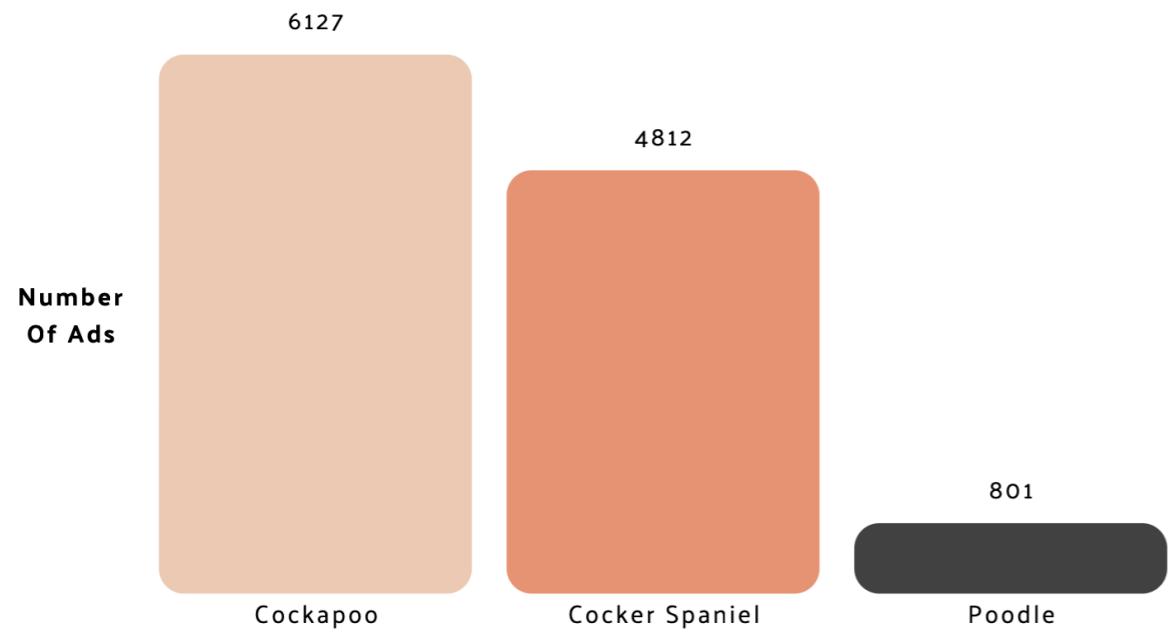
Figure 21 represents the number of adverts posted by Chihuahua breeders in one year. The goal of this visualisation was to show the user how many adverts each advertiser was posting. This would then allow them to see the number of advertisers that are at risk of being a puppy farm. This was achieved by creating boundaries. For an advertiser to be considered ethical they must post less than 5 adverts a year. Anymore they would be considered highly likely to be a puppy farm.

Figure 22 shows the number of adverts for each colour of French Bulldogs. Each bubble represents a coat colour. The size of the bubble represents the number of adverts. This chart is designed to allow comparison of each group. There are two groups represented; 'natural and 'un-natural'. The goal is to raise awareness of the detrimental breeding practices of breeding un-natural coat colours. This chart shows users the large volume of adverts for un-natural coat colours. This would then allow them to make an informed decision on whether to avoid buying from breeders breeding un-natural animals or not.

6127

4812

801

Number Of Ads

Cockapoo

Cocker Spaniel

Poodle

Figure 23

Cockapoo

visualisation

Figure 24

Rescues

visualisation

2428

Number Of Ads

1252

RESCUE

Rescue

Puppy
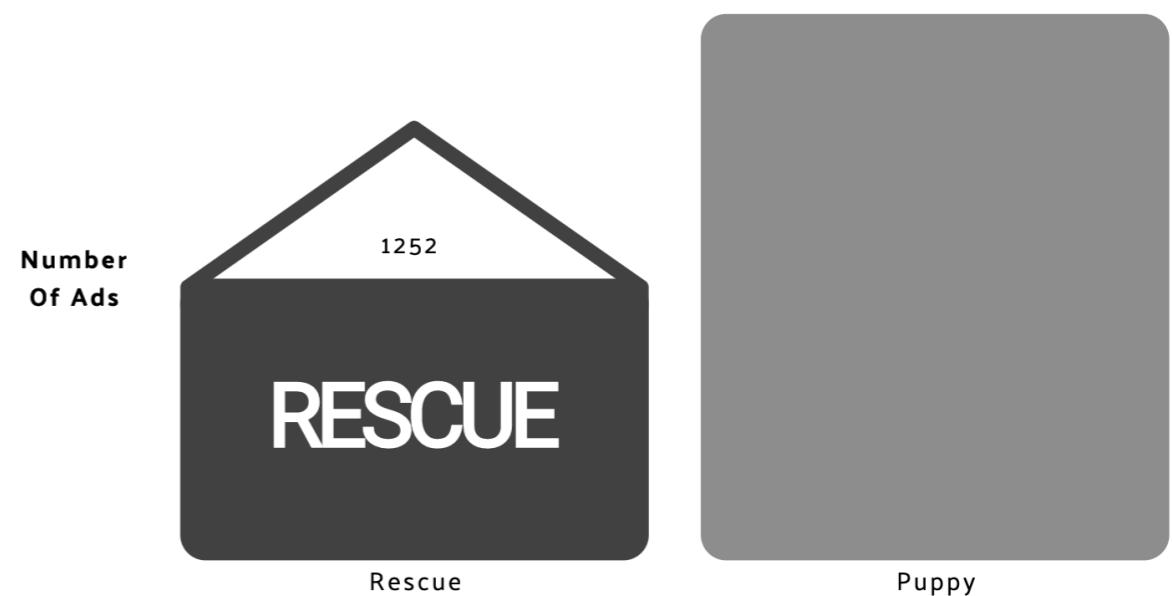
Figure 23 is a comparison of the number of adverts for hybrid Cockapoos compared to the number of adverts of its pure breed parents. The aim was to show the popularity of hybrid dogs. This would then allow users who were unlikely to consider a cross breed initially to consider a hybrid because their more consistent attributes. As found in the focus group.

Figure 24 shows the amount of Staffordshire Bull Terriers advertiser as puppies and for rescue. The goal is to show users the amounts of dogs that are in need of new homes. This would then allow users to make a decision on if they would consider rescuing a dog over buying new. Adverts for rescues were calculated by running a script that searched for key words like "rescue" and "adopt" in the advert titles. For the MVP adverts posted asking for £100 or less were also considered rescue however late these adverts were removed from the rescue because it was not definitive that they were for rescues.

Flat nosed breeds: Pug, Boston Terrier, Pekingese, Boxer, Shih Tzu, French Bulldogs, English Bulldogs, King Charles Spaniels

Other Nose   155767

Flat Nose   33649

Number Of Ads

Figure 25 shows the number of dogs being advertised that have flat noses. The goal was to show the user the number of dogs being bred that were guaranteed to be born with genetic disorders. This would then let the user make a decision of whether they would contribute towards these breeding practices or not.

Most Common Price (£)

800   500

Pedigree   Other
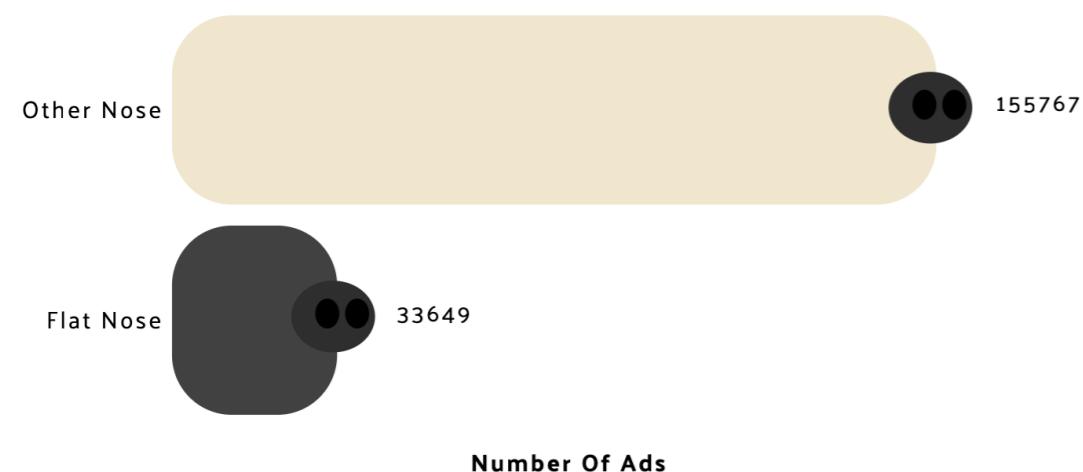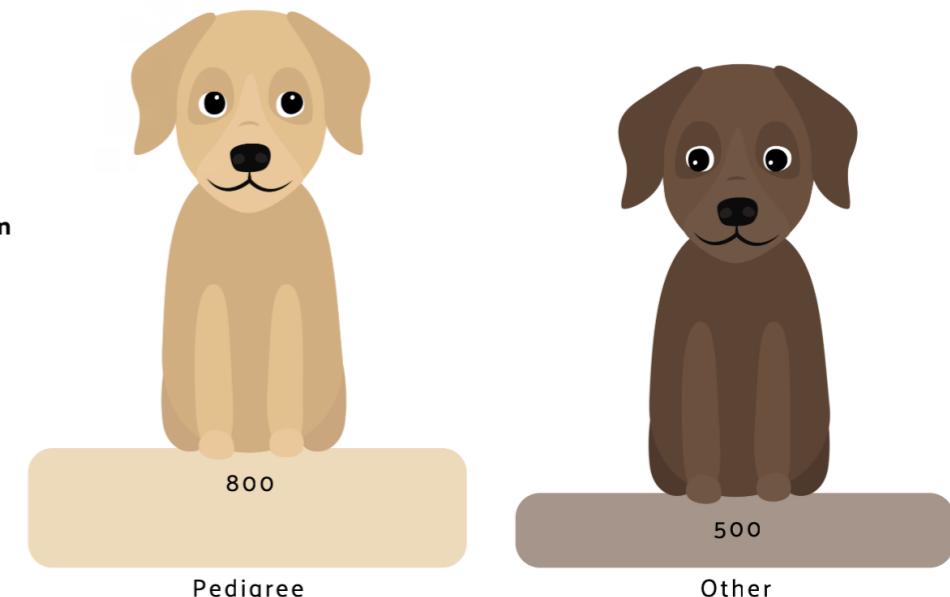
Finally, Figure 26 shows the difference in price of pedigree and non-pedigree Labradors. Commonly pedigree Labradors are £300 more expensive than non-pedigree Labradors. This would then allow users to make a decision on whether buying a pedigree is worth the extra expense than a non-pedigree.

Link Here:
https://zoepointon.github.io/DI-dog-data/index.html

Vet Interview

The purpose of the vet interview was to gain an expert's opinion on the issues being presented in the prototype. Allowing for a validity check on all the information being presented to consumers, pulling from their experience working within veterinary practices. The interview was made up of two parts; visualisation critique and semi-structured interview. The trainee vet interviewed was in their final year of study at The University of Surrey. During their studies they had worked in veterinary practices with small to mid-size animals, including dogs. They also had experience volunteering at a greyhound rescue centre.

The vet went through the prototype in stages asking questions about the data and providing feedback on what they felt work well and what they thought needed more research. They started with the front pages and worked through the issue pages. They provided feedback and context to the data that had not been explored already.

The interview was made up of 13 base questions focusing on; current resources for consumers, dog health, and possibilities for creating a resource that could be endorsed by vets. The questions provided a structure for the interview, but it allowed flexibility to ask more questions if required.

A semi structured interview was chosen as it allowed for the interview to have a controlled focus while allowing the interviewee to talk about other experiences that they felt would be useful to the study. For example, if a structured approach was taken, then the vets experience volunteering at a rescue centre might not have been discovered or utilized.

Findings

Responsibility. The expert felt that the responsibility to govern breeding practices was up to official organizations and governmental bodies such as the "RSPCA" and "Kennel Club". There are no official interventions or initiatives happening in the veterinary practices they are aware of. However, they advised that if any action was to take place in the veterinarian community it would likely come from the "BSAVA" (British Small Animal Veterinary Association) as "their policies and ways of doing things filter down to the smaller practices".

Rehoming. The expert stressed the importance of rehoming dogs. They stated, "most vets are advocates for rehoming dogs rather than buying new". They talked about their experience volunteering at a rescue centre for Grey Hounds. They strongly felt that the most moral decision is to adopt a dog as it stops the profits of "puppy farms" and "bad breeding".

Genetic Conditions. The expert stated that it was "hard to say what is caused by genetic conditions". However, the most common conditions they believed to be caused by genetics were "breathing, hip and eye" related issues. The participant believed that pure breed dogs were seen more often than mixed breeds dogs for "non-standard" issues, which they believed could be due to "selective breeding". BAOS prone dog breeds were thought to be "in the vet considerably more than others". The amount a dog would be in the vet was thought to be an important factor for a purchaser's decision. The expert stated "the vet bills are not worth it" in reference to the prospect of buying a BAOS prone dog. The participant was surprised by the popularity of "hybrid dogs" as they did not frequently see them in the vet. However, considered "the way they are bred" as a reason for them not being in the vets as "they would get less sick".

Interventions. Although the expert believed that vets had no responsibility to take action over breeding practices, they still had a moral obligation to advise the public that seek their expert guidance. Currently no materials exist that are vet approved for buying dogs or other animals. They suggested "leaflets" were the best way of giving out information as "they can be handed out at appointments" whereas recommending a website is less effective as you could "never know" if it will be followed up on. The idea of a "check list" for consumers was suggested as it was accessible, "easy for people to find a good breeder without having to do all the research themselves".

Workshop

The primary purpose of the workshop was to test the data visualisations to see if user's decision making would be affected by the knowledge they conveyed. The secondary purpose was to gain feedback on the weight of each issue in the decision-making process. This would help create the foundation for a better site structure to aid decision making more effectively. The workshop was made up of three parts; participant demographics, data visualisation sketches critique and issue sort.

Participants were asked to write down a short bio onto a post-it note. Including their age, gender and reason they want to buy a dog. The post-it notes were kept with the papers from other activities to be able to identify each participant's work.

Low-fidelity data visualisations were handed out to participants. The visualisations were made up of the ones created for the prototype and a few new ones. Participants discussed what they thought each visualisation meant and then answered four questions: (1) Would this change your decision? Why? (2) Is there a better way to present this information to help your decision making? (3) Would knowing the breed help your decision? (4) Would knowing the location help your decision? Participants discussed their answers as a group and then wrote down their answers next to each visualisation. They were also encouraged to annotate and draw on the visualisations.

Finally, the five topics were put up on the wall; genetic conditions, puppy farms, rescues, pedigree and cross breeding. Participants discussed what they would want to know about each topic that would help them make market decisions. They then wrote down the information onto post-it notes and put them next to each issue.

Low-fidelity versions of the visualisations were used rather than the final designs so that participants were more likely to give critical feedback. Participants were asked to provide design feedback on these visualisations rather than create their own because they did not have much experience using data visualisation or have creative backgrounds. If relevant participants were found that have creative knowledge, then this technique could be used in future studies.
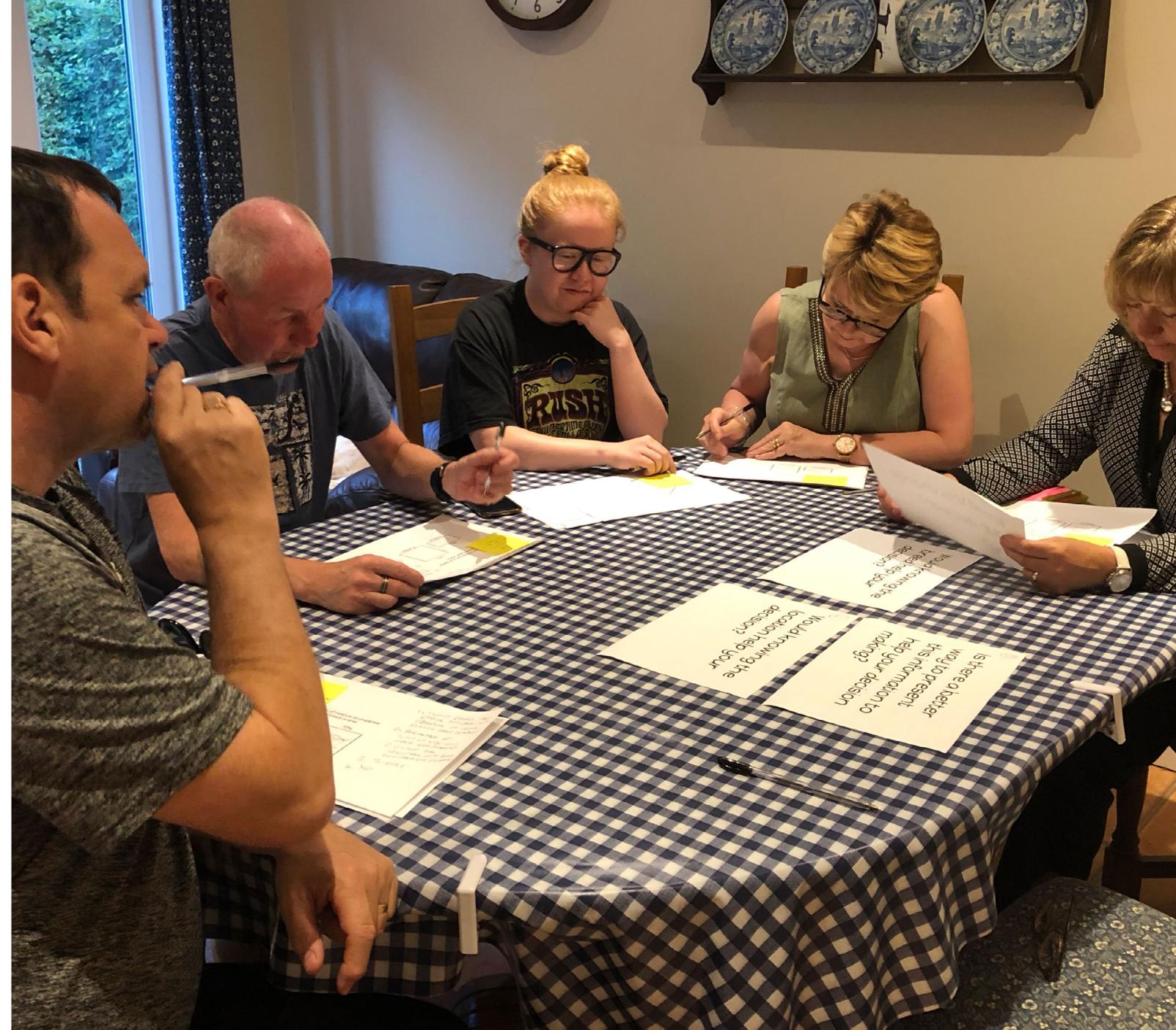
Figure 27
Workshop
participants at
table
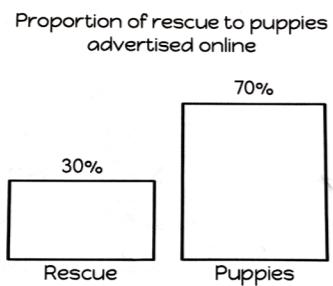
The workshop was made up of five participants aged 25 to 64, three were female and two were male. All participants had previously purchased a dog before. Three were in the research phase of buying a new dog. No participants had creative backgrounds or experience working with data visualisation.

Findings

Figure 28. Participants were interested in what kind of dogs were being advertised for adoption. Participants agreed that breed is important as well as the conditions that lead to the dog ending up needing a new home.

Figure 29. Participants needed to be told about the genetic implications on health having an un-natural coat colour caused in French Bulldogs. Once understood par-ticipants agreed that having a healthy dog is more important than a dog having a "fashionable colour". Participants wanted to know if this issue effected other breeds of dog.

Figure 30. Participants were not con-cerned with the price of the dog. "Medi-cal costs" were said to be more likely to affect a decision on breed. Participant 1 "I would always go pedigree because you know what you're getting with its per-sonality and health".

Proportion of rescue to puppies advertised online

70%
30%

Rescue   Puppies

1. No – want to bond + shape a puppy.
2. The statistics of dogs who are rehomed.
3. Yes Knowing the breed helps. Re: allergies and also dominant breeds. Alsation/Doberman/Mastiff. rotweiler.
4. → Not really – for the right dog I would travel several hours.

Figure 28 Rescue visualisation participant one

Proportion of natural to un-natural colours advertised online

Natural Colours   Un-natural Colours
Fawn   Brindle   Blue
Pied   Lilac   Tan

1. Yes knowing inter-breeds unnatural colours makes more health risks – would affect my decision.
2. No this is a great way of presenting this info (unless you add colour).
3. Yes if presented with this information.
4. N/A.

Figure 29 Colour visualisation participant one

Average price of non-pedigree and pedigree

£700
£500

Non-Pedigree   Pedigree

1. Yes – I would like a pedigree as £200 is not much more money in the grand scheme of things – need good hip|eye score for breed. want a profitable breed.
2. → No – nice + clear.
3. Yes
4. Location wouldn't matter – the dog + breeder matter the most.

Figure 30 Pedigree visualisation participant one

Figure 31 Map visualisation participant two
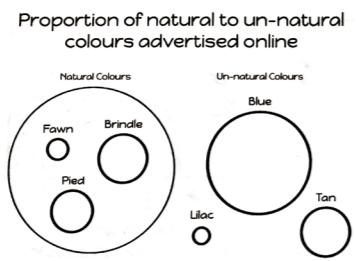
Heat map of the number of active puppy farms in each county

High
Low

① Yes I would not buy a dog from a puppy farm.
② No
③ Not really as I would not be happy about buying from a puppy farm.
④ Yes as I would not travel too far to be disappointed with the puppy farm.

Figure 32 Breathing visualisation participant four

Proportion of dogs advertised likly to suffer with genetic breathing issues

Other   90%
Flat Nose   10%

① yes could have alot of health problems
② could put more information about the breed.
③ yes it would help. because you can look at all the information on the breed.
④ no really. would go anywhere.

Figure 33 Pure to cross visualisation participant four

Proportion of cross breeds to pure breeds advertised online

80%
20%

Pure   Cross

① No as long as the puppy is healthy. less health problems
② No it is very clear
③ yes it would help me make my decision
④ No it would not matter.

Figure 31. Location did not matter to the participants. All agreed that the distance travelled to get the dog was not an is-sue. However, participants said they would avoid buying in areas with "high puppy farm rates".

Figure 32. This chart was not easily un-derstood and needed. The list of breeds needed to be stated for the visualisation to be better understood. Participant 4 suggested putting the genetic issues in "pages for each breed with likelihood of having all the different problems".
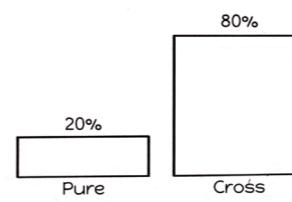
Figure 33. Participants were surprised by there being more cross breeds adver-tised. Participants were interested in what types of cross breeds were availa-ble. Participant 1 "would only get a hy-brid cross breed".

Figure 34. Participants did not under-stand this chart. However, they did like the idea of having likelihood of risk factors presented in a bar chart format.

Figure 35. Participants understood this chart easily. Participant 3 suggested "showing how many breeds each person is advertising" because they thought that a puppy farm would likely be breeding multiple breeds of dogs as it makes more money.

Likly hood of risk

① Yes - provides an extra insight into a variety of risk.

② Gives enough information, without being overwhelming.

③ Breeds have different characteristics - these could be clearly highlighted and compared using such a chart.

④ Location not necessarily a factor- would travel a distance for the right dog.

Figure 34 Spider visualisation participant five

Number of adverts posted by each advertisers in 2018

Puppy Farm Zone

① Yes - I would make effort to avoid buying from an exploitative breeder or farm.

② Perhaps showing which breeders are selling more than one breed. This is an indicator for puppy farms.

③ It would be useful to have such a chart for each breed.

④ Yes - it would also be helpful to know how many puppy farms in each area.

Figure 35 Puppy Farm visualisation participant five
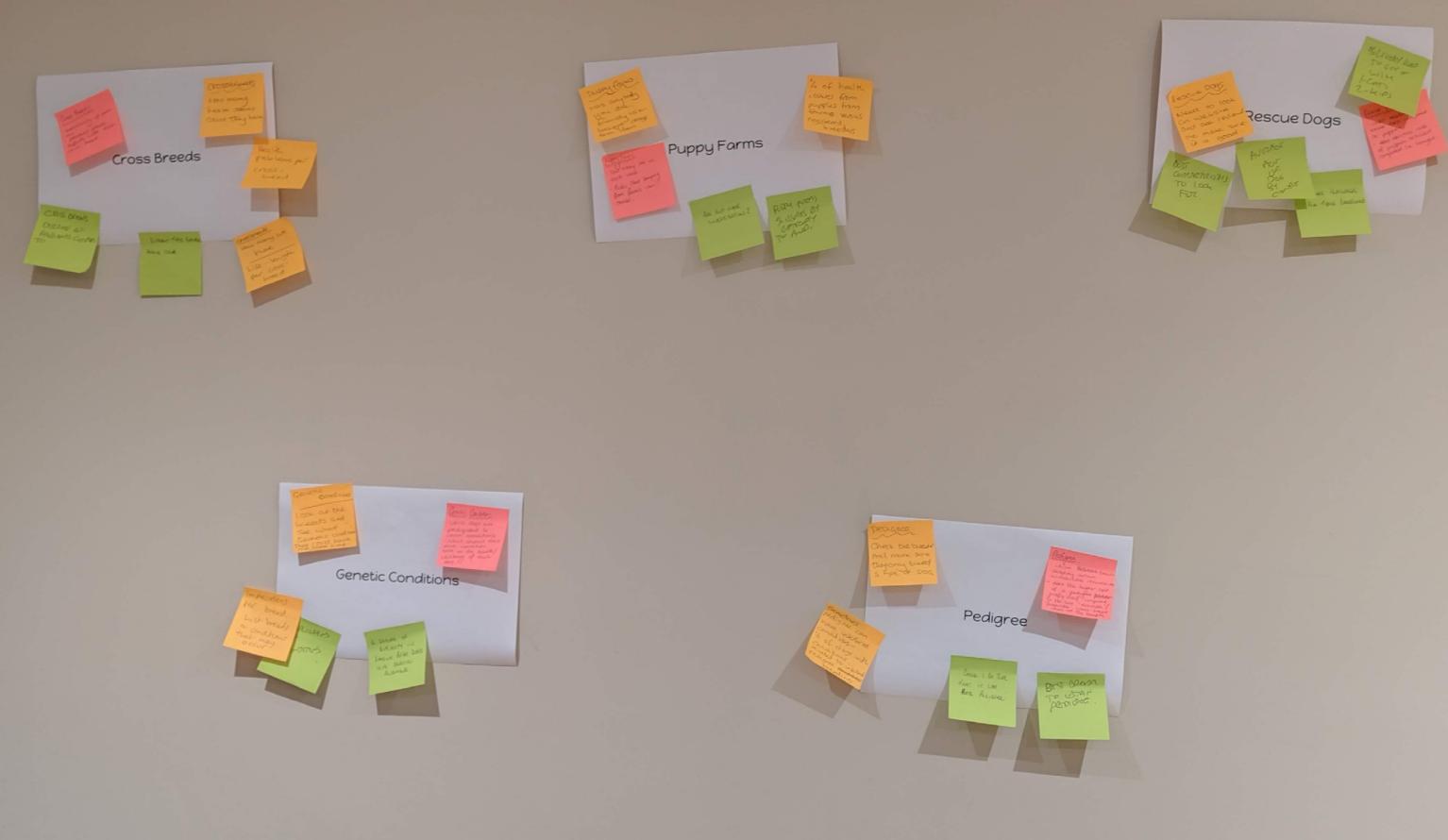
Figure 36 Workshop wall topics

Location. Most participants would not consider location in their decision to buy a dog. Participant 4 "I would drive to Scotland if I had to". However, participant 3 thought it would affect their decision based on convenience, "if there were two places to buy the dog, I would choose the one that's closer".

Risk Visualisation. Participants did not understand the risk factor visualisation in figure 34. However, participants mentioned several times through the workshop the usefulness of "visualising risk" for each breed of dog. Risks mentioned included; "health conditions", "abnormal colours", "puppy farm", "aggressiveness", "health conditions impact on life", "degree of difficulty looking after a sick dog" and "interbreeding".

Visualisation Design. Participants liked the simpler visualisations. Bar charts were felt to be a good way for comparing different metrics. A "bar chart" was suggested instead of a spider diagram in figure 34, because it was a more accessible. Participants wanted to know the exact number of dogs available in some instances like "breed availability". However preferred percentages for things like "puppy farm risk" and "health conditions"

Reason for Rescue. Participants who were initially uninterested in rescuing a dog, considered the possibility when educated on the circumstances around the rehoming. For example, participant 4 was initially set on buying a puppy from a breeder reconsidered when informed that many adverts for rehoming dogs were for puppies that did not fit into people's lifestyles, "I would rescue a puppy that someone could not handle". However, all participants agreed that if the dog was being rehomed because it was "sick" or "aggressive" it would be unlikely they would adopt it.

Breed Availability. Participants 2 and 3 felt the breed would not matter in their decision. Participant 2 "as long as it's a good companion I don't mind". Whereas the rest of the participants were more selective about the breeds they would accept. Participants that cared about the dog breed wanted to know the availability. Specifically, the breeds advertised for rescue, "if a Goldendoodle needed rescuing I'd take it" participant 4. Participants also wanted to know what "pure cross breeds" were available and how many. Participant 1 was very specific with the cross breeds they would consider, "anything crossed with a Staffordshire I would not want". They would only buy a dog that was a "pedigree cross" because they wanted to be sure of the "personality" traits.

Health. Participants agreed that if a dog was likely to have an expensive health issue it would put them off buying it. They also agreed that the cuteness of a dog was not worth the undue suffering of the animal. Participant 5 "really wanted a Grey Frenchie" but reconsider the decision after learning about the health impacts of abnormal coat colours. However, participant 5 then later stated that they would choose a "natural coloured French Bulldog or a Pug" instead. Participants were also curious of the health impact a puppy farm has on a dog's health, "percentage of health issues from puppies from puppy farms versus registered breeders" participant 3.

Final Prototype

A second version of the prototype was created. This version of the website was created using the agile methods. The findings of the vet interview and co-design workshop directly impacted the design of the second version of the site.

A new sitemap was created to plan the structure of the second version of the website. The sitemap can be seen in figure 37. The vet interview and workshop found that users were interested in seeing the issues that affect all breeds, outside of the context of individual breeds. Specifically; puppy farms, rescues and cross breeds. Due to this, individual pages were created for each of these issues. A page for BAOS was created because it is a condition that is not specific to one breed. CTAs to view this page were placed on the breed pages for dogs that suffer with BAOS. The breed pages were kept because workshop participants liked viewing some information in the context of breed, such as; medical conditions and risk factors. The checklist page was also added based on feedback from the vet interview and workshop.

Home
- Hero
- Purpose
- Stats
- Top breeds chart
- Market issues CTA
- New legislation
- Advert requirements
- Checklist CTA
- Search breeds CTA

Select Issue
- Puppy farms CTA
- Rescues CTA
- Cross breeds CTA
- Medical issues list
- BOAS CTA
- Checklist CTA

Select Breed
- French Bulldog
- Chihuahua
- Pug
- Cockapoo
- Staffordshire Bull Terrier
- Labrador

Checklist
- List
- Market issues CTA

Rescues
- Hero
- Abandonment reasons
- Puppies to rescues chart
- Advertisers list
- Advertisers chart
- Breeds chart
- Market issues CTA
- Search breeds CTA

Puppy Farms
- Hero
- Puppy farm definition
- Puppy farm signs
- Types of breeders
- Ad frequency scatter plot
- Ad breeds scatter plot
- Health risks
- Market issues CTA
- Search breeds CTA

Cross Breeds
- Hero
- Benefits
- Cross breeds chart
- Hybrid definition
- Hybrid chart
- Gene explanation
- Breeds chart
- Market issues CTA
- Search breeds CTA

Health Issues

BOAS
- Hero
- BAOS definition
- Impact explanation
- Side effects list
- Flat breeds chart
- Breeds list
- Search breeds CTA
- Market issues CTA

French Bulldog
- Stats
- Risk factors
- Health issues
- Natural colours
- Un-natural colours
- Colour chart
- Search breeds CTA
- Checklist CTA

Chihuahua
- Hero
- Stats
- Risk factors
- Health issues
- Search breeds CTA
- Checklist CTA

Pug
- Hero
- Stats
- Risk factors
- Health issues
- List of colours
- Colour chart
- Search breeds CTA
- Checklist CTA

Cockapoo
- Hero
- Stats
- Risk factors
- Health issues
- Parent breed bar chart
- Search breeds CTA
- Checklist CTA

Staffordshire Bull Terrier
- Hero
- Stats
- Risk factors
- Health issues
- Search breeds CTA
- Checklist CTA

Labrador
- Hero
- Stats
- Risk factors
- Health issues
- Search breeds CTA
- Checklist CTA

Figure 37 Final prototype site map

Since the site structure was changed, a new user journey needed to be created and implemented (figure 38). The site was split into four levels. Level one was the homepage, level two the primary issues, level three select breeds and level four checklist. The market issues were decided as the primary CTA of the website. This was because their impact on a decision was much broader than any other piece of information on the site. A template card block was designed as a blanket CTA. The card block can be seen in figure 39. This block was placed on the homepage and towards the bottom of level two pages to allow for quick navigation through the issue pages without using the navigation menu every time.

Figure 38 Final prototype user journey

Home
Select Issue
Issue
Issue N
Select Breed
Breed
Breed N
BOAS
Checklist
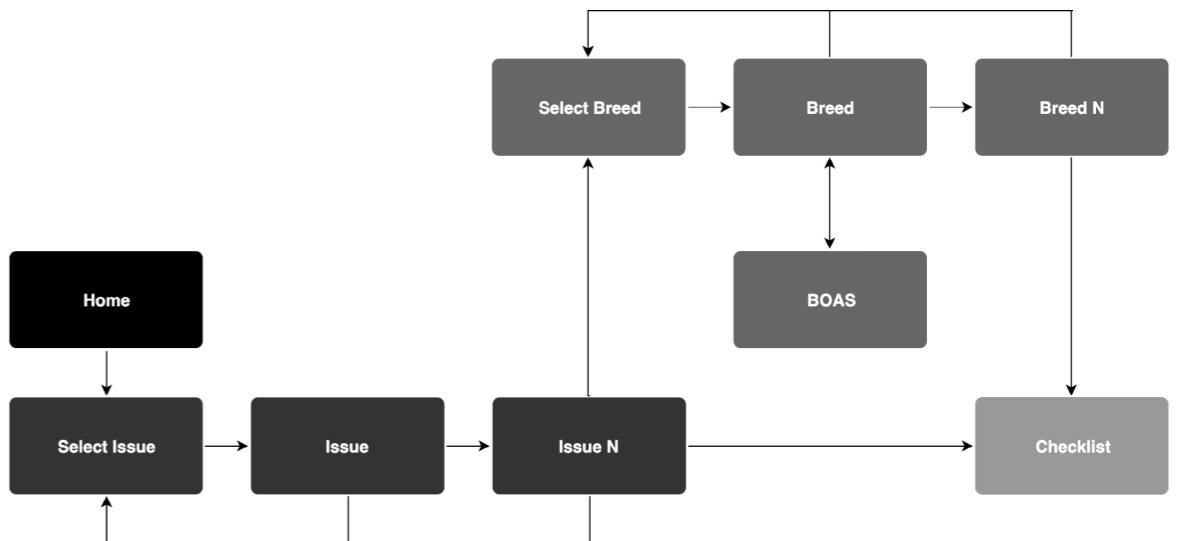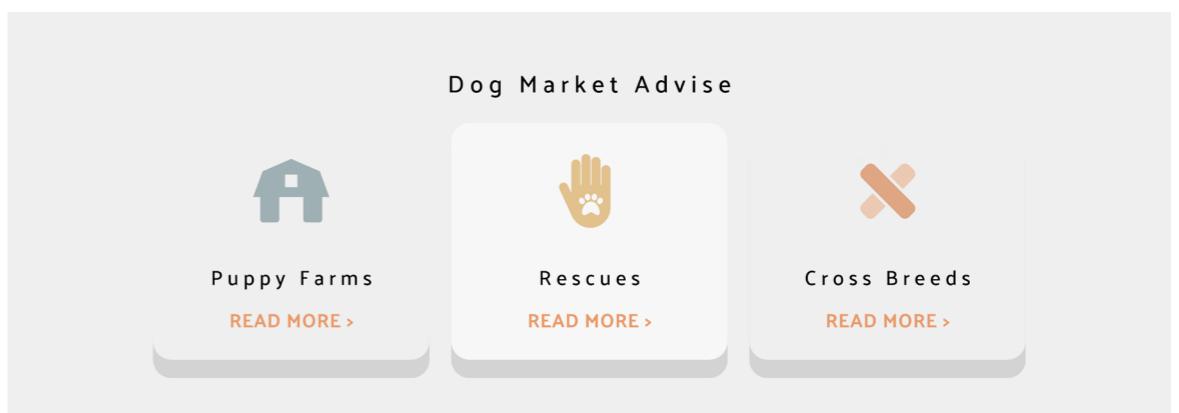
Figure 39 Issue card block

Dog Market Advise

Puppy Farms
READ MORE >

Rescues
READ MORE >

Cross Breeds
READ MORE >

For the user to fully understand each issue they ideally needed to read the information from top to bottom of each page. For this reason, the navigation bar was kept as a burger menu (see figure 40) to make it harder for users to quickly flick through the website. Therefore, reducing page to page bounce rates.

Once the users have read through the market issues, they are directed to the pick a breed page. Figure 41 shows the search breed CTA. This CTA was place at the bottom of level two pages so once users have read through market issue pages, they are directed to search for the breeds they are interested in. Once on the

breed pages there are CTAs on the French Bulldog and Pug pages to the BAOS page. All level three pages main CTA is to pick another breed. Then finally users are directed to the checklist page to view tips of what to look for in adverts.

Normal

1 Breed

84%

2 Breeds

8%

Worrying

3 Breeds
1%

4 Breeds
2%

6 Breeds
1%

7 Breeds
1%

>10 Breeds
1%

● = Percentage Of Advertisers

A Guide to Buying a Dog Online ☰

Figure 40 Navbar

Ready to pick a breed?

Take a look at our breed profiles to discover what breed is right for you.
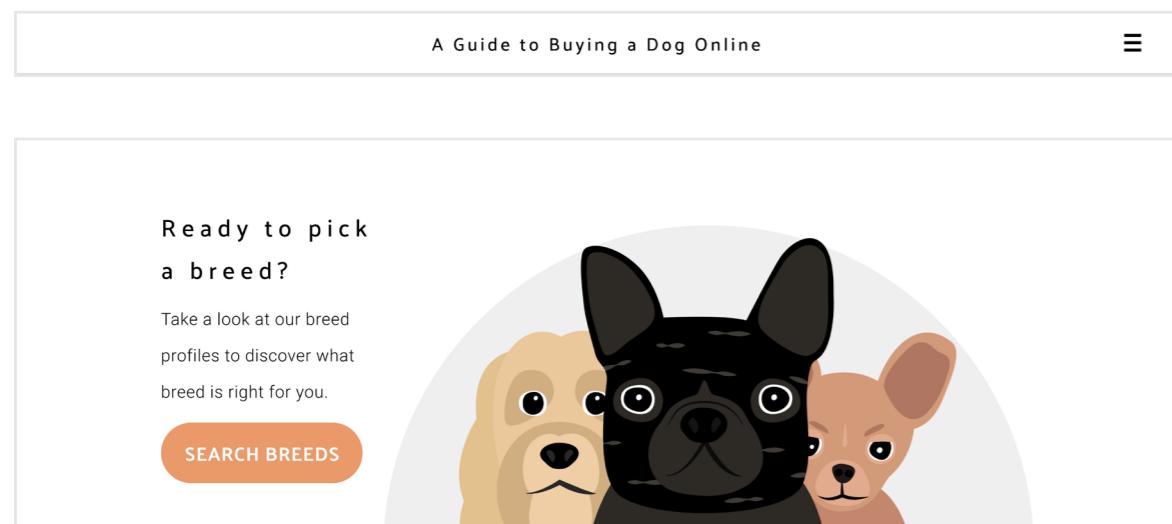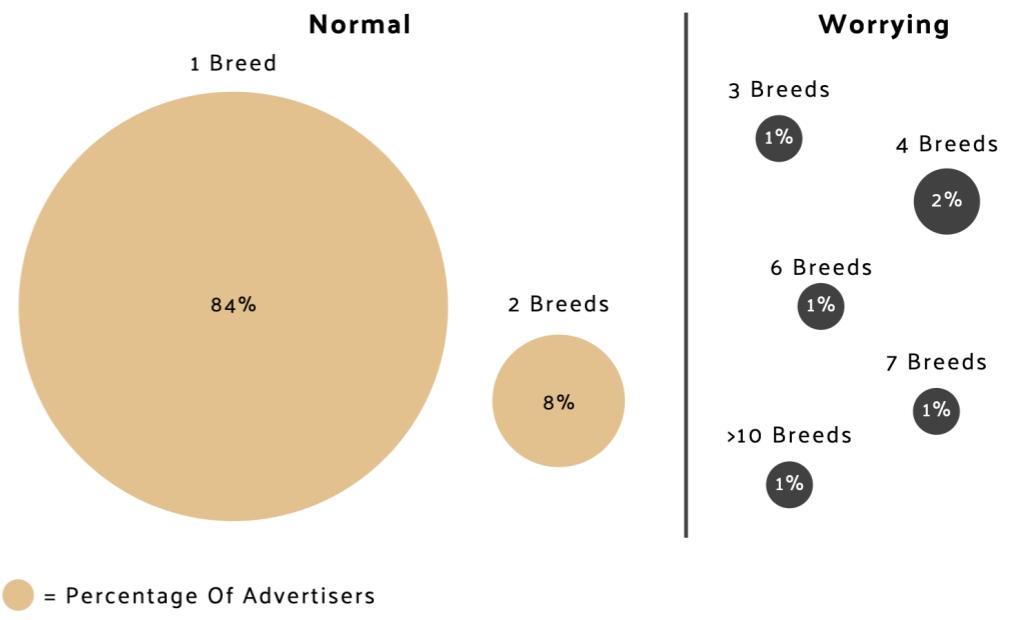
**SEARCH BREEDS**

Figure 41 Search breed CTA block
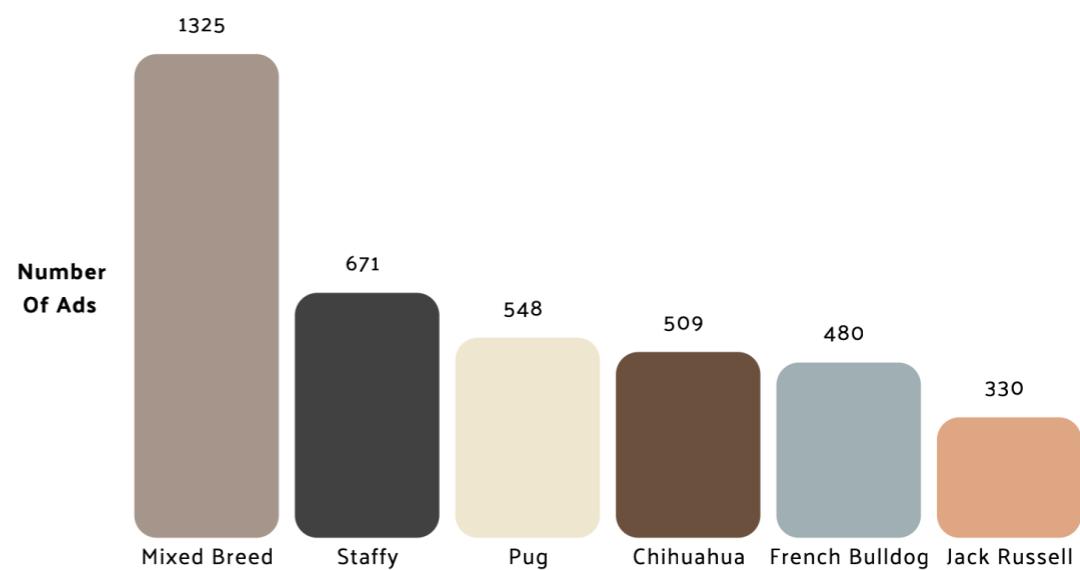
Figure 42 shows the new puppy farm chart suggested by a participant in the workshop. It depicts the number of breeds each advertiser has posted adverts for over 2018. The goal of the chart is to make consumers cautious of advertisers posting more than one breed online. This will then lead to less people buying from puppy farms.

The issue pages were split into two types; market issues and medical issues. The market issues covered general issues affecting all breeds of dog while the medical issues covered genetic medical conditions that tend to be breed specific. In the future

the medical issues would be expanded to include all conditions mentioned in the website. Each issue was explained using the templates shown in figures 16 and 17 on their respective pages. The original visualisations were updated to include data from

all dog advertisements. New charts were created based on user feedback. All new charts are visualised using comparative techniques because this is the format participants for the focus group and workshop preferred.

%
Of Ads

17   47   39   9

UK Charities   Owners   Europe   Other

Number
Of Ads

1325   671   548   509   480   330

Mixed Breed   Staffy   Pug   Chihuahua   French Bulldog   Jack Russell

Number
Of Ads

6127   1684   1320   647   465   361

Cockapoo   Cavapoo   Labradoodle   Jug   Maltipoo   Goldendoodle

In regard to rescues, workshop participants were interested in the source of the rescues. They wanted to know the circumstance for the dogs to be abandoned. The adverts were reviewed, and most rescue adverts were found to be from the original owners or charities based in Europe that work on rehoming stray dogs. Since the patterns were so subtle it was impossible to write a reliable script to determine the adverts source effectively. Therefore, dummy data was used to create the chart shown in figure 43. In the future a script would be written that would search the descriptions for key words and phrases to determine the advert source. The chart allows users to view the idea on 'rescue dog' in a different context and provides them with the many options available. The goal was to allow more people to consider rescuing a dog.

Participants in the workshop wanted to know the most advertised rescue breeds and hybrid cross breeds. Figures 44 and 45 show the six most advertised rescue breeds and hybrid cross breeds. The charts allow users to consider rescue and cross breed dogs in the familiar context of breed. While also working to change any pre-determined ideas on what these breed markets look like. For example, a user who is set on getting a pug might consider rescuing one rather than buying a puppy after seeing that there are many available for rescue, which can be seen in figure 44.
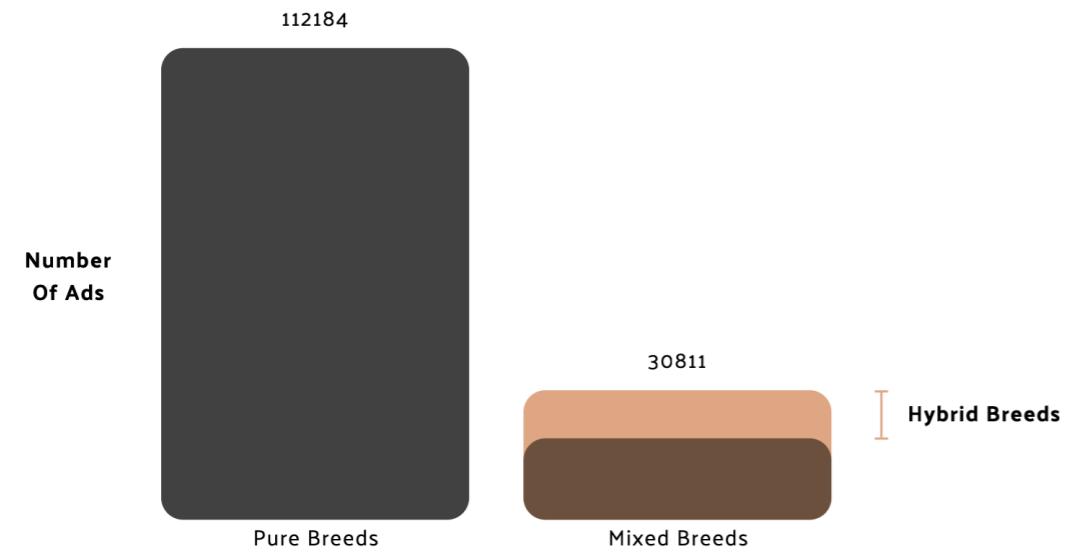
112184

Number Of Ads

Pure Breeds

30811

| Hybrid Breeds

Mixed Breeds

Top Breed Related Health Risks

Hip Dysplasia
Hip joint laxity

Cataracts
Opacity of the lens of the eye

BOS
Flat nose breathing difficulties

READ MORE >
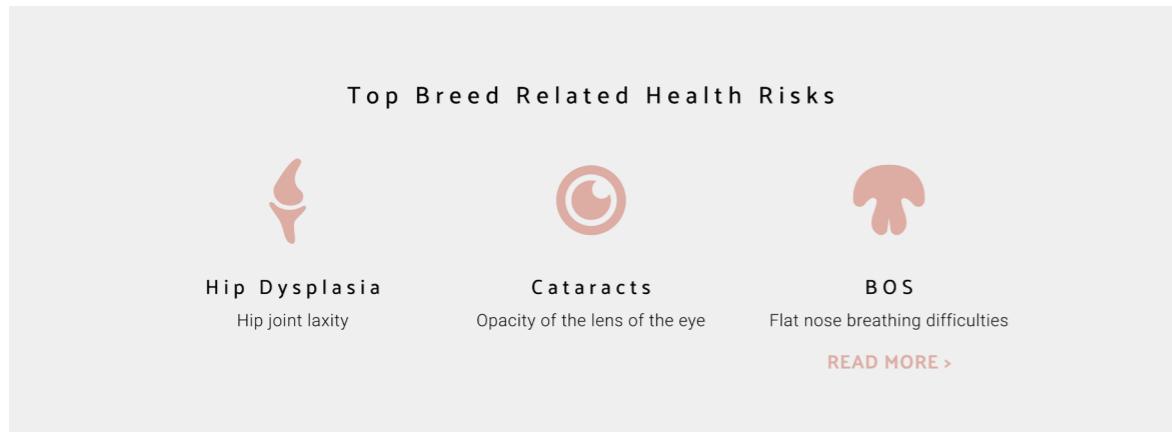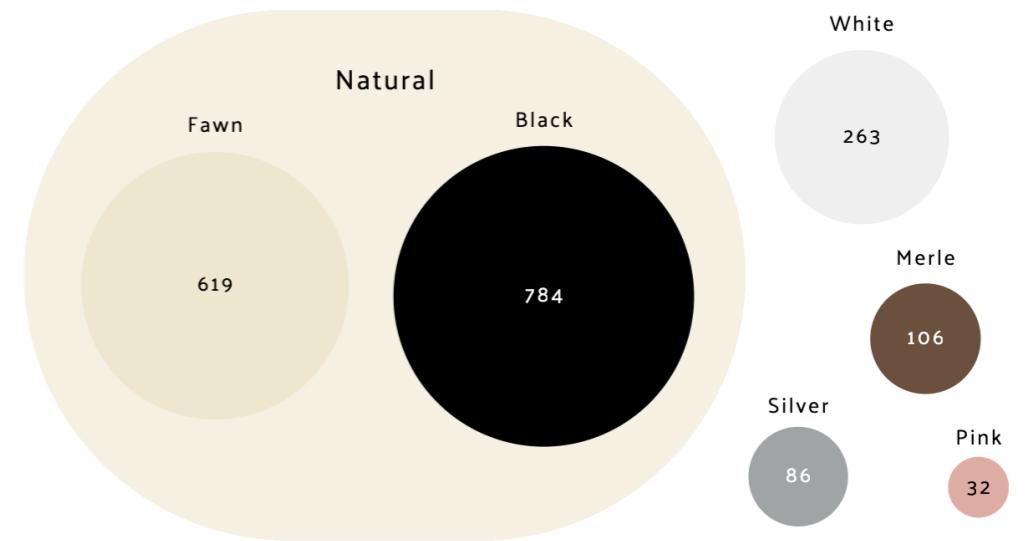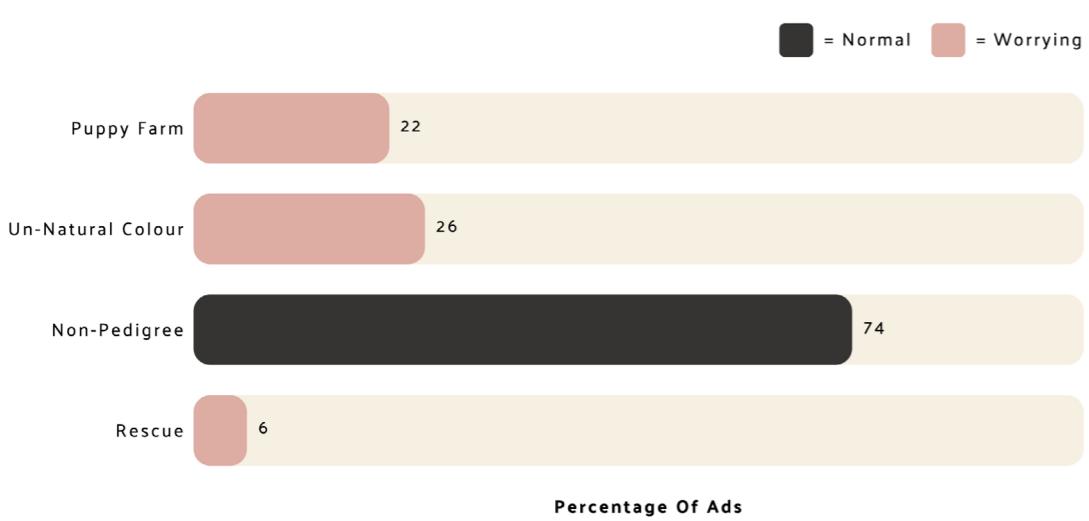
Figure 46 shows the proportion of pure to cross breed dogs advertised. The hybrid proportion is highlighted because the page focuses on the hybrid dog market specifically. This chart was used to introduce the context of the rest of the page to the user.

Workshop participants unanimously agreed that genetic medical conditions were the most influencing factor of if they would get a dog or not. The cost of medical care would put users off buying a certain breed of dog. Participants suggested a list of the genetic medical conditions be put on each breed page. Figure 47 shows the medical issue list block. Medical conditions would then link to the specific medical issue page.

White

263

Natural

Fawn

619

Black

784

Merle

106

Silver

86

Pink

32

Participants liked the original French Bulldog coat colour visualisation, shown in figure 48, and felt it would make an impact their decision. This led to more research being done into other breeds being bred to have unnatural coat colours. Out of the other breeds featured on the website pugs were also found to be victims of this issue. Figure 48 shows the final visualisation for pug coat colours which follows the same design principles as the original French Bulldog visualisation.

= Normal   = Worrying

Figure 49 Breed

risk factors

Puppy Farm   22

Un-Natural Colour   26

Non-Pedigree   74

Rescue   6

Percentage Of Ads

Figure 50 French

Bulldog decision

impact block

Decision Impact

Choosing the right colour can affect the quality of your dogs life.

Figure 51 Rescue

decision impact

block

Decision Impact

Adopting a dog provides a new life for an abandoned animal.
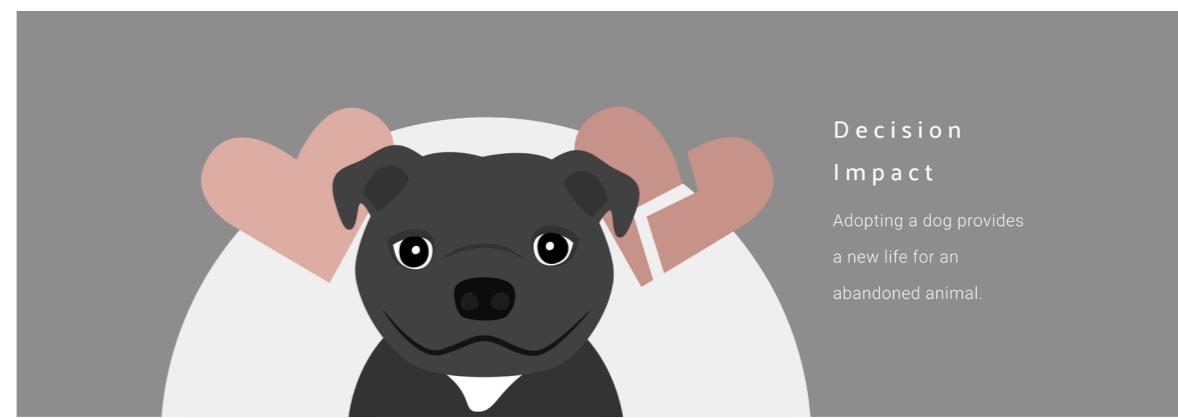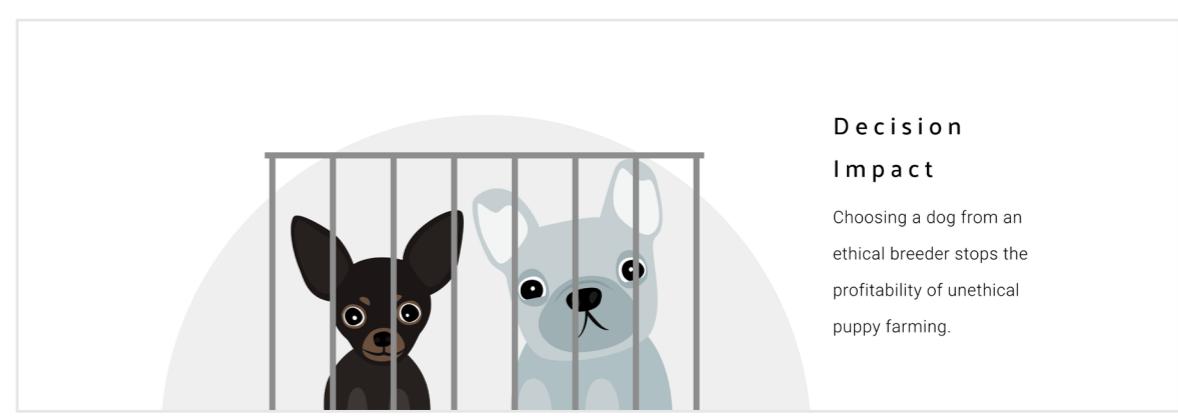
Figure 52 Puppy

farm decision

impact block

Decision Impact

Choosing a dog from an ethical breeder stops the profitability of unethical puppy farming.

Finally, participants in the workshop wanted to know the impact of the issue on specific breeds. This was visualised using a bar chart that showed the percentages of adverts were for puppy farms, non-pedigree, rescues and, for the relevant breeds, un-natural coat colours (figure 49). The stats that were considered high or abnormal were highlighted in pink to indicated to the user that these issues need to be watched out for in the respective breed market.
The goal was to visualise the impact of each issue and put it into a context that can be more helpfully applied to the user's journey of buying a dog. This was done by putting

it in the context of breed as users generally start looking at adverts once they have decided on the breed. As found in the original focus group. The aim is to make users more critical of the adverts they consider making sure they are buying their dog from an ethical source.

'Decision impact' blocks were created and put at the bottom of each issue page (figures 50 and 52). These blocks were inspired by the idea of data comics and using narrative

to interpret data. Blocks were used to depict the reality of the issues to the users. Helping to build a practical picture of the issues and encourage an emotional response.

Link here:
https://zoepointon.github.io/DI-dog-data-V2/

User Testing

The aim of the user testing was to find out if the website had any impact on participants decisions and thoughts on buying a dog online. The impact was measured based on the participants engagement and reactions to the material presented. A secondary aim was to see how the user journey affected their experience. The user testing was made up of three parts; background survey, natural user behaviour observation/ speak aloud, and scenario-based user observation/speak aloud.

The survey was made up of a set of questions that determined the backgrounds of each participants for eligibility. Participants needed to have purchased a dog before or be interested in purchasing one in the future. Their decision role was also assessed to put their role in the decision making in context.

The participants were then asked to explore the website in a usability lab. They were asked to speak out loud as they went through the website. They were specifically encouraged to think about how each piece of information might affect their opinions or behaviour. The usability lab was set up to record audio and video of the user's facial expressions and reactions using the built-in laptop microphone and web camera. The screen was also recorded to view interactions. The recordings were taken using Silverback, a piece of software designed for recording user testing.

Once the participants natural journey had been observed they were given a random scenario and asked to explore the website again. This time they were asked to point out information that would be helpful for their given scenario. The four scenarios were; (1) You wish to re-home a dog but don't know the breed you want. (2) You want a dog that will not get sick. (3) You want a cute dog like a Pug or French Bulldog but cannot decide which breed. (4) You want to buy a dog from the best breeder possible but are not sure what to look for in adverts.

Remote user testing would have allowed for a greater number of participants to test the website. However, in person user testing was chosen so that the participants could be asked direct questions as they interacted with the site. This allowed for deeper insight into the participants thoughts on the information presented.

Five participants took part in the user testing aged 21 to 58. Three were male and two were female. All participants brought their dogs as part of a group. Two were head decision makers and three were co-decision makers. All participants would consider a cross breed dog and all, but one, would consider a rescue.

Findings

Co-decision Makers Role. At times during the user testing participants defined as 'co-decision makers' made a few comments about how they did not have a big part in decision process. In particular when it came to choose the final breed and where they were buying the dog from. Participant 2 and 3 said they were both asked by the head decision maker the type of "attributes" they wanted and then attended the puppy viewing. This was the extent of their role in the process.

User Journey. Three of the participants followed the designed user journey through the website. Participant 4 explained "I want to read the whole page in case I miss something". Participant 2 felt that it was important to read all the information on the pages because it would all have an impact on their decision. They suggested removing all CTAs except those at the bottom and having a "progress bar that shows you what pages you have read". Creating a kind of lite e-learning website. Participants that did not follow the user journey were clicking on the first CTA on every page until they arrived at the breed pages. This meant that they skipped the information on the home page that explained the context of the data. This led to confusion while they were reading some of the visualisations.

Breed Impacts. The parts of the site that had the most impact on decision were when breeds could be compared. In some cases, the top breeds visualisations for rescue and cross breeds (figures 44 and 45) were enough for users to feel they had an idea of what breed they would go for. In response to figure 44, participant 4 said "I would get a mixed breed". Participant 1 opened the pages of the breeds they were interested in on different tabs and compared the information this way. Participant 5 felt the medical issues were a bit misleading because "only have three medical issues for every breed makes it seem like a Pug has the same amount of issues as a Cockapoo", "you need to see all the issues for every breed".

Discussion

Coat Colour Impact. Participants were mixed in their reactions to un-natural coat colour information, see in the French Bulldog and Pug pages. Participant 3 questioned the context stating, "how can any dog colour be un-natural". Whereas participants 4 and 5 felt completely against the practice. Participant 4 "I would never buy a dog like this just because it looks a bit cuter". Participant 1 stated "if I got a French Bulldog before seeing this, I would just automatically go for a grey one because you see them all around and they look cute". The decision impact blocks for the coat colours also worked well at convincing participants to choose a natural colour.

Comparison. Visualisations that allowed comparison had the greatest impact on decision. The ability to compare allowed the user to make the decision that was best for them, rather than being told the one perfect way. Participant 5 suggested a "comparison table" where "you pick the breeds you like and see the pros and cons all lined up".

Cross Breed Impact. The three participants that read the cross-breed page before searching through the breeds picked the cockapoo page first. Their reasons for doing this was based on the "health information" they had learned from the cross-breed page. Participant 3 also added "the risks of Cockapoos are a lot lower than the others". Due to this when participants interacted with Cockapoos, they seemed much more inclined to purchase a Cockapoo or a cross breed.

Metrics. Participants were confused when text descriptions used a different metric than the data visualisation. Participant 3 "if the charts a percentage then in the description it should be too" "then you know what your talking about". A few participants did not like the percentages, participant 1 felt ratios were more valuable because it gives you a clear idea of the impact in a practical way.

Impact on Picking Adverts. The puppy farm and checklist pages had the biggest impact on decisions around picking adverts. The number of breeds advertised by each advertiser was the most impactful visualisation of the puppy farm page. Participant 2 "I never thought of asking advertisers how many breeds they do" and "this would put me off". Participant 1 also commented that breeder needs to be an "expert" in the breeds they are producing, "you probably cannot be an expert in more than two breeds". The checklist was found to be helpful. In particular participants found practical things like checking "photos" and "phone numbers" in a search engine, a good idea that they had not considered before.

The central research question of the dissertation was; How can data visualisation be used to help consumers make ethical purchasing decisions when buying a dog online? The studies conducted found that in all cases the website allowed participants to learn something new about the online dog market. In most cases it also seemed to have an effect on certain aspects of users thinking and decision making.

Since data visualisation is based on statistics it is naturally suited to aid a utilitarian decision-making approach (Danziger, 2008). However, the nature of the decision is highly emotional for many people because of the family aspects involved. Therefore, the decision is bound to have emotional motivations. The website in its current state was found un-likely to affect a user's emotional behaviour due to its factual approach of visualising information. The illustrations and decision impact blocks (figures 50-52) were found to have positive impacts on more emotional factors such as; coat colours. More illustration could be applied to the website in the form of data comics to make the website work for deontological decision making. Also adding novel narrative structures used in data comics could be beneficial.

The visualisations rely on the written explanations for the user to understand the context of the statistics being shown (Vane, 2017). However, by presenting the information in small categorised pieces (Upton and Doherty, 2007) it allowed users to understand the information presented in a more manageable way. Comparative data visualisations were found to have the most impact of users' decisions because it allowed them to weight up options and make their own informed choices (Hullman and Diakopoulos, 2011).

Allowing users to create their own journey through the website by putting CTAs in most content blocks meant that some users missed a lot of vital information. Chawla's (2019) point that users need different things based upon their previous knowledge and preferences, therefore need to create their own journey did not work in this context. The CTAs that allowed users to leave a page before finishing it meant that they missed out on information that impacted their decisions. For example, a participant in the user testing felt they knew about puppy farms so clicked quickly out of the page. They were later given a puppy farm related scenario which meant they had to re-visit the puppy farm page and found out information that they did not know already. Removing non-essential CTAs would reduce the likelihood of this happening.

The aim of the website was to help users make ethical buying decisions. Specifically getting users to consider more carefully factors such as; rescue, health and breeders. The most ethical decision for users to make based upon the research would be to rescue a cross breed that was bred by an ethical breeder. However, since this perfect ethical outcome is near impossible to achieve, in this case and generally (Michelon, 2006), the impact on user decisions needed to be measured in a more realistic way. If the site made a consumer think about an issue in a different way and they implied that it would make them reconsider their mindset or approach the site would be deemed successful.

The clearest example of this was the way users compared the risk factors of the breeds they liked, to try and make a decision to buy the least risky option. In some cases, the final decisions were not as ethical as they could be. For example, in the workshop a participant changed their decision from an un-natural coloured French Bulldog to a Pug. The decision to buy a natural colour was an ethical improvement. However, they decided to still get a flat nosed dog breed which means the dog would still suffer from genetic health issues. This behaviour is likely due to consumers emotional connection to existing ideas, in this case 'cuteness'. However, the site did encourage critical thinking, and in most cases, visualisations pushed consumers to make more ethical choices. Even if they were only mildly better.

The factors that participants felt were most important in the ethics of decisions were; genetic health issues and enabling puppy farms. Users that visited the issue pages before the breed pages learnt about the health benefits that cross breeds possess and the impact that puppy farms have on a dog's welfare. This then meant when they came to look at the breed pages, they were attracted to the Cockapoo page. They also noticed that Cockapoos had a very low risk of being from a puppy farm. Which was generally when participants decided they would pick a Cockapoo out of the options shown on the website.

The study was limited by the number of final user testing sessions conducted. If more participants were tested the findings would have been more conclusive and patterns in behaviour could have be picked up. More extensive testing is required to create more conclusive findings.

Future challenges would be reaching the people who need the information. One way of doing this would be using social media advertising and forms. Adding a social element to the website could also be beneficial for helping users to make more ethical decisions. By adding something like a forum to the site it could work as a facilitator (Chatterjee, 2009) for a more ethical consumer behaviour by raising the social bar through community. This ties into Moore's (2017) theory of the positive effects of social communication when decision making. It would also help make the site more than a one-time visit tool.

The user centred co-design approach worked well because is allowed insight into the users' motivations and needs. Knowing this early on in the design process allowed the website to be tailored to the user. Using an agile workflow was also beneficial because allowed for iterative user testing. This meant every version of website was shown and tested on users which nurtured the user centred design approach. Every study helped build a deeper understanding of the users which made them easier to design for.

Conclusion

The site was found to have a positive impact on more utilitarian decisions and decision makers. The website had less impact on users with preconceived emotional attachment towards certain ideas and breeds. To improve the impact on the more deontological decision makers, narrative methods like data comics could be applied to the website. Also adding social elements like a form or comments could help raise the standard of mainstream social behaviours in decision making in regard to buying a dog.

In the future more user testing could be done to assess the impact on decisions using participants who are going through the process of buying a dog. More medical conditions could also be added to the site in future. Medical issues have potential to impact consumer behaviour drastically because there is both animal welfare and financial motivation. There is potential to expand the breed comparison functionality. Making the comparisons more dynamic and interaction easier could go a long way in impacting decisions.

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Appendix

Focus Group Survey Answers

Timestamp	Participant number:	What is your age?	Have you ever owned a pet dog?	Have you ever been responsible for researching and sourcing a pet dog?
2019/03/16 8:13:33 PM GMT	4	18-24	Yes	No
2019/03/16 8:13:35 PM GMT	2	25-34	Yes	Yes
2019/03/16 8:13:36 PM GMT	5	55-64	Yes	Yes
2019/03/16 8:13:53 PM GMT	8	45-54	Yes	Yes
2019/03/16 8:14:27 PM GMT	3	18-24	No	No
2019/03/16 8:14:43 PM GMT	6	55-64	Yes	Yes
2019/03/16 8:15:09 PM GMT	1	45-54	Yes	Yes
2019/03/16 8:17:28 PM GMT	9	55-64	Yes	Yes
2019/03/16 8:23:30 PM GMT	7	55-64	Yes	Yes

Vet Interview Questions

Current Information

1. Do vets or practices have any programs for reporting or finding bad breeders/puppy farms?
2. Do you have tips for avoiding puppy farms?
3. What information helps convince people to consider more deeply where they adopt a puppy from?
4. Do you give out any collateral like leaflets links to websites?

Dog Health

1. What are some of the most common genetic conditions? Which breeds do they affect?
2. BAOS - how bad is the reality of this condition? Would you put off a person from buying a dog highly likely to have this condition?
3. Do you see a trend with a higher proportion of cross or pure breeds coming in to the vets?
4. Do you think genetic testing will help stop genetic conditions? Or will it cause further selective breeding?
5. Do you know any papers that are relevant?

Prospects

1. What are the possibilities for creating a resource that can be distributed through vets?
2. Is there something already in place?
3. What's more useful - an app or leaflet or website?
4. Is there a resource to contribute to report vet puppy farms? Would vets contribute? Any possible incentives? Society or community?

User Testing Survey Answers

Timestamp	Age	Gender	Have you ever bought a dog?	Did/will you buy a dog as part of a group or alone?
2019/08/05 7:03:08 PM GMT+1	25	Male	Yes	I brought a dog with my family
2019/08/05 9:27:30 PM GMT+1	58	Male	Yes	I brought a dog with my family
2019/08/06 10:22:52 AM GMT+1	23	Male	I am interested in buying a dog in the future	With my girlfriend.
2019/08/06 7:49:19 PM GMT+1	21	Female	Yes	I brought a dog with my family
2019/08/06 8:16:14 PM GMT+1	53	Female	Yes	I brought a dog with my family

What role did/would you take in buying the dog?	What are your reasons for buying a dog?
Head decision maker of a group	Companionship!
Co-decision maker of a group	Companionship
Co-decision maker of a group	Social, companionship.
Co-decision maker of a group	I love animals and wanted a big cuddly dog to keep me company
Head decision maker of a group	Security for the house

What attributes do you look for in a dog?	What breed of dog did/might you buy?
Intelligence, comedy value, cuteness,	Standard Long-Haired Dachshund
Security and Hypoallergenic	Labradoodle
Hypoallergenic, Friendly, Active.	Goldendoodle
Cute, friendly, cuddly, non-shedding, well-behaved	Labradoodle
Hypoallergenic and easy to train	Labradoodle

Would you consider a rescue dog?	Would you consider a cross breed dog?
Yes	Yes
Yes	Yes
Yes	Yes
Yes	Yes
No	Yes

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