

UX Futures  
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# UX Perspectives on Emerging Technologies in Pet Care

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01

# Introduction

Report introduction

# Report Introduction

In 1939, Raymond Sweeney patented the first automatic pet feeder, a clock rigged to unlatch the lid of a food bowl at 6 o'clock (Sweeney, 1938). Nearly 100 years later, pet technology has expanded far beyond Sweeney's original vision, cementing itself in the smart technology market.

This report looks at the Catit PXI range of pet care devices (fig. 1) to discuss potential applications of emerging technologies to domestic pet care. First, by looking at potential applicable technologies, before proposing a PIXI Internet of Things, then moving on to discussing the wider implications of these emerging technologies on the UX discipline.



**Figure 1.** The Catit PIXI Range. The range consists of two lines. The first is PIXI Smart products, which all have electronic functions, and mostly connect to the Catit mobile app. The other side of the range is the PIXI Design range, with products featuring the PIXI nose and whiskers motif, with some products also offering electronic functions. A larger version of this image is available in **Appendix A**



02

## Emerging technologies in pet care

Biometrics | Internet of things | Proposing a Catit PIXI IoT

# Biometrics

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Biometrics traditionally refers to the use of biological or physical characteristics for security validation (Johnson, 2017). The expansion of the wearable technology market has seen biometric technology applied in other contexts; from facial recognition in **body-cams** to biometric health monitoring (**BHM**) wearables (Fig. 2) (Almadan & Rattani, 2021; Maiorana, 2022). Similarly, biometric technology is establishing itself in the agriculture industry as a non-invasive method of assessing livestock health (Fuentes et al., 2021). Thus, it is only natural that we are seeing biometric technologies applied to the domestic pet industry, too.

## Monitoring pets using biometrics

Pet loss or theft has long been a concern for pet owners. Traditionally, **microchipping** has been the solution to these concerns. However, owners are now turning towards **GPS** tracking collars for live, easily accessible supervision of their pet's location. Alongside this functionality, GPS tracking collars are increasingly offering health monitoring functionality using biometrics, touting this feature as "lifesaving" (petpace, no date).

The benefits of BHM collars extend further. Martin (2023) argues that the data collected by these collars can

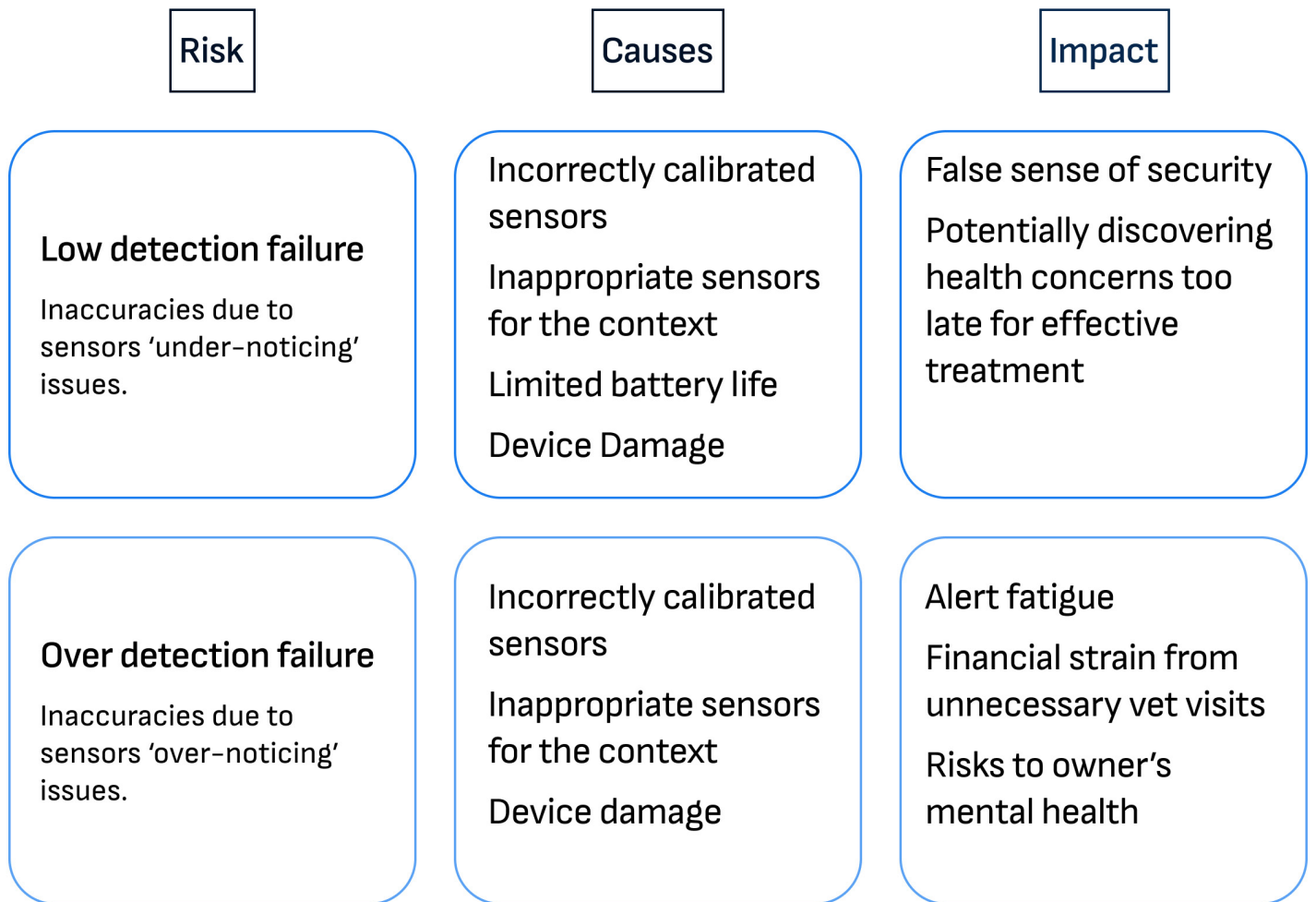


**Figure 2.** Public safety applications of biometric technology include facial recognition in body cams (right) worn by law enforcement, while more commercial applications include smartwatches like the Fitbit Versa 4 (Thorpe, 2021; Google, no date)

form a database of pet health information, one arguably more accurate than health databases obtained through clinical research. Furthering our understanding of pet health and leading to potential breakthroughs in the veterinary care industry.

## Accuracy concerns

However, Martin (2023) also raises concerns about data accuracy, suggesting that these collars may be "pushing human solutions on fundamentally incompatible species" (online). Currently, BHM sensors rely on skin-to-skin contact, and contactless BHM sensors in this context are still in their infancy (Mauran, 2022). Furthermore, limited battery life and a high risk of device damage can lead to further inaccuracies due to unintentional gaps in the data.







**Figure 3.** The potential causes and impacts of inaccurate readings from BHM collars (NNGroupm 2022; Sheils McNamee, Connolly & Smitton, 2025). A larger version of this image is available in **Appendix B**.

Figure 3 outlines the causes and impacts of potential data inaccuracies in BHM collars. Care must be taken in the creation of BHM collars, both in the physical manufacturing of the products and the UX of any associated applications. If not, these devices can be detrimental to a pet's physical health and the owner's mental health - a far cry from the comforting, "lifesaving" capabilities they publicise.

## A Biometric PIXI System

Alternatively, the purpose of biometrics in pet technology can be far more traditional - for identification. Boulaouane et al. (2016) found that facial scans can identify cats with an accuracy of more than 99%. This presents an alternative to microchip-enabled products (fig. 4) that have become ubiquitous in the pet technology market.

✓ Authorised pet

-  The feeder lid will remain closed at all times until it is opened for food replacement - **see page 5** - or an authorised pet approaches to eat.
-  When a pet places its head into the hoop on the front of the feeder, the microchip reader is activated.
-  If the pet is authorised and allowed to eat, the lid will slide open for them.
-  Once your pet has eaten and moved away from the feeder the lid will close after a short delay (**see page 14** to adjust the lid delay). This once again seals the bowl keeping the food fresher.

✗ Unauthorised pets



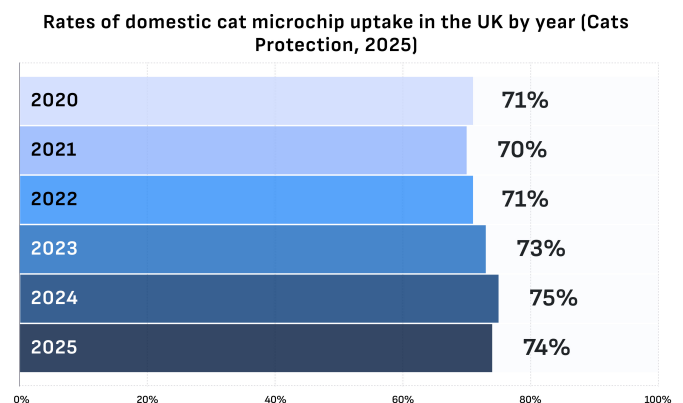
If an unauthorised greedy pet tries to eat from the feeder when the lid is closed then the lid will simply not open.

**Figure 4.** An excerpt from the user manual of Sure Petcare's Microchip feeder, outlining the normal operation of the microchip recognition technology-enabled product (Sure Petcare, 2025).

Despite legal requirements to microchip pets in the UK, microchipping rates remain steady at 75% (fig. 5), additionally, this is not a global legal requirement (Cats Protection, 2025). Biometric identification allows pet technologies to retain the functionalities awarded by microchip recognition, without requiring a microchip, globalising the marketability of devices.

Moreover, biometrics have the potential to capture more information than just identity. A 2023 study found that AI analysis of movement data was up to 81% accurate in identifying a

dog's emotional state (Chen et al., 2023). As AI developments continue to accelerate, we can predict that this rate will increase, and biometric data will become even more insightful than it is now.



**Figure 5.** A chart of microchipping rates in the UK by year (Cats Protection, 2025). A larger version of this chart is available in **Appendix C**.



**Figure 6.** An example of the interface of a PIXL IoT monitoring app, which summarises device status alongside providing insights into pet well-being. In this instance, users are informed of a water fountain's status, as well as hydration levels for each of the cats in the household.

# Internet of things (IoT)

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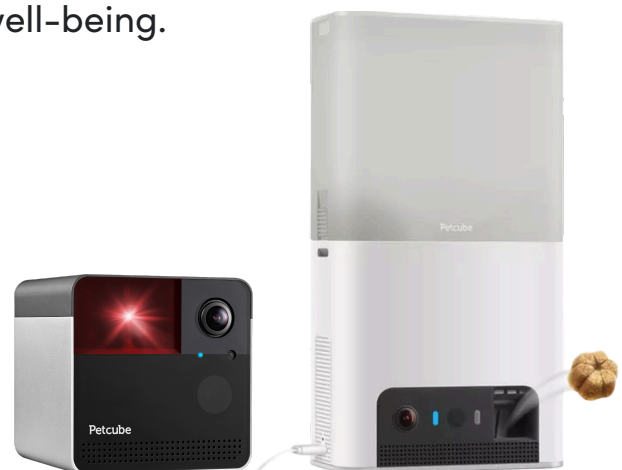
IoT is an emerging technology referring to a network of devices interacting with each other to collect and share data (IBM, no date). Commonly seen in 'Smart Home' technologies, where an IoT operates around a home for various purposes such as energy saving and security, the market for Smart Home IoT devices is increasing at a rapid pace. Indeed, global spending on smart home-related devices is expected to reach 204 billion dollars in 2027 (Strategy Analytics, 2022)

## A Pet Centred IoT

While smart home technologies are increasingly popular, pet-centred IoT systems are relatively unexplored. While pet cameras and automatic feeders have gained popularity, these devices tend to function in isolation and miss the characteristic networking aspect of IoT. Catit's PIXI series is a prime example of this. While these products are all part of the same design system, they do not interact with each other. By appropriating the design system into an IoT system, users can gain unique insights into their pet's well-being (Fig. 6).

## IoT For Pet Wellbeing

A contemporary issue in pet ownership is the ongoing impact of COVID-19. In 2020, 3.2 million households acquired a pet for companionship and mental well-being (Brown, 2025; Victor & Mayer, 2023). During the **pandemic restrictions**, pets and owners alike grew accustomed to constant companionship. When these restrictions eased, routines shifted dramatically, and behavioural issues such as **separation anxiety** became a common phenomenon (Brown, 2015). These intense bouts of anxiety have adverse effects on pets' physical health (de Souza et al., 2020; Dreschel, 2010) and owners' mental health (PR Newswire, 2023). IoT-integrated pet technologies, such as the PetCube cameras (fig. 7), facilitate remote care. Owners can speak to, play with, or give treats to their pets through an app, alleviating their separation anxieties and their pet's boredom, thereby improving well-being.



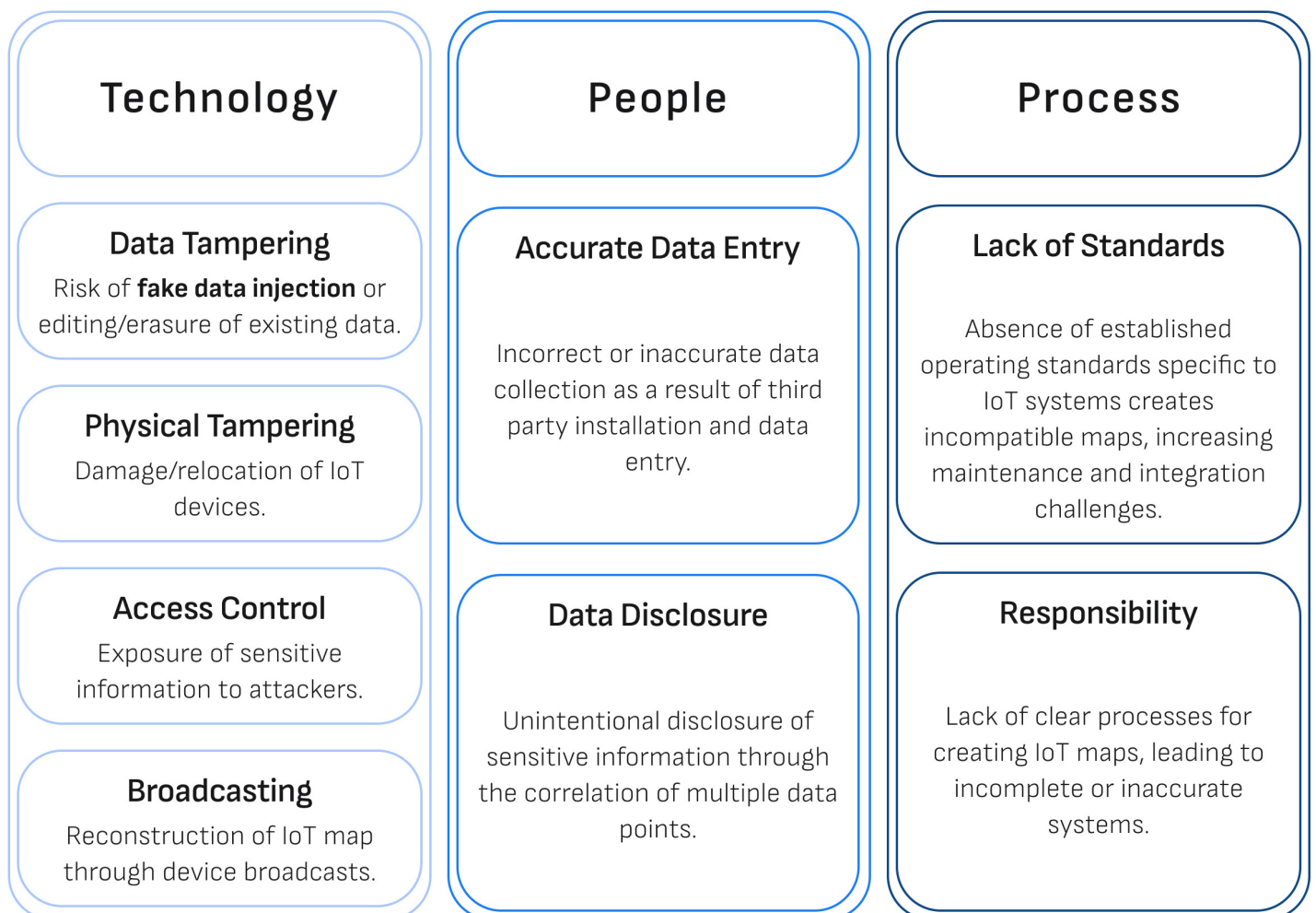
**Figure 7.** Devices such as the Petcube Play 2 (left) and Petcube Bites 2 (right) allow owners to view their pet, speak to them with two-way audio, and initiate laser pointer play or dispense treats, respectively (Petcube, 2025). These features alleviate separation anxiety through the facilitation of remote care.

## Security concerns with the IoT

Security is a key concern with IoT (Hidalgo et al., 2022; Lawrence, 2024). Greengard (2021) remarks that IoT systems can be vulnerable to **cybersecurity attacks**, noting that “the dizzying array of hardware, software, operating systems, protocols and communications methods creates gaps and potential entry points” (p. 190). Shaw et al. (2019) further explore these concerns through the lens of the three key cybersecurity pillars (fig. 8). While the cybersecurity risks of domestic IoT

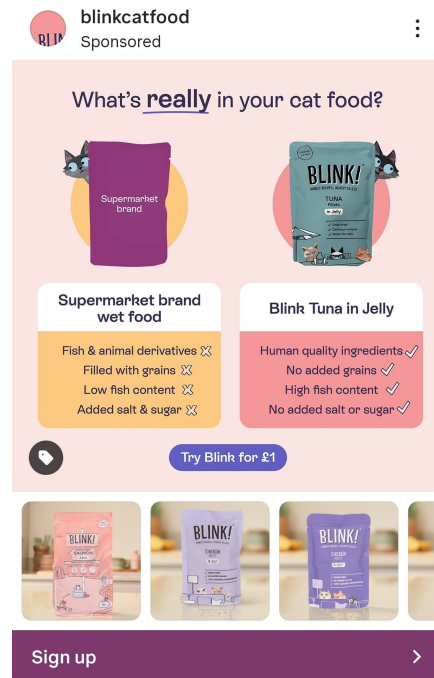
systems are comparatively smaller than their large-scale commercial counterparts, they are no less dangerous.

IoT systems capture and disclose a staggering amount of personal data. Van Kleek et al. (2019) note that under the “prevailing model of surveillance capitalism” (p. 1), this data is exploited at the cost of user privacy. It is not uncommon for IoT systems to disclose data to third parties (Van Kleek et al., 2019), who can exploit this data for profit, ultimately harming the user.

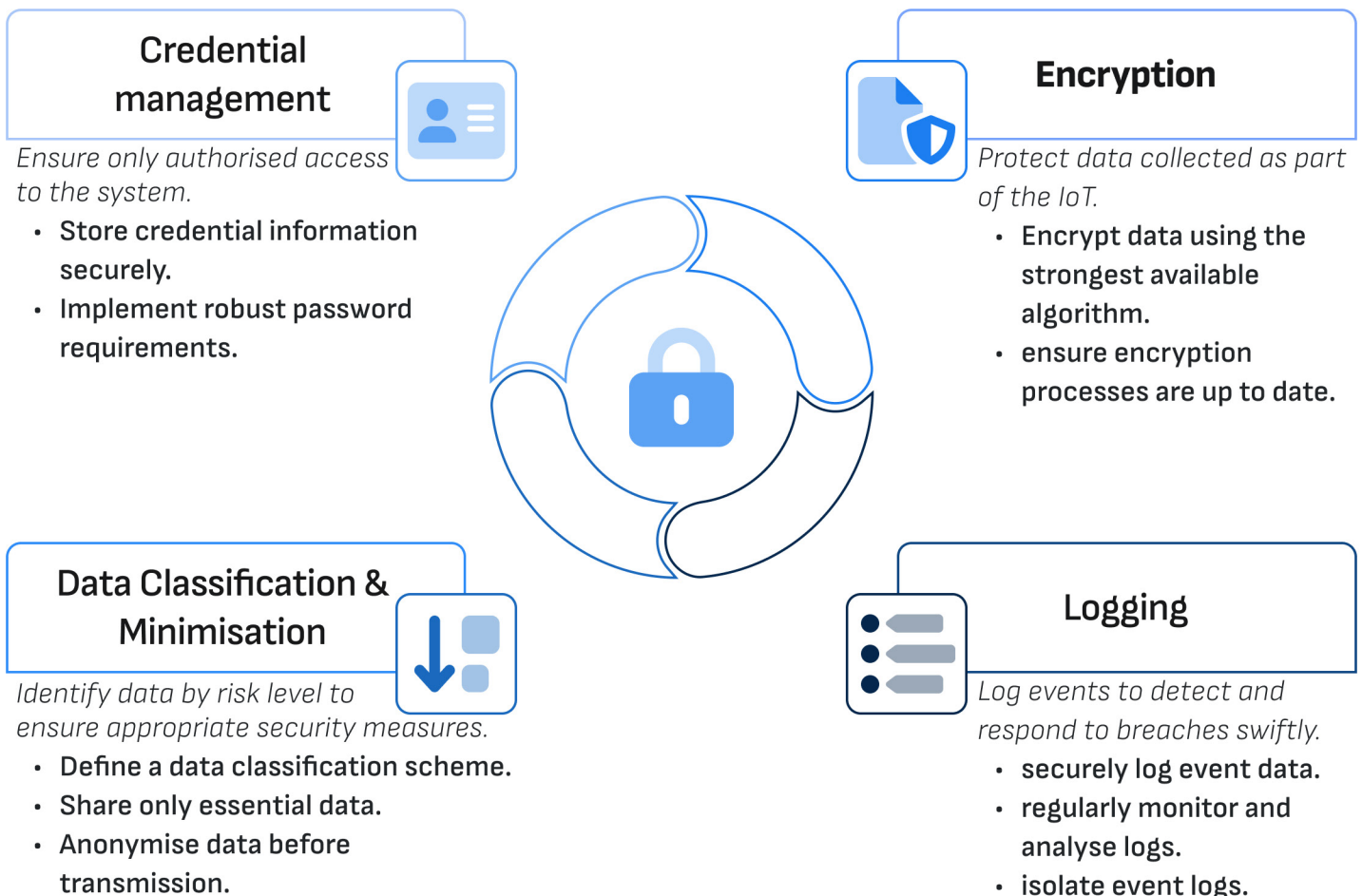


**Figure 8.** A summary of the security risks in an IoT system, as mapped to the three cybersecurity pillars by Shaw et al. (2019). A larger version of this image is available in **Appendix D**.

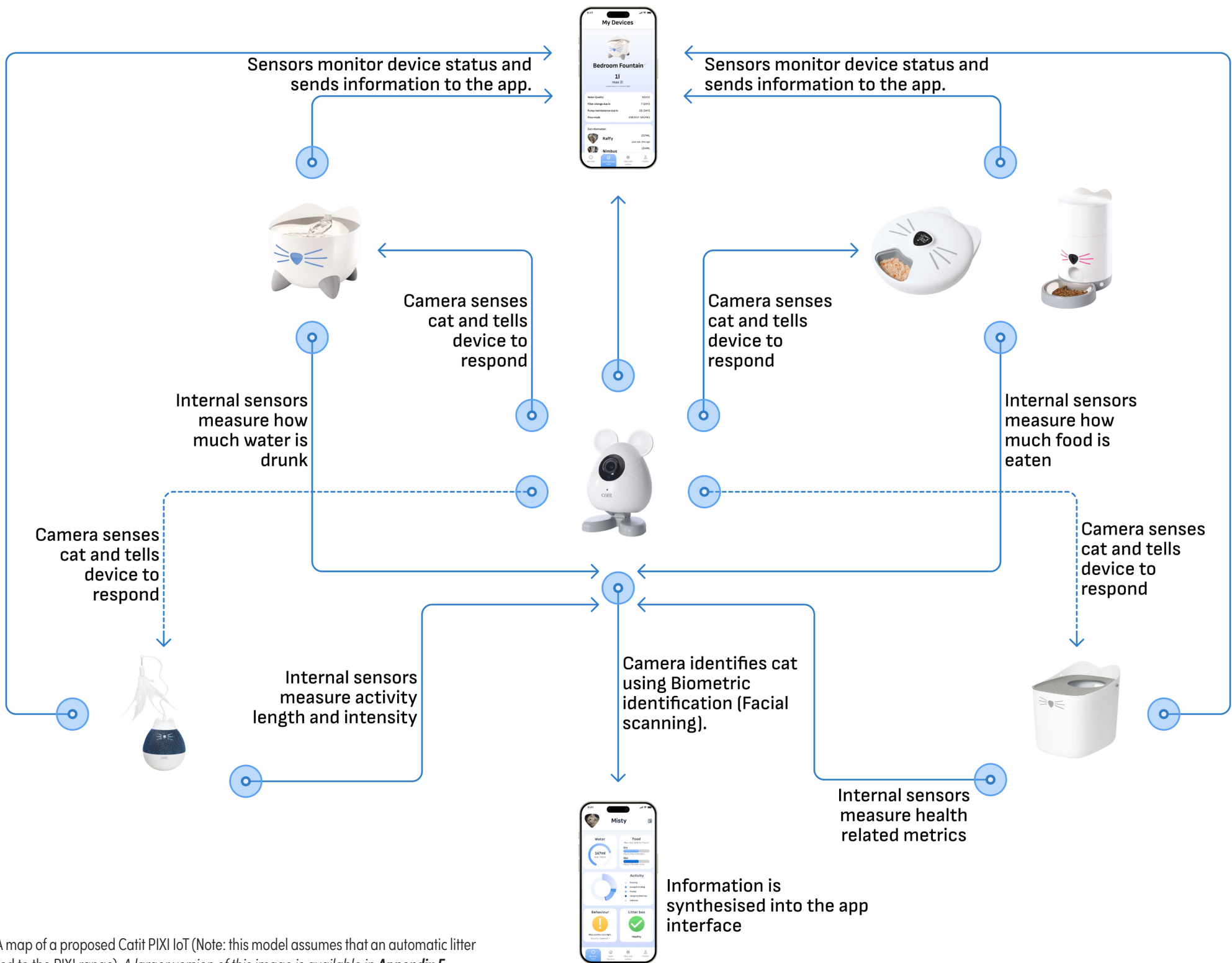
One way in which this data can be exploited is in the form of targeted advertisements using unethical practices (fig. 9). The emotional harm from being exposed to these can negate the benefits of the system itself. Any pet-centred IoT should consider robust mitigations (fig. 10) to ensure its users' data is sufficiently protected.



**Figure 9.** An example of an advertisement for pet food arguably involving manipulative marketing strategies including, 'guilt marketing' (Marketing Week, 2009)



**Figure 10.** Mitigation strategies for third-party data breaches as outlined by the IoT Security Foundation (2019). A larger version of this image is available in **Appendix E**.



**Figure 11.** A map of a proposed Catit PIXI IoT (Note: this model assumes that an automatic litter tray is added to the PIXI range). A larger version of this image is available in **Appendix F**.

## Proposing a Catit PIXI IoT

Figure 11 proposes a Catit PIXI IoT as an alternative to wearable pet health monitors. The system centres around the camera, which tracks the cat's location and communicates with the other products to respond accordingly. For example, the fountain would activate as a cat approaches, while an **automatic litter tray** would start a cleaning cycle as a cat leaves. Sensors within each product would capture health-related metrics, which are supported by biometric identification and AI analysis, then sent to a mobile monitoring application (fig. 12).

**Figure 12.** An example of the interface of the Catit PIXI IoT management application, where users can see an overview of pet health and behavioural metrics.



Contemporary pet health monitoring products may not suit all consumers. **Breakaway collars** are considered the safest collars for cats; however, the quick-release safety aspect can easily cause attached wearables to become lost or damaged. Moreover, outside of very specific circumstances, GPS tracking is of little use for the growing number of indoor cat owners (Cats Protection, 2025; Foreman-Worsley et al., 2021). A PIXI IoT targets these consumers with a system tailored to their cat’s lifestyle.

Data suggests that only 9% of cat owners consider themselves budget-conscious (Statista, 2023). However, empathy mapping suggests that in this emerging market, subscription fees and hidden costs are a significant pain point (fig. 13). While establishing the IoT can be costly (fig. 14), the system depends on Wi-Fi, not mobile data. This removes this pain point while retaining the overall benefits.

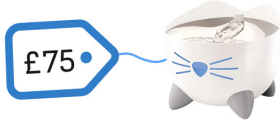
## Empathy Map – Catit IoT



**Figure 13.** An empathy map of users of smart home technology and pet technology. Since pet-specific IoTs are a relatively unexplored system at present, semantic analysis was done of social media and forum threads relating to pet healthcare technology, pet tracking technology and smart home technology ([Deleted], 2019; fromva2fla, 2023; glowstickglasses, 2025; mayabear, 2020; mister obama, 2025; socker18; 2022; yuste, 2023). A larger version of this image is available in **Appendix G**.



PIXI Smart Mouse Camera \*



PIXI Smart Drinking Fountain



PIXI Vision Smart Feeder \*\*



PIXI Smart 6-meal Feeder



PIXI Spinner



PIXI Litter Box \*\*\*

**Estimated minimum setup cost:  
£820**

\* Due to the proposed system's reliance on camera feeds, a system will likely need multiple cameras to operate effectively, increasing the cost.

\*\*A cheaper alternative is the Catit PIXI Smart Dry Food feeder at £89, although this does not have video functionality like the vision feeder.

\*\*\*There is not currently an automatic litter box available in the Catit PIXI range, as such the cost has been estimated based on market research (Higgins, 2025).

Furthermore, the system can expand as and when the user needs. The experience map seen in figure 15 establishes that a user is unlikely to purchase every product at once; rather, they establish the IoT over time. This eases the financial burden of purchasing multiple devices whilst appealing to the user's characteristic of being innovators or early adopters of new products (Geweise, Rau and Varghese, 2025).

**Figure 14.** Estimates of the minimal cost to fully establish a Catit PIXI IoT. Prices are based on the full price of an item as of December 2025, with the price of the theorised automatic litter box being calculated from the Amazon prices of the top 6 automatic litter boxes as identified by Higgins (2025)

# Experience Map – Catit IoT

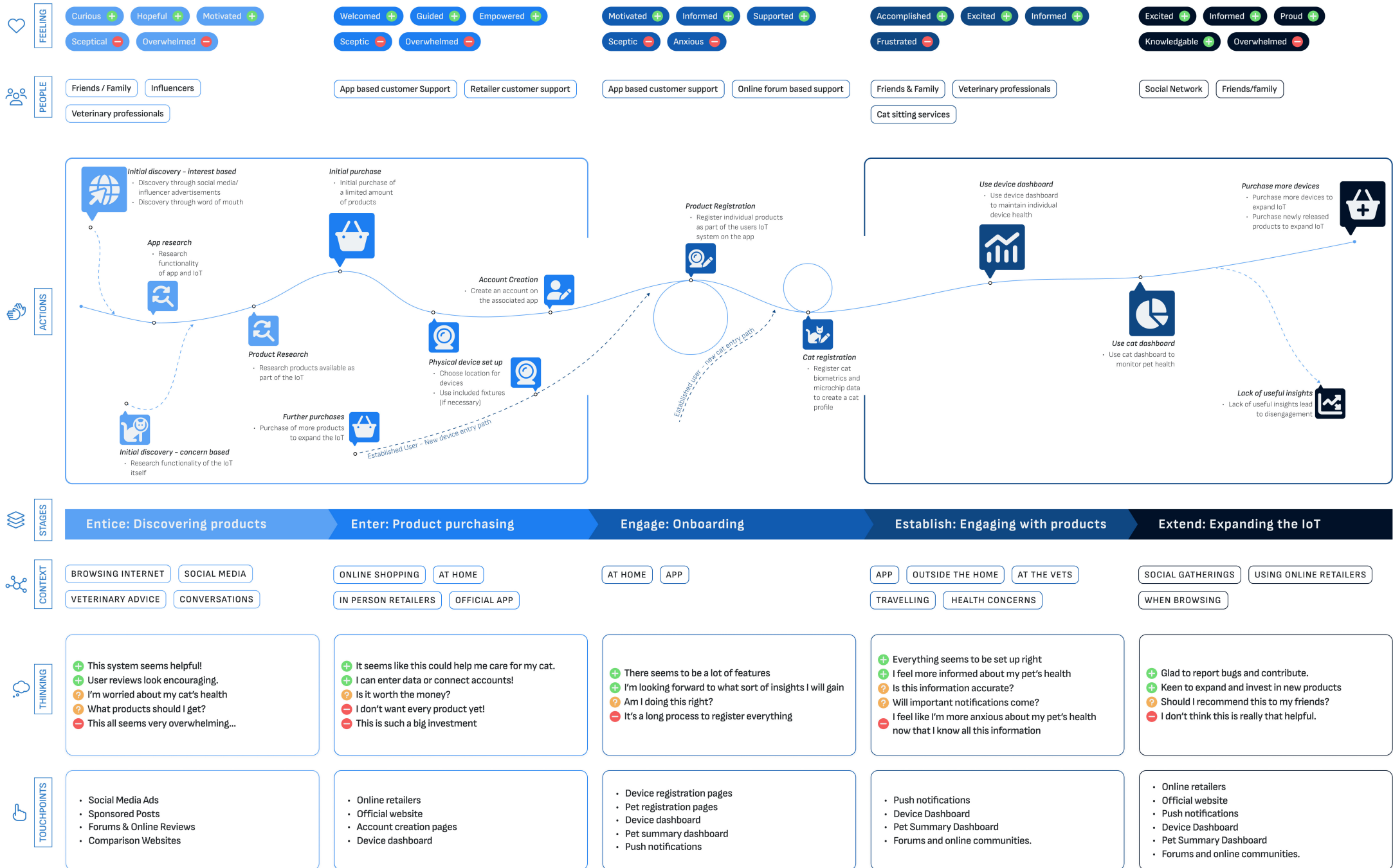


Figure 15. An experience map outlining a user's experience of establishing the Catit PIXI IoT. A larger version of this image is available in **Appendix H**.



03

## UX in emerging technologies

Contemporary UX practices and emerging technologies |  
What do emerging technologies mean for UX?

# Contemporary practices in emerging technologies

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As technology develops, it is imperative that UX develops in tandem. Emerging technologies such as IoT are spearheading a shift in attitudes towards technology, from consciously interacting with, toward unconsciously embedded in life. As such, UX practitioners should consider how our established techniques can be applied in these future-facing contexts to ensure ethical and beneficial adoption of these technologies.

IoT systems are intended to be invisible; that is, they should seamlessly improve the user's natural state (Shaw, Mikusz, Nurmi & Davies, 2019). To do this, we must sincerely understand the user. Empathy mapping examines the user's state when engaging with a product to help understand their priorities (Gibbons, 2018). Through this understanding, we can then know which UX design techniques to employ to make a system that not only integrates with but also benefits the user's daily life.

We gain further understanding of the life that IoT intends to improve through experience mapping. This technique looks beyond the user to the context in which the user engages with the technology. Shaw et al. (2019) note that this context is essential to fully harness the capabilities of an IoT in such a way

that mitigates the potential risks of the system to the user.

However, these user-centred techniques overlook a key actor in the IoT, the machines themselves. Devices in IoT systems are not merely facilitators; they communicate and interact with each other independently of the user (Tsvetkova et al., 2017). If we ignore these computer-to-computer interactions in favour of focusing solely on human-to-computer, we run the risk of imposing solutions that inadvertently damage the user experience or introduce security risks (Tsvetkova et al., 2017). In short, while contemporary UX techniques establish a full understanding of the human-to-computer interactions, they are not enough to fully understand an IoT system itself and should not be used in isolation.

# What do emerging technologies mean for UX?

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The ethos of UX design lies in creating seamless and easy interactions. In 2D mediums, we have well-established design principles and UX 'Laws' to follow (Yablonksi, 2020). However, with emerging technologies such as IoT, our mediums are diversifying beyond the screen and established design principles are being turned on their head (Hacid, Al-Shamaileh & Maamar, 2023).

Devices within an IoT are likely screenless and rely on a number of interaction methods, for example, voice commands, physical buttons or gestures (Lawrence, 2024). Despite this diversity, it is key to ensure that the experiences of using devices within a single system are unified and natural, with consistent interaction patterns and visual languages (Lawrence, 2024; Hidalgo et al., 2023). In other words, as we move towards future technologies, UX designers ironically need to turn towards the historic, pre-digital foundations of the user experience discipline; **ergonomics** and product design. Considering digital user experience from a more physical perspective will be key to cementing a fully digitised day-to-day life that these emerging technologies hope to establish.



04

# Reference

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# Glossary

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<b>AI</b>	Artificial intelligence.
<b>Alert Fatigue</b>	A UX concept identifying that an excess of notifications will lead to users dismissing notifications without reading them.
<b>Automatic Litter Tray</b>	A pet technology product where waste is removed from a cat litter tray without the need for human intervention.
<b>Bodycam</b>	A small video camera worn on the body, typically by law enforcement.
<b>Breakaway collars</b>	Safety collars for cats wherein the fastening pins are rounded. This allows the clasp to easily unfasten when enough force is applied, reducing the risk of strangulation or injury.
<b>Cybersecurity attacks</b>	Malicious attempts to breach computer systems to cause damage or for financial gain.
<b>Encryption</b>	Scrambling data into an unreadable code using an algorithm, so that it can only be understood by the intended recipient.
<b>Ergonomics</b>	The study of designing things for efficient and comfortable use.
<b>Fake data injection</b>	A cyberattack where the attacker purposefully implants incorrect data into a dataset, invalidating the data.
<b>GPS</b>	Global Positioning System.
<b>Microchip</b>	A small identification device implanted under the skin of a pet, which can be scanned to identify the pet's registered owner.
<b>Pandemic restrictions</b>	The restrictions placed on the public to prevent the spread of COVID-19, including social distancing measures and the closure of non-essential businesses.
<b>Separation Anxiety</b>	A psychological phenomenon where being apart from someone or something causes unease, worry or fear. Often manifests in destructive behaviour in pets.

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# Appendices

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## **Appendix A**

Figure 1: The Catit PIXI range of products

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## **Appendix B**

Figure 3: The potential causes and impacts of inaccurate readings on biometric health collars

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## **Appendix C**

Figure 5: A chart of microchipping rates in the UK by year

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## **Appendix D**

Figure 8: A summary of the security risks in an IoT system

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## **Appendix E**

Figure 10: Mitigation strategies against third party data breaches in an IoT

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## **Appendix F**

Figure 11: A map of the proposed Catit PIXI IoT system

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## **Appendix G**

Figure 13: An empathy map of smart technology and pet technology users.

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## **Appendix H**

Figure 15: An experience map of a user of the Catit PIXI IoT

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# Appendix A - Figure 1: The Catit PIXI range of products

## PIXI Smart products

*With app connectivity*



PIXI Smart Drinking Fountain



PIXI Smart Feeder



PIXI Smart Mouse Camera



PIXI Smart 6-meal Feeder



PIXI Vision Smart Feeder

## PIXI Design products

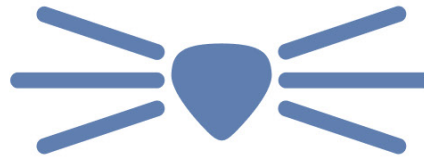
*With electronic function*



PIXI Spinner



PIXI Drinking fountain



## PIXI Smart products

*With no app connectivity*



PIXI Vision Smart Vacuum food container

## PIXI Design products

*With no electronic function*



PIXI Feeding Dishes



PIXI Treat Dispensers



PIXI Elevated feeding dish



PIXI Scratchers



PIXI Litter Box

# Appendix B - Figure 3: The potential causes and impacts of inaccurate readings on biometric health collars

**Risk**

**Causes**

**Impact**

**Low detection failure**  
Inaccuracies due to sensors 'under-noticing' issues.

Incorrectly calibrated sensors  
Inappropriate sensors for the context  
Limited battery life  
Device Damage

False sense of security  
Potentially discovering health concerns too late for effective treatment

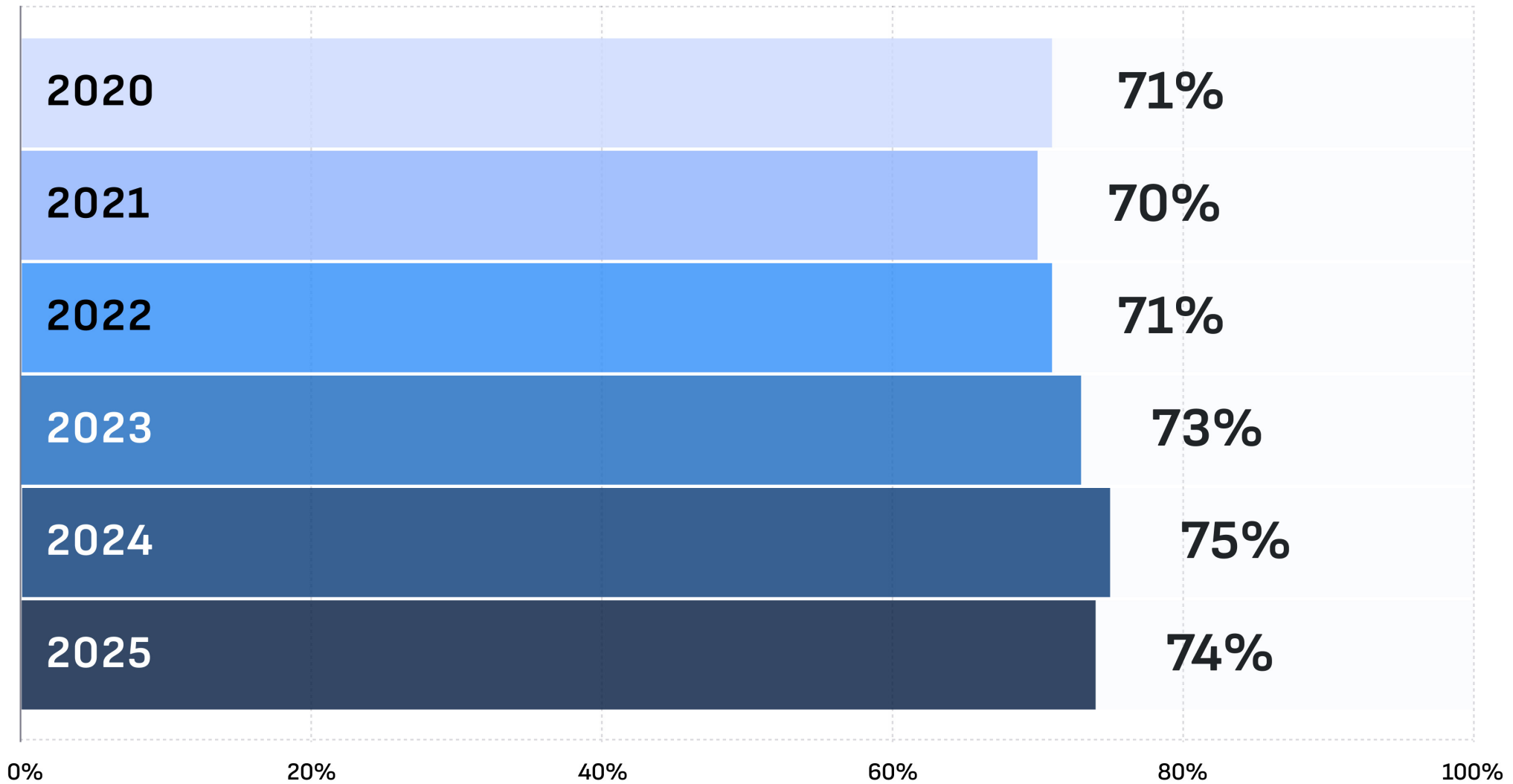
**Over detection failure**  
Inaccuracies due to sensors 'over-noticing' issues.

Incorrectly calibrated sensors  
Inappropriate sensors for the context  
Device damage

Alert fatigue  
Financial strain from unnecessary vet visits  
Risks to owner's mental health

Appendix C - Figure 5: A chart of microchipping rates in the UK by year

### Rates of domestic cat microchip uptake in the UK by year (Cats Protection, 2025)



## Appendix D – Figure 8: A summary of the security risks in an IoT system

### Technology

#### Data Tampering

Risk of **fake data injection** or editing/erasure of existing data.

#### Physical Tampering

Damage/relocation of IoT devices.

#### Access Control

Exposure of sensitive information to attackers.

#### Broadcasting

Reconstruction of IoT map through device broadcasts.

### People

#### Accurate Data Entry

Incorrect or inaccurate data collection as a result of third party installation and data entry.

#### Data Disclosure

Unintentional disclosure of sensitive information through the correlation of multiple data points.

### Process

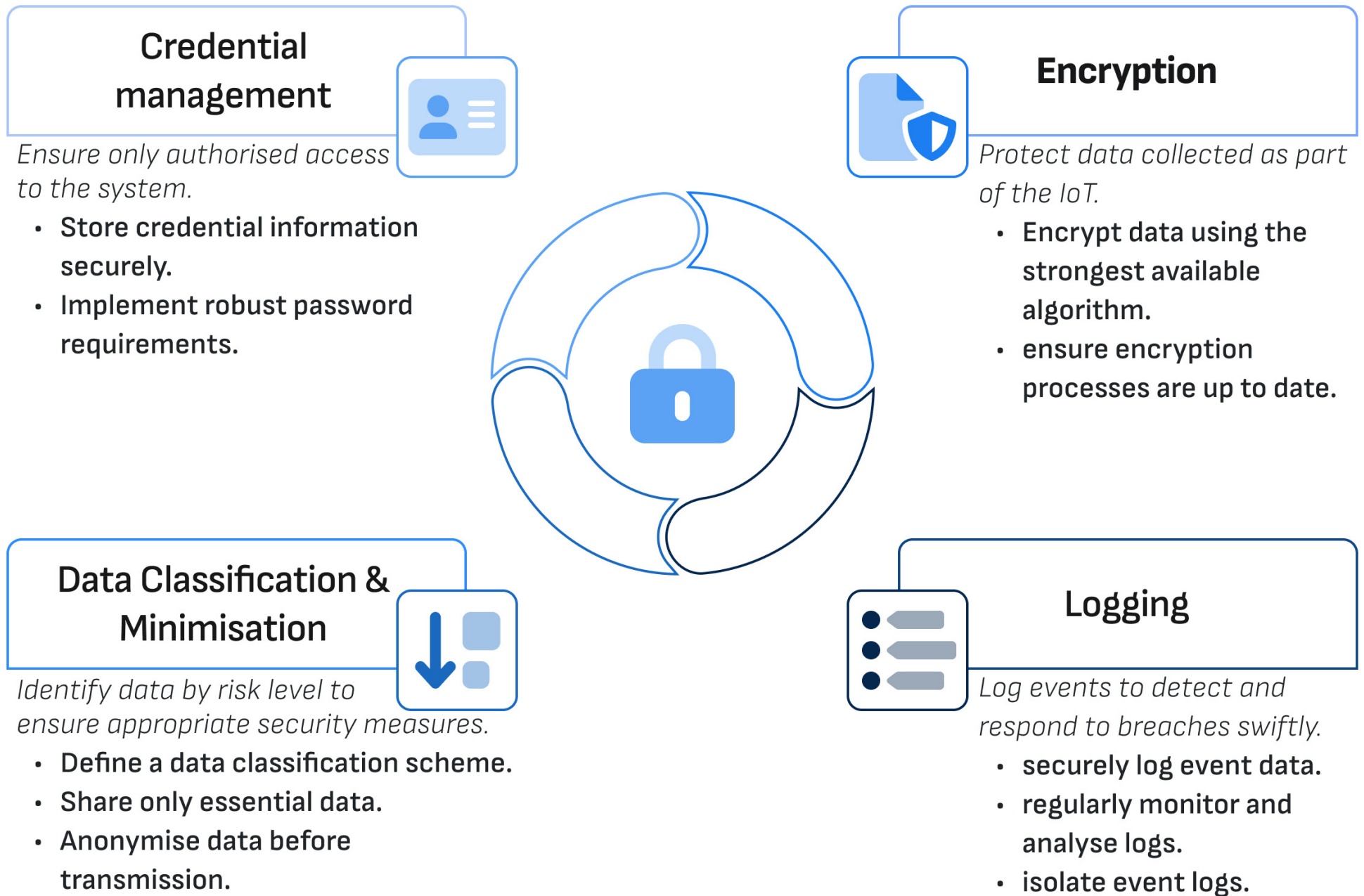
#### Lack of Standards

Absence of established operating standards specific to IoT systems creates incompatible maps, increasing maintenance and integration challenges.

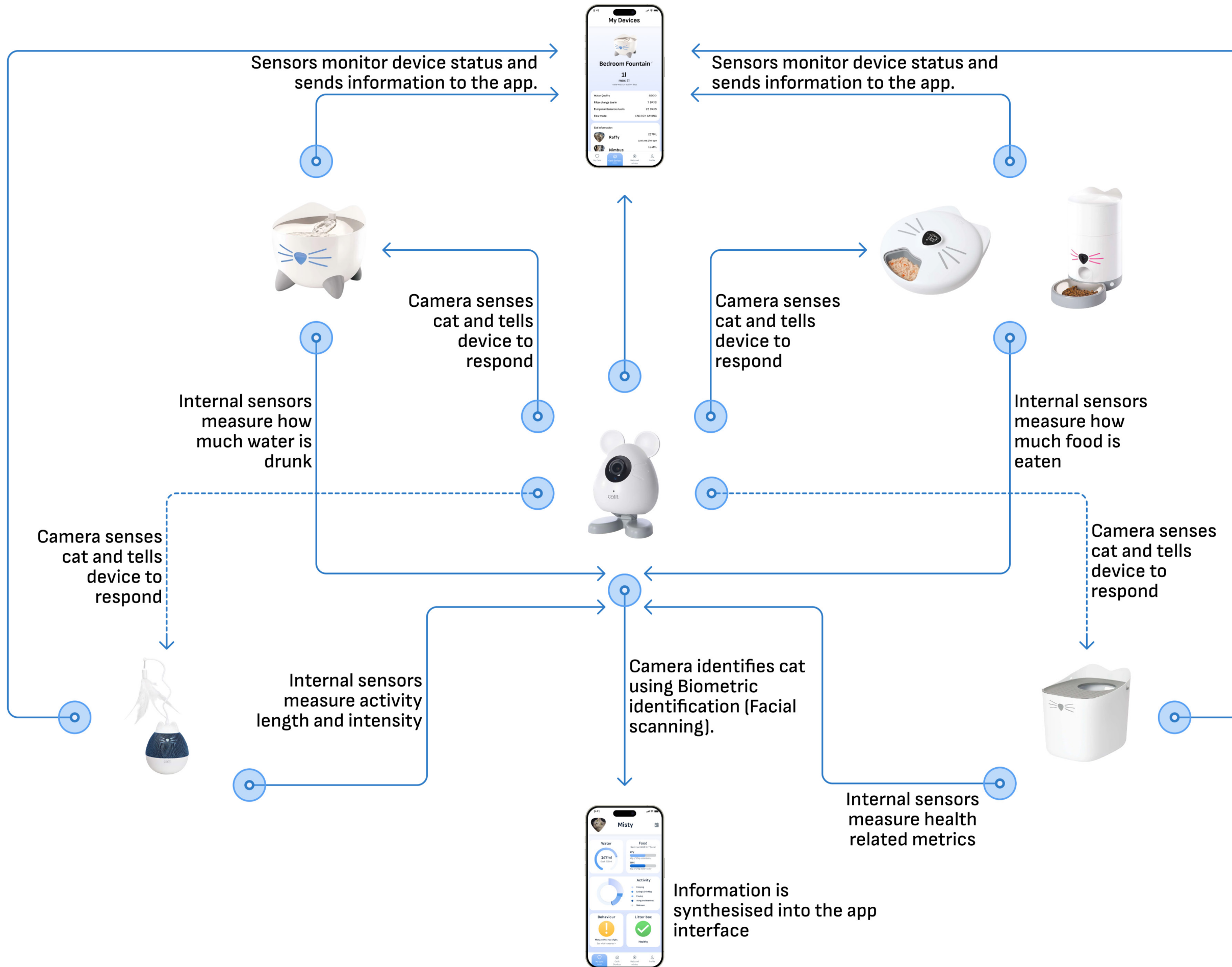
#### Responsibility

Lack of clear processes for creating IoT maps, leading to incomplete or inaccurate systems.

# Appendix E - Figure 10: Mitigation strategies against third party data breaches in an IoT



Appendix F - Figure 11: A map of the proposed Catit PIXI IoT system



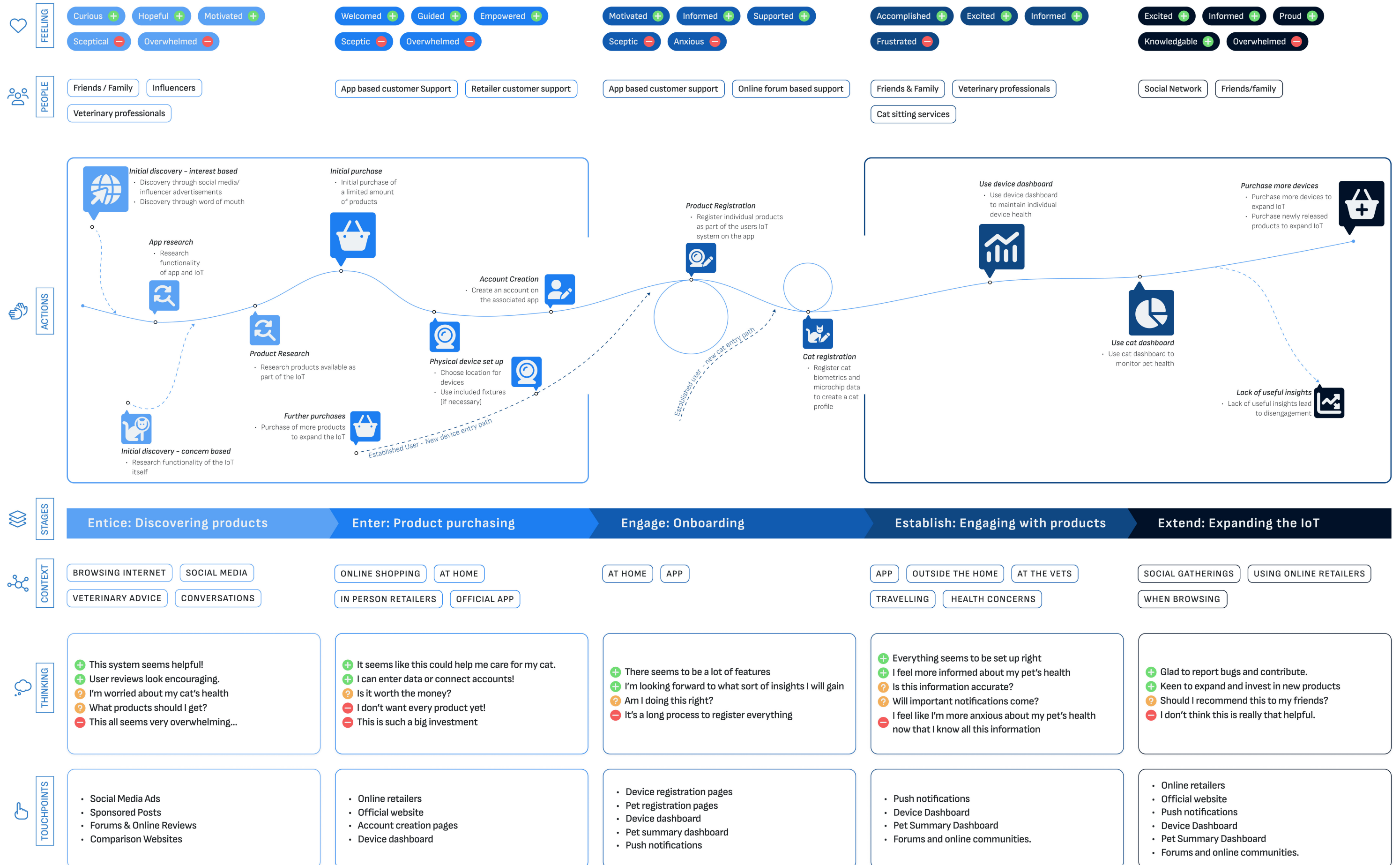
# Appendix G - Figure 13: An empathy map of smart technology and pet technology users.

## Empathy Map - Catit IoT



# Appendix H - Figure 15: An experience map of a user of the Catit PIXI IoT

## Experience Map - Catit IoT





**Misty**  
Liverpool, UK



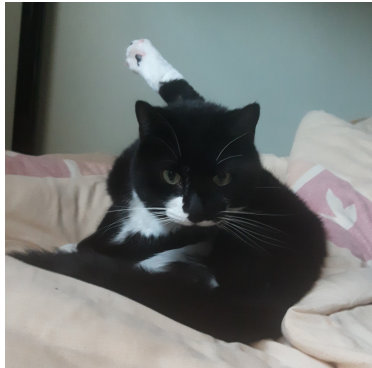
**Roo**  
Canterbury, UK



**Bear**  
Canterbury, UK



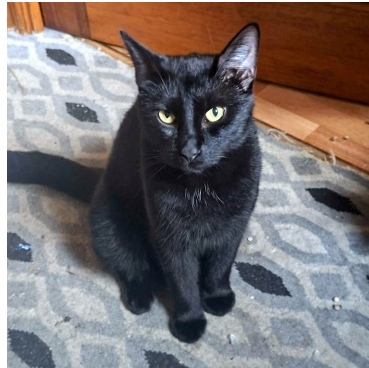
**Luna**  
Canterbury, UK



**Nox**  
Cork, Ireland



**Nimbus**  
Antrim, UK



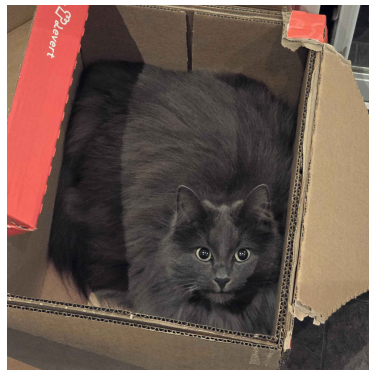
**Raffy**  
Antrim, UK



**Chibiusa**  
Thessaloniki, Greece



**O-wol**  
Seoul, South Korea



**Luna**  
Trondheim, Norway

With special thanks

to the feline friends who inspired this report